

From Training to Innovation: The Mediating Role of Learning-Oriented Management Practices in Firms

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Abstract: Corporate innovation performance is often seen as a black box, influenced by various determinants. These include both external factors, such as technological input, and internal factors, such as organizational capabilities. This paper draws on human capital theory and the resource-based view suggesting that employee training and knowledge development constitute valuable internal resources. This topic is particularly important in Central and Eastern Europe, where firms operate in an environment shaped by a strong industrial tradition and integration into European value chains. At the same time, such territory continues to display persistent features of catching-up innovation systems, with limited absorptive capacity, shortages of skilled labor, and the uneven diffusion of advanced managerial practices. Although the importance of employee training and knowledge development for innovation is widely acknowledged, existing research does not sufficiently explain whether training alone is enough to enhance innovation performance or whether its effect depends on learning-oriented management practices. This article addresses this gap by examining the mediating role of these practices in the relationship between training and knowledge development and firms' innovation performance. By employing firm-level data obtained from the World Bank Group Enterprise Surveys (WBES) 2024 and the Partial Least Squares Structural Equation Modeling (PLS-SEM) method, we show that training and knowledge development positively affect innovation performance. Moreover, we show that this relationship is partially mediated by learning-oriented management practices. Such findings offer several new insights from which initial implications for practitioners and policymakers can be derived, particularly within Central and Eastern Europe. From a policy perspective, the findings support the importance of such instruments that will be aimed not only at human capital development, but also at the diffusion of managerial capabilities fostering organizational learning. From a managerial perspective, the study shows that investments in training are more significant when linked to systematic performance management and a culture of continuous improvement.

Keywords: Knowledge management, Organizational learning, Innovation performance, Training and knowledge development, Learning-oriented management practices

1. Introduction

Innovation performance is a key determinant of firms' competitiveness in increasingly dynamic and knowledge-intensive markets (Namazov & Bassabi, 2025). In this context, firms are expected not only to invest in technologies, but also to strengthen internal capabilities that support knowledge creation, absorption, and application. Among these capabilities, training and knowledge development play an important role because they enhance employees' skills and broaden the firm's internal knowledge base (Abrar et al., 2021). However, the effect of training on innovation is not automatic. Knowledge acquired by employees must be effectively shared, coordinated, and applied within the organization if it is to contribute to innovation outcomes (Tan & Nasuridin, 2011). It is particularly relevant in Central and Eastern European (CEE) countries, where firms operate in environments shaped by capability upgrading, labour shortages, and uneven diffusion of advanced managerial practices (Stojčić, 2024; Kotkova Striteska et al., 2024). In such a context, training and knowledge development may be important for strengthening innovation capacity, but their effect may depend on whether firms adopt management practices that support continuous learning and the use of knowledge in everyday operations (Klímová et al., 2025; Stojčić et al., 2025).

This study focuses on firms operating in four CEE countries: Latvia, Slovenia, Poland, and Czechia. Although these countries differ in terms of economic size and industrial structure, they share a broader post-socialist development trajectory and face similar challenges related to capability upgrading, labour shortages, and the uneven diffusion of advanced managerial practices (Prokop et al., 2021; Kotkova Striteska et al., 2024; Zhu et al., 2026). This makes the CEE context a suitable empirical setting for examining how internal capabilities are linked to firms' innovation performance (Stojčić, 2021; Ferrazzi et al., 2025).

Against the above backdrop, we focus on the following research question: **How do learning-oriented management practices mediate the relationship between training and knowledge development and firms' innovation performance in CEE countries?**

This paper contributes to the existing literature in three main ways. First, it extends prior research on the training–innovation link by examining whether the effect of training and knowledge development on firms' innovation performance is transmitted through learning-oriented management practices. Second, it integrates insights from human capital theory, the resource-based view, and the organizational learning perspective into a single analytical framework, thereby offering a more fine-grained explanation of how internal capability-building translates into innovation outcomes. Third, it provides new firm-level evidence from four Central and Eastern European countries, a regional context that remains underexplored despite its specific innovation challenges related to capability upgrading, labour shortages, and the uneven diffusion of advanced managerial practices.

The remainder of the article is structured as follows. The next section presents the theoretical background and hypotheses. The following section describes the data and methods. The subsequent section reports the empirical results. The final section concludes the article.

