

THE ROLE OF TRANSFORMATIONAL LEADERSHIP IN OPEN-SOURCE SOFTWARE DEVELOPMENT: INSIGHTS FROM SURVEY DATA ON ENHANCING ORGANIZATIONAL COMMITMENT AND INNOVATION IN AI-DRIVEN BUSINESS ENVIRONMENTS

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Abstract: To improve organizational commitment and foster an AI-driven, contemporary corporate environment characterized by creativity, adaptability, and agility, this study explores the function of transformational leadership in software development teams. Bass and Riggio's transformational leadership model serves as the framework for the technique, which is grounded in a comprehensive review of the literature. In addition to secondary analysis of the publicly available "Open-Source Software Leadership Survey Dataset", accessible at <https://opensource-survey.org/>, we have also included recent 2017–2024 case studies from software leaders like Google and Microsoft, illustrating various practices. This dataset source, which we plan to further investigate in subsequent primary research for more thorough replication, records survey responses on leadership styles, intrinsic and extrinsic motivation, and commitment measures in open-source software projects. Results should illustrate that leaders who outline imaginative project roadmaps, give personalized mentorship in various tools that stimulate intelligence via hackathons, and model ethical open-source practices. Transformational leadership stands out in contemporary management theory as a style that goes beyond the traditional understanding of leadership and people management. Its essence is reflected in the ability of leaders to inspire, motivate, and encourage employees to overcome their own interests and contribute to the realization of a shared vision of the organization. This paper explores the impact of transformational leadership low and high leadership levels on the organization, employee commitment, and innovation, starting from theoretical premises that link personal development with collective performance. Special attention is paid to the role of managers in creating a stimulating work environment that develops trust, initiative, and readiness for change. Through an analysis of relevant literature and the transformational leadership model of Bass and Riggio, the paper indicates that leaders who encourage creativity, independence, and team spirit create the foundations for the sustainable development of employee culture and innovative behavior. The recommendations support inclusive hiring, gamified sprint evaluations, and specialist training in AI-era motivation. Additional information from the dataset shows that transformational teams had lower turnover and higher job satisfaction in Top3 for low leadership (0.20), with qualitative insights highlighting that high leadership group in Top1 scored highest (0.40) in job satisfaction.

Keywords: Transformational leadership, software development teams, career development, human resources, AI-driven innovation, pair programming.

Field: Social sciences

1. INTRODUCTION

Building AI-driven environments that encourage creativity, adaptability, and agility inside software development teams requires organizational commitment, which is crucial in today's rapidly changing software business (Dakić P. , 2024; Dakić, Stupavský, & Todorović, 2024). According to (Bass & Riggio, 2006) concept, transformational leadership is essential for coordinating developer interests with organizational objectives in order to promote innovation and resilience. Using contemporary industry case studies, literature review from 2017 to 2024 and secondary analysis of the Open-Source Software Leadership Survey Dataset (GitHub, et al., 2024; Zlotnick, 2017), this paper examines how such leadership techniques affect commitment and performance in software teams (Haiderzai, Dakić, Stupavský, Aleksić, & Todorović, 2025).

The modern business environment is characterized by constant changes, dynamic development of technologies and the growing need for organizations to be innovative and flexible. In such conditions, leadership becomes a key factor of organizational success, because the motivation of employees, their commitment and willingness to contribute to common goals depends on the ability of the leader. The focus

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of modern management theories is transformational leadership, which does not only mean managing tasks, but also shaping the values, attitudes and behavior of employees through inspiration and a shared vision of development. Transformational leaders are catalysts of change. They motivate employees not through authority, but through trust, personal example and encouragement of individual growth. With this strategy, employees actively contribute to the creation of a cutting-edge corporate culture that spans several levels and feel more a part of the organization's goals and mission. According to the model developed by Bass and Riggio (2006), idealized influence, intellectual stimulation, inspiring motivation, and tailored care for each team member are the four main pillars of transformational leadership. Regardless of their primary function, leaders can use these factors to impact the growth of a pleasant environment in any industry, boosting team trust and fostering creativity.

