

The Role of Digital Transformation and Transformational Leadership in Enhancing Employee Performance in the Industry 4.0 Era

Amroni¹, Hodi², Murthada², Helmi Akmal Fauzan⁴, Riesna Apramilda⁵

¹Universitas Catur Insan Cendekia, ²Sekolah Tinggi Teknologi, ³Universitas Muhammadiyah Mahakarya Aceh, ⁴Universitas Catur Insan Cendekia, ⁵Universitas Ibnu Sina

e-mail: ¹amroni@cic.ac.id, ²hodi@sttkd.ac.id, ³murthada@ummah.ac.id, ⁴helmi.akmal@cic.ac.id, ⁵riesna.apramilda@uis.ac.id

* Amroni

ABSTRACT

This study aims to analyze the role of digital transformation and transformational leadership in enhancing employee performance in the Industry 4.0 era. This research employs a Systematic Literature Review (SLR) approach using the PRISMA framework to identify, evaluate, and synthesize relevant studies published between 2019 and 2025. A total of selected articles from reputable and Scopus-indexed journals were analyzed. The findings indicate that digital transformation significantly improves employee productivity, efficiency, and adaptability through the integration of advanced technologies. Transformational leadership also plays a critical role in motivating employees, fostering innovation, and facilitating organizational change. Furthermore, the integration of digital transformation and transformational leadership creates a stronger and more sustainable impact on employee performance. This study contributes to the development of organizational strategies in adapting to the challenges of the Industry 4.0 era.

Keywords: Digital Transformation, Transformational Leadership, Employee Performance, Industry 4.0, Human Resource Management

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I. INTRODUCTION

The rapid advancement of digital technologies in the Industry 4.0 era has significantly transformed organizational practices, particularly in human resource management and employee performance. Organizations increasingly adopt digital transformation strategies to enhance efficiency, innovation, and competitiveness. However, the success of digital transformation is not solely determined by technological readiness but also by leadership effectiveness and employee adaptability.



Employee performance plays a crucial role in achieving organizational goals in a dynamic and technology-driven environment. The adoption of digital technologies has been shown to improve productivity, streamline workflows, and support decision-making processes (Verhoef et al., 2021). Nevertheless, technological changes often require strong leadership to ensure successful implementation and minimize resistance among employees.

Transformational leadership is widely recognized as an effective leadership style in managing organizational change. Transformational leaders inspire and motivate employees, foster innovation, and encourage adaptation to new technologies (Bass & Riggio, 2006). Empirical studies have demonstrated that transformational leadership positively influences employee performance, particularly in uncertain and rapidly changing environments (Avolio, Walumbwa, & Weber, 2009).

Although prior studies have examined the impact of digital transformation and transformational leadership on employee performance, these variables are often analyzed separately. There is still limited comprehensive understanding of how digital transformation and transformational leadership interact and jointly influence employee performance in the context of Industry 4.0.

Therefore, this study aims to systematically review the existing literature on the role of digital transformation and transformational leadership in enhancing employee performance. By employing a Systematic Literature Review (SLR) approach, this study seeks to synthesize previous findings and provide a comprehensive understanding to support organizational strategies in adapting to the challenges of the Industry 4.0 era.

II. LITERATURE REVIEW

Digital Transformation

Digital transformation refers to the integration of digital technologies into business processes to improve organizational performance and create value. It involves the adoption of advanced technologies such as big data, artificial intelligence, and cloud computing. Digital transformation has been recognized as a key driver of organizational change and competitiveness in the Industry 4.0 era. Previous studies show that digital transformation enhances operational efficiency, flexibility, and employee productivity (Verhoef et al., 2021; Vial, 2019).

Transformational Leadership



Transformational leadership is a leadership style that motivates and inspires employees to achieve higher levels of performance by fostering innovation, creativity, and organizational change. According to Bass and Riggio (2006), transformational leaders influence employees through vision, intellectual stimulation, and individualized consideration. Empirical research indicates that transformational leadership has a significant positive effect on employee performance, engagement, and organizational commitment (Avolio, Walumbwa, & Weber, 2009).

