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Research Article

Managerial creativity and its development supported by artificial intelligence: a comparative perspective between Europe and Asia and empirical evidence from industrial enterprises

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Abstract: Managerial creativity is a key competency for ensuring innovation and competitiveness in the context of globalization and rapid technological change. This paper analyses the factors influencing managers' creative thinking, methods for its development and organizational strategies, with a comparative look at European and Asian approaches. Findings suggest that Asian organizations favour collective creativity, structured learning, and technocentric AI integration, while European models emphasize individual autonomy, interdisciplinary collaboration, and a human-centered AI ethic. The study combines a qualitative literature review with a quantitative survey of 109 L&D professionals in industrial enterprises in Slovakia and the Czech Republic. The results showed moderate effectiveness of internal learning processes, with adaptation of new employees, inadequate measurement of outcomes and low motivation to learn being the main barriers. Information flow was often restricted by outdated processes. However, respondents showed high interest in using AI to support personalisation, onboarding and the development of creative thinking. Based on the analysis, a model of AI supporting 'augmented creativity' is proposed, where generative AI acts as a partner to develop divergent thinking and flexibility in problem solving. The study also highlights ethical and organisational challenges, such as automation bias or the risk of limiting creative autonomy, and recommends a hybrid approach combining a European focus on individual initiative and ethics with an Asian collective responsibility and technology focus.

Keywords: managerial creativity; empirical analysis; AI in trainings; organizational learning; educational technology; industrial training

I. INTRODUCTION

In today's dynamic and unpredictable business environment, organizations face constant changes that require innovative solutions. Managerial creativity is increasingly recognized as an essential competency that enables managers to adapt to new challenges, implement original ideas and ensure sustainable growth of their organizations. Globalisation, digital transformation and the advent of Industry 4.0 have accelerated the need for creative leadership. As part of this transformation, employee learning and development is shifting from traditional, static methods to dynamic and personalized approaches that are responsive to individual needs and pace of learning. The development of information technology and in particular the advent of artificial intelligence (AI) is creating new opportunities to increase the efficiency, quality and attractiveness of learning processes in companies. AI enables not only the automation of administrative processes, but also the personalisation of learning plans, the efficient analysis of learning needs, the generation of learning materials or the provision of real-time feedback. While managerial creativity has been extensively studied in Western contexts, cross-regional comparisons between Europe and Asia remain limited. At the same time, the rapid growth of artificial intelligence (AI) has changed the way creativity can be developed and supported.

AI-driven systems enable personalisation, real-time feedback and adaptive learning, elements that are particularly valuable in developing creative competencies in managers. The introduction of Artificial Intelligence (AI) into the learning and

development processes of managers represents one of the most significant trends in contemporary management education in both Europe and Asia. Although AI opens up new possibilities for personalizing learning, analyzing talent, and stimulating creativity [1], it also brings a number of challenges and ethical issues that affect both the effectiveness and trust in these technologies [2]. This study aims to integrate these findings into a unified empirical and comparative framework. The research objectives are twofold:

1. To compare European and Asian approaches to the development of managerial creativity.
2. to empirically investigate how AI can support creative thinking and learning in industrial enterprises in Central Europe (Slovakia and the Czech Republic).

The synergistic approach combines technological innovation with principles of effective human capital management, thus providing a basis for discussing the ethical, legal and organizational aspects of the digitalization of learning processes.

II. LITERATURE REVIEW

In the current industrial environment characterized by automation and digitization, creative thinking is a strategic competence for workers. It encompasses not only the ability to generate new ideas but also to connect knowledge, solve problems in unconventional ways, and adapt to changing conditions. According to [3], in the context of Industry 4.0, the continual development of creative and quality-oriented competencies is essential for sustaining innovation in industrial enterprises, with AI serving as a supportive tool for improvement. Successful managers must combine analytical and intuitive approaches, integrating creativity into decision-making to generate innovative solutions.

Creativity enables divergent thinking—the ability to create multiple alternatives for a single situation—and is manifested in management through strategic decision-making, team motivation, and change management. Managerial creativity differs from artistic creativity in that it integrates imagination with leadership, problem solving, and decision-making. Researchers identify four main determinants of managerial creativity: (1) individual factors such as cognitive ability, openness, motivation, and self-efficacy; (2) organizational culture supporting autonomy and open communication; (3) transformational leadership; and (4) technological support through digital and AI tools.