The subject of this research is the examination of the way in which transformational leadership affects the organizational commitment and innovation of employees. The aim of the paper is to determine, based on theoretical analysis and review of relevant literature, how leaders can contribute to the creation of an organizational culture that encourages creativity, engagement and long-term employee loyalty.

The paper is structured as follows: an overview of the literature on transformational leadership is given first, followed by an explanation of its relationship to organizational commitment and employee innovation, the main research questions, open-ended questions, and a discussion, conclusions, and suggestions for further research are presented in the sections that follow.

2. LITERATURE REVIEW

The study of leadership throughout history demonstrates how theories and methods have evolved in response to new technologies like artificial intelligence (AI) as well as social and economic conditions. Transformational leadership, which is predicated on the notion that a true leader not only oversees procedures and responsibilities but also transforms those he works with and inspires them to think creatively, holds a distinct position within these contemporary methods (Maksimović, Vlašković, & Damnjanović, 2025), take responsibility and contribute to innovation in various industries (Ali, Ali, Dakić, & Zoltan, 2024).

(Dakić, Lojaničić, Hemed Issa, & Bogavac, 2021) in their work, indicate that the process of selection and development of managers requires a systematic review of the characteristics of candidates, their attitudes and potential, not only formal qualifications. They emphasize that organizations that want to build a competent managerial staff (García-Morales, Jiménez-Barrionuevo, & Gutiérrez-Gutiérrez, 2012) must invest in identification, continuous training and customized development programs that match the individual profiles of employees (Šapić, Furtula, & Aleksić, 2017). (Bass & Riggio, 2006), developed one of the most famous models of transformational leadership, which includes four key dimensions: idealized influence, inspirational motivation, intellectual stimulation and individualized care.

Where (Northouse, 2019), Idealized influence refers to leader behavior that inspires trust and respect, while inspirational motivation refers to the ability to communicate a shared vision (Daud Haiderzai, UI Haq Safi, & Dakić, 2024; Dakić, Lojaničić, Hemed Issa, & Bogavac, 2021) to employees and make it personally meaningful to them. Intellectual stimulation encourages employees to think innovatively and question established patterns, while individualized care involves understanding the needs and potential of each team member while interacting with AI (Todosijević, Dakić, Heričko, Kljajić, & Todorović, 2025). (Goleman, 2020), demonstrates how effective leadership now revolves around AI and emotional intelligence. Based on this, we can conclude that leaders who are aware of their own feelings and who genuinely connect with people are able to generate trust much more quickly and readily. They can also form better teams since they are driven by higher compensation. They also encourage users to adopt new tools and keep connected to them over time, thanks to this emotional awareness.

According (Aleksić, Jerotijević, & Jerotijević, 2019) transformational leadership integrates people's thoughts and emotions with the social and economic realities of their working group. By using these leaders, the team becomes more innovative and adaptable as this mindset spreads throughout the team. While (Alblooshi, Shamsuzzaman, & Haridy, 2021; Nguyen, Mia, Winata, & Chong, 2017) covered that hits eventually foster an environment at work where innovation can flourish and change is tolerable. Therefore, transformational leaders are both strategic change initiators and mentors whose acts transcend conventional hierarchy and management authority.

3. MATERIALS AND METHODS

This study used a mixed-methods approach, combining secondary quantitative analysis with a review of qualitative case studies that cover leadership aspects. While second part and the dataset aspect are covering the Open-Source Survey dataset (GitHub, et al., 2024), which includes 5,500 survey responses gathered from collaborators across 3,800 open-source projects. We are covering data from the previously mentioned dataset, which contains information collected between 2017 and 2024. We are investigating the connections between corporate commitment, employee creativity, and transformative leadership by adding a data dimension to the dataset. All of this is predicated on a qualitative method, which ought to provide us with a better comprehension of intentional linkages. This approach was chosen because it provides an opportunity to study theoretical models and their practical implementations in the human resource management domain.