2. Theory Background and Hypotheses Development

Human capital theory posits that individuals are not merely units of labor but repositories of knowledge, skills, and abilities that constitute a form of capital. Investments in this capital, through education and training, enhance individual productivity and organizational effectiveness (Becker, 1962). From this perspective, Training and Knowledge Development (TKD) is not a cost but a strategic investment that augments a firm's stock of valuable, often firm-specific, human capital (Noopur & Dhar, 2020). This enhanced knowledge base is a fundamental prerequisite for innovation, as it equips employees with the cognitive tools necessary to generate novel ideas and solve complex problems (Abrar et al., 2021). The resource-based view (RBV) of the firm extends this logic by framing human capital as a critical strategic resource and source of sustained competitive advantage (Khan et al., 2024). According to the RBV, resources that are valuable, rare, inimitable, and non-substitutable allow firms to outperform competitors (Barney, 1991). Knowledge, especially the tacit, context-specific knowledge embedded within employees, often meets these criteria (Khanra et al., 2022). The knowledge-based view (KBV), an extension of the RBV, argues that the primary role of the firm is to integrate and apply specialist knowledge (Grant, 1996). Thus, a firm's ability to innovate depends on its capacity to develop, protect, and deploy its unique knowledge-based resources, with human capital at its core (Alkaraan et al., 2025).

However, possessing human capital alone is not sufficient for innovation; firms must also have mechanisms to activate and leverage it. Here, the organizational learning perspective becomes essential. Cohen and Levinthal (1990) introduced absorptive capacity, arguing that a firm's ability to recognize the value of new information, assimilate it, and apply it to commercial ends is critical for innovation. Organizational learning is the process through which firms develop this capacity, involving the sharing, interpretation, and integration of knowledge among individuals and groups (Sancho-Zamora et al., 2022). This perspective highlights that innovation is not an isolated act but a collective learning process, dependent on organizational routines, communication channels, and a culture that facilitates knowledge creation and transfer (Kumar et al., 2025). Together, these theories suggest a causal chain: firms invest in human capital through training, which becomes a strategic knowledge resource. Its conversion into tangible innovation, however, hinges on the firm's ability to facilitate organizational learning and knowledge management processes that enable the effective application of that knowledge (Tu & Wu, 2021).

2.1 Training and Knowledge Development and Innovation Performance

The most direct pathway through which firms can enhance their innovation capabilities is by investing in the knowledge and skills of their workforce. TKD encompasses formal and informal activities designed to improve employees' task-related competencies, broaden their expertise, and foster creativity (Sung & Choi, 2014). Such investments directly contribute to innovation performance by enriching the firm's human capital base, which serves as the primary input for novel ideas and solutions (Al-Abbadi et al., 2019). When employees participate in training, they acquire new knowledge, refine existing skills, and are exposed to different perspectives and problem-solving techniques. This expanded cognitive repertoire enables them to identify opportunities for improvement, develop new products or services, and implement more efficient processes. As research has consistently shown, a highly skilled and knowledgeable workforce is better equipped to engage in the complex tasks of experimentation, knowledge combination, and implementation that underpin innovation (Stojčić, 2024). For example, studies have demonstrated that firm-level investments in training are positively associated with patenting activity, the introduction of new products, and the successful commercialization of innovations (Dostie, 2018). By enhancing both the depth and breadth of employee competencies, TKD directly fuels the firm's capacity to generate and execute innovative projects (Abrar et al., 2021). Therefore, we hypothesize:

H1: Training and knowledge development positively affect firms' innovation performance.

2.2 Training and Knowledge Development and Learning-oriented Management Practices

While TKD enhances individual capabilities, its full potential is realized within a supportive organizational context that encourages continuous learning and knowledge application. Firms that make substantial investments in formal training and development are more likely to adopt complementary management practices to ensure a return on these investments. These practices, collectively termed Learning-Oriented Management Practices (LOMP), involve leaders actively facilitating employee learning in daily work through behaviors such as coaching, supporting experimentation, providing constructive feedback, and encouraging knowledge sharing (Wallo et al., 2024). The link between TKD and LOMP is rooted in strategic consistency (Wright & McMahan, 1992). A firm's decision to invest in TKD signals that it values knowledge and employee growth as strategic priorities. To maximize the value of this investment, it becomes logical for the organization to align its management style accordingly. Managers are incentivized and equipped to act as facilitators of learning, ensuring that the knowledge gained during training is not lost but is actively applied, shared, and integrated into work routines. For instance, a manager in a firm with a strong training culture is more likely to provide employees with challenging assignments where they can practice new skills, create platforms for team reflection, and model learning-oriented behaviors themselves (Wallo et al., 2022). A strategic commitment to TKD thus cultivates an environment where learning-oriented leadership is not just an incidental benefit but becomes an essential component of the management system, designed to leverage the firm's investment in human capital (Sung & Choi, 2018). Here, we hypothesize:

H2: Training and knowledge development positively affect learning-oriented management practices.