Majerová [4] further emphasises the connection between cognitive rationality and sustainable managerial decision-making, showing that motivation and cognitive structures significantly shape how managers evaluate and generate creative solutions. This perspective supports the argument that creativity is not purely intuitive but relies on balanced cognitive processes.

European and Western models emphasize autonomy, interdisciplinary collaboration, and tolerance of risk and failure. Educational and organizational systems encourage experimentation and independent learning. [5] highlighted social and environmental factors influencing creativity, [6] pointed to the role of the creative class in economic growth, and [7] integrated intelligence, wisdom, and creativity in leadership. These perspectives prioritize individual autonomy and interdisciplinary problem solving, with learning methods such as brainstorming, design thinking, and lateral thinking.

Two dominant paradigms explain creativity in work and management contexts:

(a) Component models [8] focus on domain knowledge, cognitive skills, and motivation, analysing how environments support or inhibit creativity.
(b) Systems models [9] extend this by examining interactions between the person, the professional domain, and the social "field" that validates innovation. These models show that creativity development requires both individual and organizational change, including supportive norms and evaluation structures.

The Western cultural model values individualism, originality, autonomy, and institutional validation (e.g., copyright, IP). While it promotes independent innovation, critics argue it often overlooks collective and contextual aspects of creative work.

In the European context, creativity is seen as a transversal competence linked to lifelong learning and social cohesion. EU policies promote creative skill development through curriculum integration, international cooperation, and inclusive learning that supports collaboration and problem solving. The European approach favors systemic interventions—team training, cross-functional projects, and shared innovation responsibility—over individual-focused programs. When combined with AI tools, these methods open new opportunities for creative collaboration, though motivation and autonomy must remain protected.

Asian countries such as Japan, China, South Korea, and India adopt collective and technology-intensive approaches to creativity, emphasizing social harmony and group innovation. The SECI model [10] explains how tacit knowledge is shared and transformed within teams, forming the basis of collective creativity. Other studies confirm this perspective: [11] analysed cultural diversity in Asian teams; [12] explored leadership's impact on creativity in China; [13] documented technology-driven innovation in Korea by showing how within-group knowledge spillovers in Korean business

groups support innovation performance; and [14] examined creativity in Indian management education.

Common characteristics include collective learning (kaizen), structured lifelong learning, strong mentoring systems, and integration of technology (AI, big data, simulation). These build collective innovation capital and scalable improvement processes. From an HRM perspective, sustainable and human-centred practices also contribute to the development of managerial creativity. Huseynova [15] shows that sustainable HRM strengthens employer branding and employee engagement, both of which support intrinsic creative motivation. Marczis et al. [16] highlight that climate-risk data and sustainability-driven decision-making require managers to integrate creativity with analytical responsibility. Poškuvienė et al. [17] similarly point out that high-quality service design and customer-oriented innovation depend on structured creative problem-solving processes. These findings enrich the cross-regional comparison presented in this study. Empirical studies—such as [18] on Indian R&D, and [19] on Korean SMEs—show that combining structure with autonomy enhances creativity and productivity.

Asian companies increasingly use AI-assisted mentoring, simulation tools, and data analytics for creative learning. Reviews indicate that embedding these technologies in collective processes enhances divergent thinking ("augmented creativity").

Additional research in industrial engineering shows that immersive technologies such as virtual and augmented reality significantly enhance creative problem-solving by enabling simulation and experimentation in safe digital environments. Holubek et al. [20] demonstrated that VR-based robotic cell simulations support innovative thinking and rapid iteration, while their later work [21] confirmed similar benefits in robot programming and layout design. Complementary findings by Krynke and Mazur [22] indicate that computer simulation contributes to more effective managerial decision-making and creativity in production planning. These insights further reinforce the role of digital technologies as an ecosystem supporting managerial creativity.

Key recommendations from research include:

1. Support collective transfer of tacit know-how through mentoring and on-the-job learning (SECI model).
2. Combine structured curricula with experimentation using real production data.
3. Use AI as an augmentation tool—intelligent assistants, simulations, and personalized analytics—ensuring ethical and transparent use.
4. Evaluate innovation capacity through team-based metrics (e.g., process improvements, time-to-prototype) that reflect collective creativity and ambidexterity.