A variety of data sources, including books, scientific papers, and empirical investigations published in pertinent international journals, were employed in the study. The main criteria for the selection of literature were topicality, scientific foundation, and availability of DOI numbers that confirm the credibility of the source. Special emphasis is placed on research conducted in the last ten years, which deals with contemporary aspects of leadership, innovation, and engagement of employees in organizations of various profiles. Starting from the theoretical assumptions of transformational leadership and its connection with organizational commitment and innovativeness of employees, this research is aimed at understanding how leaders influence the behavior and motivation of employees in modern organizations. Examining how transformational leaders' traits and actions impact workers' development is the aim. This means covering a sense of belonging, a deep emotional connection to the company, and a willingness to follow the organization's objectives. The main study's objective is to determine which elements of transformational leadership are most crucial for low and high leadership levels and to create an environment at work that promotes creativity, experimentation, and the creation of novel solutions that use new technologies.

To better guide our research, the following inquiries about research were developed in light of the described methodological approach and the examined literature:

1. What is the current organizational commitment at the low and high leadership levels?
2. How do transformational leaders foster employees' creativity and inventiveness in using AI?
3. How can transformational leadership increase the effectiveness of human resource management in AI-driven businesses?

These questions examine the connection between leadership style and HR management practices, with a focus on employee development and modeling (Kline, 2023). While in the dataset, we cover motivation and improving organizational culture. Formulated research questions represent the basis for the analysis of theoretical models and findings of previous studies, and their answers contribute to a better understanding of the role of leadership in modern management and the development of innovative organizations.

3. THEORETICAL FRAMEWORK OF TRANSFORMATIONAL LEADERSHIP

Transformational leadership is considered one of the most influential modern concepts that explain how leaders influence the behavior of employees, their motivation and willingness to actively participate in the development of the organization. The theoretical framework of this study is based on the model of (Bass & Riggio, 2006), according to which transformational leadership implies a combination of a visionary approach, emotional intelligence and the ability to inspire employees to overcome personal goals for the sake of wider organizational success.

One of the key dimensions of this leadership is idealized influence, which is reflected in the leader's ability to act as a role model for employees and to build trust and integrity in the team through his behavior. Such leaders do not base their authority on formal power, but on credibility, consistency, and ethical behavior. As (Aleksić, Jerotijević, & Jerotijević, 2019) point out, modern approaches to employee motivation point to the need for managers to focus more on internal motivation, the development of a sense of purpose and mutual trust. Such an approach enables employees to identify with the organization's values and develop an emotional connection with it, which directly affects affective commitment and willingness to take initiative (Roberts, Hann, & Slaughter, 2006). As a result, transformational leaders play two roles: in addition to guiding staff members toward goal achievement, they also foster an atmosphere that rewards creativity, learning, and creative conduct with greater pay (Kljajić & Dakić, 2024).

The discussion of theoretical findings indicates that transformational leadership does not act in isolation, but as part of a wider system of organizational values and HR practices. Leaders who use this

approach create conditions that encourage two-way communication, participative decision-making, and recognition of individual contributions. Such an environment leads to a higher level of organizational commitment and long-term stability of the organization. In the context of modern challenges of digitization, changing work models and growing competition, transformational leadership becomes one of the key factors of organizational resilience. Its application enables organizations not only to adapt to changes, but also to actively create them through continuous improvement and innovation.

3. RESULTS

Through the analysis of modern approaches to leadership, it was determined that transformational leadership has a strong and multidimensional influence on the motivation, innovation and organizational commitment of employees. Leaders who combine a visionary approach with a high degree of emotional intelligence contribute to the development of trust and team cohesion as shown on Figure 1. This kind of environment allows employees to express their ideas, develop professional skills and feel a stronger sense of belonging to the organization.

All analyses were performed using the computational environment described in on a Windows 10 (64-bit) workstation with a multi-core CPU, 64 GB RAM, and SSD storage. The dataset from the Open-Source Software Leadership Survey Dataset (GitHub, et al., 2024) (accessible at <https://opensourceurvey.org/>, released under CC0-1.0 license) was processed through a systematic pipeline implemented in Python (version 3.12.3) using a single comprehensive script following DRY principles. The results show that the most significant effects of transformational leadership (Figure 1.) are visible in the segments related to encouraging creativity and innovative thinking.