Employee Performance

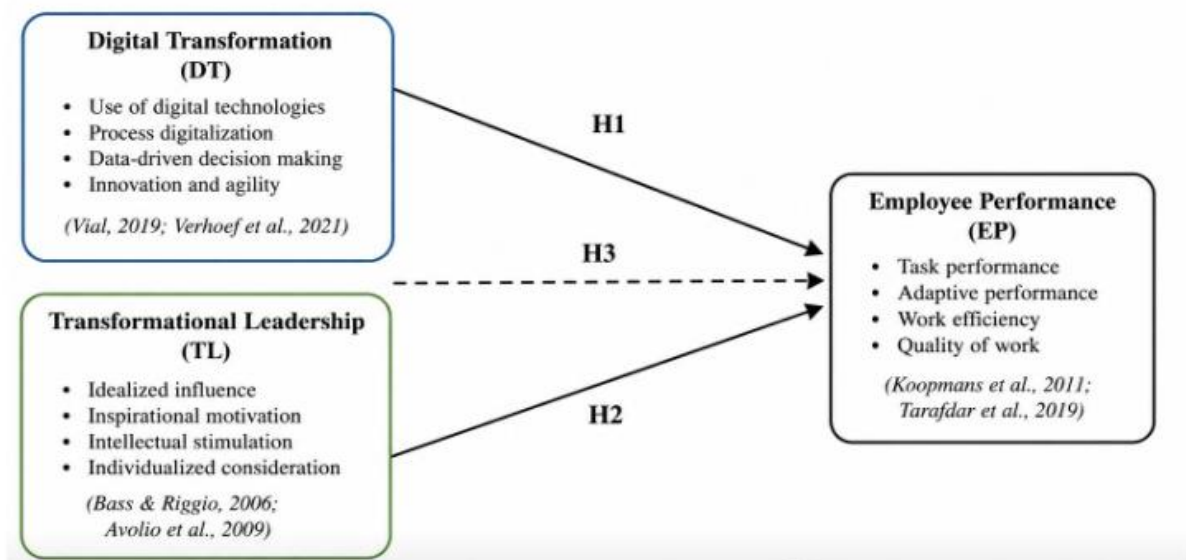
Employee performance refers to the level of achievement of tasks and responsibilities assigned to employees within an organization. It includes aspects such as productivity, efficiency, quality of work, and adaptability. In the context of Industry 4.0, employee performance is influenced by both technological factors and leadership practices. Studies have shown that organizations that effectively combine digital transformation and leadership strategies tend to achieve higher employee performance (Tarafdar et al., 2019).

Conceptual Framework

Based on the literature, digital transformation and transformational leadership are identified as key determinants of employee performance. Digital transformation improves work processes and efficiency, while transformational leadership enhances motivation, adaptability, and innovation among employees. Both variables are expected to have individual and combined effects on employee performance in the Industry 4.0 era.



Figure 1. Conceptual Framework



Based on the literature review, digital transformation and transformational leadership are identified as key factors influencing employee performance in the Industry 4.0 era. Digital transformation enhances work efficiency, flexibility, and access to information, which ultimately improves employee productivity and performance (Verhoef et al., 2021; Vial, 2019). Therefore, the following hypothesis is proposed:

H1: Digital transformation has a positive effect on employee performance.

Furthermore, transformational leadership plays a critical role in motivating employees, fostering innovation, and facilitating organizational change. Leaders who adopt a transformational approach are able to improve employee engagement and performance in dynamic environments (Bass & Riggio, 2006; Avolio et al., 2009). Thus, the second hypothesis is formulated as follows:

H2: Transformational leadership has a positive effect on employee performance.

In addition, the integration of digital transformation and transformational leadership is expected to create a stronger impact on employee performance. Digital transformation requires effective leadership to ensure successful implementation, while transformational leadership supports employee adaptability and acceptance of technological changes. Therefore, the combined effect of these variables is hypothesized as follows:

H3: Digital transformation and transformational leadership simultaneously have a positive effect on employee performance.

III. METHODS

This study employs a Systematic Literature Review (SLR) approach to analyze the role of digital transformation and transformational leadership in enhancing employee performance in the Industry 4.0 era. The SLR method is used to systematically collect, evaluate, and synthesize relevant studies to ensure a comprehensive and reliable understanding of the research topic.

Research Design

This research adopts the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to guide the literature review process. The PRISMA approach consists of four main stages: identification, screening, eligibility, and inclusion of relevant articles.

Population and Sample

The population of this study includes all scientific articles related to digital transformation, transformational leadership, and employee performance. The sample consists of selected journal articles that meet the inclusion criteria and are relevant to the research objectives.