Both regions show a convergence towards hybrid models, where creativity is enhanced by artificial intelligence and data-driven learning. A successful combination of individual autonomy with collective responsibility could yield excellent results (see **Table 1**.).

Table 1. *Comparison of European and Asian Models (Author's own elaboration)*

Aspect	***European Models***	***Asian Models***
Focus	Individual autonomy and critical thinking	Collective creativity and collaboration
Training Approach	Expert-led courses and tailored learning opportunities	Digital learning platforms and internal training sessions
Technological Integration	Emphasis on digital technologies and lifelong learning	Adoption of digital learning platforms and upskilling
Cultural Orientation	Individualistic	Collectivist
Innovation Strategy	Encouraging independent problem-solving	Fostering innovation through teamwork and shared experiences

III. METHODOLOGY

This study uses a mixed methodology. Primarily, it uses a qualitative methodology based on the analysis of secondary sources (a comparative review of European and Asian literature). This framework is complemented by quantitative exploratory research conducted through a questionnaire study to explore the possibility of using AI to promote creative thinking in the training of employees in industrial enterprises.

The research was designed to identify critical barriers to creativity and learning in industrial enterprises and to assess the potential of AI in promoting learning and creative thinking. The questionnaire was divided into six parts focusing on critical barriers, emergence, information flow, application of AI and strategic insight.

The population included HR, L&D and education professionals in industrial companies in Slovakia and the Czech Republic:

- Respondents: 109 professionals (59% Slovakia, 41% Czech Republic)
- Positions: HR business partners (35%), HR managers (25%), L&D specialists (30%), internal coaches (10%).
- Company size: 10% (≤50 employees), 35% (51-250), 30% (251-1000), 25% (>1000).

Data analysis involved quantitative methods including percentage distribution and identification of critical areas.

The majority of respondents rated the effectiveness of in-house training as only moderate (60%), with only 20% considering it high and 20% considering it low. This suggests considerable room for improvement, digitisation and personalisation.

The following were identified from the survey as the three most problematic areas of learning:
1. Adaptation of new employees (65% of responses).
2. Measuring the effectiveness of training (55% of responses).
3. Motivating staff to learn (50% of responses).

Factors most inhibiting development included lack of staff time (70%), poor support from managers (60%) and unclear learning objectives (50%). These findings correlate with the literature which suggests that ineffective onboarding and lack of motivation limit the development of creative thinking.

The onboarding process was rated as only partially effective (50%), with 40% finding it ineffective. The most problematic areas were:
- Lack of cultural integration (60%).
- Poor communication with the mentor (55%).
- Lack of practical information (50%).

The period of full adaptation often required 3-6 months (50%), with 25% exceeding 6 months. Only 15% of companies used digital assistants or AI chatbots.

Analysis of information flow revealed critical gaps:
- Only 10% of companies had fully functional systems for updating documents.
- 85% of respondents reported frequent (40%) or occasional (45%) use of outdated processes or forms due to communication gaps.
- 40% reported that information about updates arrived too late.

This lack of timely and up-to-date information and ineffective reporting systems are critical barriers to the development of creative thinking, which requires timely feedback and transparency.

The potential of artificial intelligence and the promotion of divergent thinking

Artificial Intelligence (AI) is a set of technologies that enable machines to perform tasks requiring human cognitive skills. AI is currently being applied in education as a means of personalisation, automating assessment and supporting learning through adaptive systems. Respondents to the questionnaire showed a high level of interest in AI, with 50% rating its potential in education as high and 40% as medium.

AI in the development of divergent and creative thinking

According to [23], generative AI assistance in workplace learning and task support can enhance employees' creative performance, while AI-based training systems can also provide interactive prompts and feedback that support practice-oriented learning ("learning by doing"). The use of AI as an interactive assistant that generates suggestions and feedback may help employees explore alternative solutions and support divergent thinking and promotes "creative learning by doing".

Generative models such as ChatGPT, Claude or Gemini can function in the learning process as:
- Mentors: help employees design onboarding training based on the job.
- Sparring partners: offer alternative perspectives on a problem, encouraging flexibility of thinking.
- Creative tools: generate visual or textual stimuli that serve as inspiration.