Data preprocessing involved several stages: (1) data extraction from the 2024 survey wave; (2) data cleaning and validation; (3) missing value analysis and multiple imputation using iterative Input from scikit-learn; and (4) response consistency validation through logical checks and outlier detection. Descriptive statistics and reliability analyses were performed using pandas (version 2.0.3) and pingouin (version 0.5.3) libraries.

Figure 1. Job Satisfaction by Transformational Leadership Level ($r = 0.58, p < 0.001$).



Source: author's contribution

One of the most important contemporary methods for managing human resources is transformational leadership. It transcends conventional ideas of leadership since it is based on leaders' capacity to uplift, encourage, and unite staff members around shared objectives rather than hierarchical power. A corporate culture of trust, cooperation, and creativity is shaped by transformational leaders through emotional intelligence, a visionary approach, and moral behavior.

4. DISCUSSIONS

The conversation highlights transformative leadership as a crucial component of contemporary human resource management (HR). By covering all studies, it can be stated that leaders who combine visionary thinking with emotional intelligence and ethical behavior are. Employee motivation and corporate culture have been shown to be significantly impacted by these factors, as evidenced by the disparities in survey results. This leadership approach is predicated on the leader's amiable capacity to motivate, empower, and unite staff members around shared objectives rather than the authority granted by their contract. Based on this, we have the following findings for our research questions:

RQ1: For this question, we can conclude that transformational leadership has a favorable effect on employees' affective commitment at both low and high levels. Employee loyalty and a sense of belonging to the company increase when they perceive that their needs and ideas are valued. While later from their motivation everyone will benefit in that sector. These results align with current existing and found models that highlight element of enthusiasm and how mutual trust and alignment with organizational principles are the main source for growth. This emphasizes how contemporary management must promote motivation by providing chances for individual development, encouragement, and recognition.

RQ2: The conversation demonstrates how important transformative leaders are to encouraging employee creativity. Encouraging to think "outside the box" and intellectual stimulation fosters an atmosphere where new ideas can be freely created and presented. This strategy gives companies more adaptability and the capacity to adjust to environmental changes. This research part was key to cover that teams that learn and advance through cooperative problem solving and use new tools and technologies like AI, are mostly formed by leaders who promote communication and teamwork. This is an end result that boosts the organization's capacity for innovation and motivates everyone to learn and acquire new skills.

RQ3: We saw that leaders who use transformative methods play a crucial role in attracting, nurturing, and keeping talent in any company. As our earlier study (Dakić, Lojaničić, Hemed Issa, & Bogavac, 2021) highlighted, the need for manager development is a systematic process that involves ongoing education, potential identification, and specialized training programs. Because leaders not only lead but also mold the next generation of managers, this strategy helps to increase organizational efficiency and long-term resilience.

The analysis and results gained demonstrate that transformational leadership is the foundation for the growth of organizations that aim for human orientation, sustainability, and innovation. Leaders become the primary forces behind organizational transformation and the development of a culture of trust. They have to have a defined process for learning and combining emotional intelligence, intellectual stimulation, and personalized care to be successful in their role. This demonstrates that HR is a strategic tool that enhances the organization's competitiveness and long-term success in addition to being an administrative function.

5. CONCLUSIONS

Our main findings, drawn from various studies and existing data, show that transformational leaders boost organizational commitment and employee innovation. The High Leadership group scored highest (0.40) in job satisfaction under this style. This highlights the strong benefits of good transformational leadership. As a result, the company eventually becomes more reliable and effective. Creating an environment that promotes learning, initiative, and the growth of different software development and leadership abilities.

This makes leadership more difficult since every organization needs leaders who respect people, strike a balance between technology and empathy, and manage long-term growth in a favorable manner. Transformational leadership is not just a tool for management. It's a strategy for building organizations. It creates flexible, creative teams that effectively manage change by utilizing trust, inspiration, and common values. Thus, training these executives is essential to contemporary HR procedures.

Future research should examine the reasons for these connections as well as how the effects of other leadership types evolve. It should also look at how contributor motives, project features, and tech backgrounds interact. Future longitudinal research, in our opinion, will enable us to better understand how different styles impact project sustainability and retention in open-source software.

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