Learning-Oriented Management Practices and Innovation Performance

Learning-Oriented Management Practices create (LOMP) an organizational environment that is inherently conducive to innovation. While TKD equips individuals with knowledge, LOMP provides the social and structural mechanisms necessary to transform that individual knowledge into collective, innovative outcomes (García-Morales et al., 2008). Leaders who adopt a learning orientation act as catalysts for innovation by fostering a climate of psychological safety, intellectual stimulation, and collaboration. Specifically, LOMP enhances innovation performance in several ways. First, by encouraging experimentation and treating failures as learning opportunities, managers reduce the perceived risk associated with developing novel ideas, thereby promoting creativity and exploratory behavior (Wallo et al., 2024). Second, by actively coaching and providing developmental feedback, they help employees refine their ideas and overcome challenges in the innovation process. Third, by fostering open communication and knowledge sharing, they facilitate the combination and recombination of diverse knowledge from different individuals and teams—a key driver of both incremental and radical innovation (Kianto et al., 2017). As studies on learning-oriented leadership have shown, managers who support, educate, and challenge their employees create conditions that stimulate problem-solving, proactivity, and continuous improvement, which are direct antecedents of innovation (Wallo et al., 2022). Such a management style moves beyond mere supervision to actively orchestrate the learning processes that are fundamental to developing and implementing new ideas. Thus, we hypothesize:

H3: Learning-oriented management practices positively affect firms' innovation performance.

The Mediating Role of Learning-Oriented Management Practices

Synthesizing the arguments above, we propose that the relationship between TKD and innovation performance is not merely direct but is significantly mediated by Learning-Oriented Management Practices. While TKD is crucial for creating and strengthening the firm's internal knowledge base (the *resource*), LOMP represents the managerial capability required to effectively deploy that resource for innovative ends (the *process*) (Jiang et al., 2012). The impact of training on innovation is not automatic; knowledge acquired by individuals can remain siloed or underutilized without managerial systems that facilitate its circulation and practical application (Abrar et al., 2021). LOMP serves as the critical transmission mechanism that bridges the gap between individual learning and organizational innovation (Tan & Nasuridin, 2011). When managers actively facilitate learning, they ensure that knowledge gained from training is shared across teams, integrated with existing organizational knowledge, and applied to solve real-world problems. They create routines and a climate where employees are motivated and empowered to use their newly acquired skills creatively, thereby transforming individual competencies into an organizational capability for innovation (Zhao et al., 2021). In essence, TKD increases the organization's *potential* absorptive capacity, but LOMP enhances its *realized* absorptive capacity—the ability to transform and exploit that knowledge for innovation (Zahra & George, 2002). For instance, an employee may

return from a training course with a novel idea, but it is the learning-oriented manager who provides the resources, encouragement, and cross-functional connections needed to develop that idea into a viable product or process innovation (Wallo et al., 2024). This mediating logic suggests that the positive effect of TKD on innovation performance is significantly stronger in firms where managers actively practice learning-oriented leadership. Without this facilitative context, the returns on training investments are likely to be diminished (Li et al., 2018). We therefore hypothesize:

H4: Learning-oriented management practices mediate the relationship between training and knowledge development and firms' innovation performance.

3. Research Methodology

3.1 Data

The analysis is based on firm-level data from 2,654 enterprises operating in four CEE states: Latvia (259), Slovenia (402), Poland (1,725), and Czechia (268). This sample provides a basis for examining the relationships between TKD, LOMP, and innovation performance in the CEE context. The data were drawn from the World Bank Enterprise Survey (WBES) 2024 (for more details about the WBES, please see Stojčić et al., 2025). The study works with three latent constructs presented in Table 1. Moreover, we include firm size as a control variable (Prokop & Stejskal, 2019). Although the original WBES items differ in their response formats, all indicators were transformed into numerical form and treated as metric indicators in the PLS-SEM estimation (e.g. binary data Yes = 1, NO = 0).