In line with [24] model of the creative process, it is possible to identify phases in which AI plays a supporting role:
1. Preparation
2. Incubation: through generative models, it enables experimentation with different approaches and combinations of ideas.
3. Illumination: AI generates inspirational suggestions leading to a breakthrough idea.
4. Verification: intelligent simulation environments allow to test and validate the generated solutions.

This approach, called augmented creativity (co-creation between humans and technology), fosters a culture of innovation.

AI is seen as a means to overcome the shortcomings of current education, especially in industrial enterprises. Respondents see the greatest benefits in the following areas:
- Onboarding and onboarding (60%) - AI Buddy systems help new hires navigate the company structure, explain directives, and mediate contact.
- Personalization of learning plans (55%) - AI tracks learner progress, analyzes learner preferences, and suggests appropriate adaptive e-learning activities.
- Learning Needs Analysis (50%).

AI also supports linguistic intelligence, which is crucial in global societies where AI can automatically translate learning materials and

training videos into multiple languages, while translation quality may vary and therefore often requires quality control [25].

The development of Artificial Intelligence (AI) is transforming not only industrial processes, but also paradigms of education and management development. In recent years, AI has become a key element of so-called "Augmented Creativity", that is, augmented creativity in which technology becomes a co-author of the ideation process [26]. In executive education, AI is being used to personalize learning, analyze cognitive patterns, and simulate decision-making processes, significantly changing the way creative and strategic competencies are developed. Despite these benefits, a growing set of ethical, psychological, and organizational concerns that challenge the balance between human and machine creativity is evident. Research [27] shows that AI can foster divergent thinking, but at the same time reduce autonomy and intrinsic motivation - factors that [5] argues form the basis of human creativity.

From a cognitive perspective, AI provides managers with access to unlimited sources of data, solution suggestions, and decision-making models. However, studies in the field of AI-supported learning point to what is known as automation bias - the tendency to rely on system recommendations without critical evaluation [28]. This can lead to a weakening of the ability to think independently and creatively. In education, this problem is particularly evident in so-called AI-augmented classrooms, where students (including managers) often adopt the outputs of models without reflecting on the processes that led to them. Hence, there is a requirement for 'meta-creative competence' - the ability not only to generate new AI-enabled ideas, but also to critically evaluate their origins, quality and ethical implications [29].

The issue of ethical transparency and accountability for creative decisions generated or co-generated by AI is frequently discussed in European research discourse. As AI systems become more autonomous and opaque, scholars highlight the difficulty in assigning responsibility for their outcomes, especially when these systems have the potential to perpetuate biases and cause harm. [30].

The European Union has therefore adopted several initiatives, such as the Ethics Guidelines for Trustworthy AI [31], which emphasise the 'human-in-command' principle - AI should support human decision-making, not replace it. In the Asian context, concerns are often framed differently. In Japan and Korea, for example, AI is seen as a collective intelligence partner [32] rather than a threat to individuality. This stems from the cultural values of collectivism, which allow for a more seamless integration of AI into team and learning processes. Conversely, in Western countries there is a more frequent concern about the loss of creator identity and originality. [33] emphasized the necessity of a transparent AI ethic and advocated for a "human-centered AI" approach that ensures the augmentation - not replacement - of human creativity.

From a managerial perspective, three key organizational challenges emerge:

1. Integrating AI into decision-making structures - the need to change organisational processes so that AI complements human decision-making, not centralises it.
2. Retraining and 'upskilling' managers - most EU companies still do not have creativity development programmes that reflect digital human-machine collaboration [34].
3. Cultural resistance - many managers fear that AI will dilute the value of their experience, which can lead to passive resistance to new technologies.

Empirical research [35] shows that successful implementations of AI in creative teams occur when organizations explicitly distinguish between "AI-driven innovation" and "AI-assisted creativity" (human creativity with technological support).

The most sensitive aspect is the impact of AI on the intrinsic motivation and identity of the creator. If the results of the work are associated more with the system than with the person, the sense of ownership of the idea may be reduced. In management education, it is therefore recommended to maintain a balance between the technical and human side of creativity, fostering what is called creative self-efficacy - the belief in one's own creative ability [36].

In Asian cultures that emphasize harmony between humans and technology, these challenges are interpreted less as a threat and more as an evolution of work identity [37]. However, legal and ethical issues of intellectual property of AI-generated outputs also need to be more sensitively addressed in the European environment.