Sampling Technique

A purposive sampling technique was used to select the articles based on specific inclusion criteria:

1. Articles published between 2019 and 2025
2. Studies focusing on digital transformation, transformational leadership, and employee performance
3. Articles published in reputable journals indexed in Scopus or other recognized databases
4. Articles written in English

Based on the selection process, a total of 30 articles were included in the final analysis.

Operational Definition of Variables

- Digital Transformation (X_1): The adoption and integration of digital technologies such as automation, artificial intelligence, and digital platforms to improve organizational processes and performance.
- Transformational Leadership (X_2): A leadership style that inspires and motivates employees through vision, innovation, and individual consideration to achieve higher performance.
- Employee Performance (Y): The level of employee achievement in terms of productivity, efficiency, quality of work, and adaptability in the workplace.

Research Instrument and Data Collection

This study uses secondary data obtained from journal articles collected through databases such as Google Scholar, Scopus, and ScienceDirect. A literature review matrix was used as the main instrument to extract and organize key information, including author, year, research method, variables, and findings.

Data Analysis Technique

The data were analyzed using a qualitative synthesis method. The selected articles were categorized, compared, and interpreted to identify patterns, relationships, and research gaps. The analysis focuses on understanding how digital transformation and transformational leadership influence employee performance, both individually and simultaneously.



IV. RESULTS

This section presents the results of the systematic literature review, including the synthesis and interpretation of findings from the selected studies.

Summary of Finding

Based on the analysis of 30 selected journal articles, the results indicate that digital transformation and transformational leadership are key determinants of employee performance in the Industry 4.0 era. The majority of the reviewed studies consistently demonstrate a positive relationship between these variables and employee performance.

Effect of Digital Transformation on Employee Performance

The findings reveal that digital transformation significantly improves employee performance by enhancing efficiency, flexibility, and access to real-time information. The use of digital technologies enables employees to perform tasks more effectively and adapt to dynamic work environments. These findings are consistent with previous studies, which indicate that digital transformation positively influences productivity and organizational performance (Verhoef et al., 2021; Vial, 2019).

Effect of Transformational Leadership on Employee Performance

Transformational leadership is found to have a strong positive impact on employee performance. Leaders who inspire, motivate, and support employees are able to increase engagement, creativity, and job satisfaction. This ultimately leads to improved individual and organizational performance. These findings support earlier research suggesting that transformational leadership enhances employee outcomes, particularly in environments characterized by change and uncertainty (Avolio et al., 2009; Bass & Riggio, 2006).

Simultaneous Effect of Digital Transformation and Transformational Leadership

The results also show that the combination of digital transformation and transformational leadership produces a stronger effect on employee performance compared to individual effects. Digital transformation requires effective leadership to ensure successful implementation, while transformational leadership facilitates employee adaptability and acceptance of technological changes. This finding highlights the complementary relationship between technological advancement and leadership practices..



V. CONCLUSION AND SUGGESTION

This study aims to analyze the role of digital transformation and transformational leadership in enhancing employee performance in the Industry 4.0 era using a Systematic Literature Review (SLR) approach. Based on the findings, it can be concluded that both digital transformation and transformational leadership play significant roles in improving employee performance.

Digital transformation contributes to enhancing employee efficiency, flexibility, and adaptability by integrating advanced technologies into organizational processes. Meanwhile, transformational leadership plays a crucial role in motivating employees, fostering innovation, and facilitating organizational change. Leaders who adopt a transformational approach are able to support employees in adapting to technological advancements and dynamic work environments.

Furthermore, the integration of digital transformation and transformational leadership provides a stronger and more sustainable impact on employee performance. These two factors are interconnected and mutually reinforcing, where effective leadership supports the successful implementation of digital transformation, ultimately leading to improved organizational outcomes.

Suggestion

Based on the conclusions, several recommendations are proposed:

1. For organizations, it is important to align digital transformation strategies with effective leadership practices to maximize employee performance.
2. For leaders, adopting a transformational leadership style is essential to encourage innovation, enhance employee engagement, and support adaptation to technological changes.
3. **For future research**, it is recommended to explore additional variables such as digital skills, organizational culture, and employee readiness, which may influence the relationship between digital transformation and employee performance. Furthermore, empirical studies using quantitative or mixed methods are suggested to validate and extend the findings of this study.



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