Table 1: Constructs used in the model

Training and knowledge development (TKD)	TKD
Over fiscal year, did this establishment have formal training programs for its permanent, full-time workers?	TKD1
Referring to those training programs, what percentage of permanent, full-time workers of the following categories received formal training? If easier, please provide the total numbers (provide one or the other but not both).	TKD2
Learning-oriented management practice (LOMP)	LOMP
Over fiscal year, what best describes what happened at this establishment when a problem in the production process arose? (fixed only; fixed and prevented recurrence; fixed and continuous improvement; no action)	LOMP1
Over fiscal year, did this establishment monitor any performance indicators?	LOMP2
How many performance indicators were monitored? (1–2; 3–9; 10 or more)	LOMP3
What best describes the time frame of those targets? (short-term; long-term; combination of both)	LOMP4
How easy or difficult was it for this establishment to achieve those targets overall? (achieved without much effort; with some effort; with normal effort; with more than normal effort; with extraordinary effort; targets not achieved)	LOMP5
Innovation performance (IP)	IP
During the last three years, has this establishment introduced new or improved products or services?	IP1
During the last three years, has this establishment introduced any new or improved process? These include: methods of manufacturing products or offering services; logistics, delivery, or distribution methods for inputs, products, or services; or supporting activities for processes?	IP2
During fiscal year, did this establishment spend on research and development activities, either in-house or contracted with other companies, excluding market research surveys?	IP3
Source: WBES 2024	

3.2 Method Description

Following prior research employing structural equation modelling in management and innovation studies (Hair et al., 2019; Hajek & Prokop, 2023), this study applies the PLS-SEM approach. The method is appropriate for analysing complex relationships among latent variables, particularly when the model includes both direct and indirect effects and when the constructs are measured by several observed indicators. The analytical procedure consisted of three main steps. First, the measurement model was assessed in order to verify the quality of the constructs. Reliability was examined using composite reliability (ρ_c), while convergent validity was evaluated through the average variance extracted (AVE). Discriminant validity was tested by applying the Fornell-Larcker criterion and the heterotrait-monotrait ratio (HTMT). Second, the structural model was evaluated using path

coefficients to assess the hypothesized relationships between training and knowledge development, learning-oriented management practices, and innovation performance. The significance of the estimated relationships was verified using bootstrapping. Third, the analysis focused on indirect effects in order to test whether learning-oriented management practices mediate the relationship between training and knowledge development and firms' innovation performance.

4. Results

4.1 Model Validation

To ensure the reliability and validity of the model, factor analyses (rho_c, AVE, and outer loadings) were conducted to assess the quality of the constructs (see Table 2). The obtained values exceeded the recommended thresholds (Hair et al., 2019). The reliability of the model was confirmed by composite reliability (rho_c > 0.6), and its convergent validity was verified using the average variance extracted (AVE > 0.5). In addition, outer loadings were examined to assess how strongly individual indicators contributed to their respective constructs. Most values were above the recommended threshold of 0.7, confirming the satisfactory convergent validity of the measurement model. Although one indicator of innovation performance showed a slightly lower loading (0.644), the overall construct quality remained acceptable.

Table 2: Model Reliability and Validity

	Composite reliability (rho_c)	Average variance extracted (AVE)
IP	0,783	0,549
LOMP	0,946	0,778
TKD	0,839	0,722
Source: Own analysis		

Discriminant validity was assessed using the HTMT (heterotrait-monotrait ratio) criterion (Table 3). Since all HTMT values were below the recommended threshold of 0.85, the constructs can be considered empirically distinct. The results were further supported by the Fornell-Larcker criterion (Table 4), which showed that the square root of the average variance extracted (AVE) for each construct exceeded its correlations with the other constructs. These findings confirm satisfactory discriminant validity of the model.

Table 3: Discriminant validity - heterotrait-monotrait (HTMT)

	Firm Size	IP	LOMP	TKD
Firm Size				
IP	0,018			
LOMP	0,065	0,429		
TKD	0,048	0,476	0,458	
Source: Own analysis				

Table 4: Fornell-Lacker criterion

	Firm Size	IP	LOMP	TKD
Firm Size	1,000			
IP	0,016	0,741		
LOMP	0,063	0,350	0,882	
TKD	0,038	0,312	0,350	0,850
Source: Own analysis				

Overall, the model meets the necessary requirements for further analysis and interpretation of the relationships between the examined variables.