Comparative analysis: the use of AI in education and the development of managerial creativity in Europe and Asia

The integration of artificial intelligence (AI) into management education and creative processes is currently a key topic in the field of human resource management (HRM) and organizational learning. In doing so, Europe and Asia represent two distinct paradigmatic approaches (see **Table 2.**):

- The European model is based on the principle of human-centered AI, emphasizing ethics, trustworthiness, inclusiveness and lifelong learning. Creativity is understood as a competence that is developed through collaborative learning and systemic actions [38].
- The Asian model, particularly in Japan, South Korea and China, emphasises collective

intelligence and the synergy between humans and technology. Managers' creativity is understood as the collective ability to improve processes and adapt to technological innovations [32; 37].

Table 2. *Comparison: AI, learning and managerial creativity (Author's own elaboration)*

Category	***Europe***	***Asia (Japan, Korea, China)***	***Research Resources (DOI)***
Dominant approach	Human-centered AI; emphasis on ethics, transparency and lifelong learning	Technocentric pragmatism; AI as a tool for collective improvement	[31] - https://doi.org/10.2759/177365 ; [32] - https://doi.org/10.1016/j.compedu.2021.104236
Learning objective	To develop *meta-creative* competences and critical thinking when working with AI	Optimise productivity and innovation cycles through AI-assisted teamwork	[29] - https://doi.org/10.1186/s41039-017-0062-8 ; Li et al. 2023 - https://doi.org/10.1016/j.techfore.2023.122319
Pedagogical approaches	Personalized learning, blended learning, creative workshops with AI tools (ChatGPT, Midjourney, Copilot)	AI as an integral element of e-learning platforms; collective decision-making simulations	[27] - https://doi.org/10.1609/aaai.v34i10.7083
Ethical principles	"Trustworthy AI" framework (EU) - accountability, transparency, human control	"Harmony of human-machine" - AI as a partner, not an opponent	[31], [32]
Organisational use	AI in HRD to personalise manager development and assess creativity; less emphasis on automation	AI in industrial enterprises to support team creativity and innovation processes; high level of digitalization	[35] - https://doi.org/10.1007/s12599-020-00666-8
Cultural framework	Individualism + participation → AI as a decision aid	Collectivism + technological optimism → AI as a team member	[32], [37]
Challenges and concerns	Erosion of creative autonomy, ethical responsibility for AI outputs, need for digital literacy training	Risk of technological dependence, pressure for performance and conformity, less room for individual deviation	[28] - https://doi.org/10.5465/annals.2018.0057
Examples of implementation	Erasmus+ AI Education Initiatives, IBM SkillsBuild, AI4Creativity (EU)	AI-Creative Labs (Seoul), Alibaba Innovation Hubs (China), Japan Society for AI Learning	[34], [37]

Analytical interpretation of differences (see **Table 3.**):

1. Cultural determinants of creativity: European models of creativity education emphasize reflection and ethical use of AI. In contrast, Asian systems are characterized by greater trust in technology as a tool of collective wisdom. This leads to higher levels of AI implementation in management training, but sometimes at the expense of individual creative freedom.

2. Organizational readiness: European industrial enterprises are often limited by regulations and slower adoption of innovation. In contrast, in Korea and China, the adoption of AI is more dynamic as governments consider AI as a strategic factor for economic growth [37].

3. Educational methodology: In Europe, the emphasis is on "learning by reflection", while Asia is focusing on "learning by doing with AI". This difference is also reflected in the way managerial creativity is developed - in Europe it is value-driven reflective creativity, in Asia it is process-driven innovative effectiveness.

4. Ethical implications: The European framework [39] creates a legislative underpinning for the responsible use of AI. In Asia, the focus is on

pragmatic benefits, with ethics integrated into technology guidelines rather than legal norms.