4.2 Direct and Indirect Effects

The results of the path coefficient analysis confirmed several statistically significant relationships between the examined constructs (Table 5). LOMP had a positive and statistically significant effect on Innovation

Performance. TKD also showed a positive and statistically significant effect on Innovation Performance, and it positively affected LOMP as well. Overall, these findings support the proposed direct relationships among the main constructs.

Table 5: Bootstrapping test on path coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
Firm Size -> IP	-0,009	0,021	0,050	0,187	0,852
LOMP -> IP	0,275	0,267	0,022	12,254	0,000
TKD -> IP	0,216	0,213	0,023	9,300	0,000
TKD -> LOMP	0,350	0,350	0,017	20,015	0,000
Source: Own analysis					

Based on the bootstrapping results, a statistically significant specific indirect effect was identified, indicating that the relationship between Training and Knowledge Development (TKD) and Innovation Performance (IP) is mediated by Learning-Oriented Management Practices (LOMP) (Table 6). Specifically, TKD positively influenced IP through LOMP, which confirms the mediating role of learning-oriented management practices in the model. These results suggest that training and knowledge development strengthen innovation performance not only directly, but also indirectly through managerial practices that support learning, monitoring, and the practical application of knowledge.

Table 6: Bootstrapping Test: Specific Indirect Effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
TKD -> LOMP -> IP	0,096	0,093	0,009	10,643	0,000
Source: Own analysis					

The total effects analysis (Table 7) showed that Innovation Performance was influenced primarily by Training and Knowledge Development and Learning-Oriented Management Practices. TKD had the strongest total effect on Innovation Performance, while LOMP also showed a positive and statistically significant total effect. In contrast, Firm Size did not have a statistically significant effect. These findings suggest that innovation performance is shaped mainly by internal capability-building factors rather than by firm size.

Table 7: Bootstrapping Test: Total Effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
Firm Size -> IP	-0,009	0,021	0,050	0,187	0,852
LOMP -> IP	0,275	0,267	0,022	12,254	0,000
TKD -> IP	0,312	0,306	0,023	13,425	0,000
TKD -> LOMP	0,350	0,350	0,017	20,015	0,000
Source: Own analysis					

5. Conclusion and Discussion

Our findings confirm that training and knowledge development positively affect innovation performance both directly and indirectly through learning-oriented management practices in CEE countries. This highlights the central message of the study: investments in employee development are crucial for innovation, but their impact is significantly amplified when firms simultaneously create managerial conditions that support learning, knowledge sharing, and the practical application of acquired skills (Tan & Nasurdin, 2011; Noopur & Dhar, 2020). In this respect, the study extends existing research by demonstrating the mediating role of learning-oriented management practices and provides a more nuanced explanation of the pathway through which training-related investments are translated into firm-level innovation performance (Tan & Nasurdin, 2011; Noopur & Dhar, 2020). At the same time, the paper offers new empirical evidence from the CEE context, where there is still a need for this type of analysis due to the specific challenges related to capability upgrading, labour shortages,

and the uneven diffusion of advanced managerial practices (Prokop et al., 2021; Stojčić, 2021; Kotkova Striteska et al., 2024).

These findings also carry important managerial and policy implications. From a managerial perspective, firms should view training not as an isolated activity, but as part of a broader organizational system that includes performance monitoring, constructive feedback, problem solving, and continuous learning support (Li et al., 2018). Such an approach may increase the extent to which training investments are transformed into innovation outcomes. From a policy perspective, initiatives aimed at strengthening firm innovation in CEE countries should not focus solely on workforce training but should also promote the development and diffusion of managerial capabilities that enable firms to absorb, share, and apply knowledge more effectively (Ferrazzi et al., 2025).

The study acknowledges several limitations. First, the cross-sectional nature of the WBES 2024 data limits strong causal inference. Second, the reliance on standardized survey indicators restricts the ability to capture richer organizational and contextual dimensions of learning-oriented management practices. Third, treating the selected CEE countries as a single pooled sample prevents a fine-grained comparison across national settings. Future research could overcome these constraints by employing longitudinal data, incorporating additional organizational or institutional variables, and conducting country specific analyses within the CEE region. Further investigations might also explore whether the mediating role of learning-oriented management practices varies across sectors, firm size categories, or ownership structures (Stojčić, 2024).

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