Table 3. *Key challenges and recommendations for the use of AI in education and the development of managerial creativity (Author's own elaboration)*

Area of challenge	*Problem description*	*Possible solutions/recommendations*	*Relevant resource*
Ethics and bias	AI can replicate cultural and gender stereotypes.	Transparent algorithms, ethical audits of AI.	[40]
Loss of autonomy	Managers may rely on AI instead of their own creativity.	Creative thinking training, reflective learning.	[41]
Digital competence	Lack of skills to work with AI in education.	Corporate AI academies, lifelong learning.	[42]
Privacy	Risk of leakage of personal and corporate data.	Secure cloud solutions, data governance.	[43]
Cultural differences	Different understanding of creativity between regions.	Cross-cultural training and diverse learning models.	[44]

IV. RESULTS AND DISCUSSION

The findings of the study reveal several important factors influencing managerial creativity. Personality traits, motivation, leadership style and organizational culture play a crucial role. Managers who foster open communication, trust and autonomy are more likely to encourage creative problem solving in their teams. These findings correspond with earlier research showing that creativity in industrial organisations often emerges in environments where communication channels and leadership support are clearly defined. Similar patterns were identified in Asian enterprises, where structured learning cycles and collective mentoring support innovation [10; 13]. The barriers identified in this study—such as insufficient motivation or ineffective onboarding—therefore reflect broader systemic constraints typical for production-oriented industries. In addition, access to resources and opportunities for continuous learning strongly influence the development of creative skills.

Methods for developing creativity include formal training programs, workshops, and creativity techniques such as brainstorming, design thinking, and lateral thinking exercises. Mentoring and interdisciplinary collaboration further enhance the creative potential of managers. European approaches emphasise individual autonomy, interdisciplinary collaboration and an environment conducive to innovation. In contrast, Asian approaches place greater emphasis on collective creativity, structured learning programmes and technological integration, particularly through the use of digital tools, big data and artificial intelligence.

When comparing these conceptual differences with the empirical findings of this study, several parallels arise. Respondents in Central European industrial enterprises reported weaknesses primarily in structured learning processes and information flow—areas that Asian organisations traditionally manage with greater systematisation through mentoring, knowledge-sharing cycles and continuous improvement practices such as kaizen. This may explain why onboarding and communication gaps emerged as the most critical barriers in our dataset: without structured knowledge transfer, individual autonomy alone is insufficient for sustained creative output.

Comparative analysis suggests that European models of creativity development favour independence, experimentation and tolerance of failure as part of the creative process. However, our findings also indicate that such approaches require organisational infrastructure that many Central European industrial enterprises still lack—especially in areas such as performance measurement, documentation management and leadership involvement. This is consistent with Teplická & Hurná [46], who emphasise the need for regionally adapted performance management systems. For industrial organisations, this implies that creativity development cannot rely solely on training content but must include systemic improvements such as streamlined information flow, digital learning tools and clearly defined learning responsibilities. Asian approaches emphasise discipline, long-term learning and collective responsibility. Both perspectives have their advantages, and organizations that combine these approaches are likely to achieve excellent results. Overall, the results suggest that the most effective strategy for industrial enterprises in Central Europe is a hybrid model combining individual creativity with structured organisational processes. Hybrid intelligence approaches [35] support this idea by demonstrating that AI-enabled systems perform best when they augment, rather than replace, human cognitive processes. Such a model offers organisations the opportunity to strengthen both creative autonomy and operational reliability, ultimately improving innovation capacity.

The high interest in AI tools reported by respondents further reinforces the augmented creativity model proposed in this paper, where AI acts as a cognitive partner. AI-supported simulations, automated onboarding assistants or personalised learning plans compensate for structural weaknesses in traditional training systems. This aligns with [20], who demonstrated that virtual simulation environments increase engagement and creative experimentation, and with [22], who confirmed that digital modelling enhances managerial decision-making. These synergies suggest that AI can effectively strengthen both European autonomy-based and Asian structure-based creativity models.

V. CONCLUSION

Managerial creativity is a fundamental competency that is now essential to ensure innovation, adaptability and competitiveness of organizations in an environment characterized by globalization, digital transformation and rapid technological change. The successful development of this competence requires a comprehensive approach that includes not only personal motivation and individual predispositions of managers, but also institutional support through education, organisational culture, innovation-supportive policies and effective human resource management systems. This study has made a significant contribution to the understanding of the development of managerial creativity by providing a comparative analysis of cultural approaches to creativity, while also providing empirical data on specific barriers faced by industrial enterprises in Central Europe.

A comparative analysis of the literature and empirical findings showed that there are clear regional differences in approaches to managerial creativity. European models, relying on individual-psychological components [4] and systems approaches [45], emphasise individual autonomy, experimentation, critical thinking and the ethics of a human-centred approach to technology. Creativity is seen as a cross-cutting competency, linked to lifelong learning, interdisciplinary collaboration and social responsibility. In contrast, Asian approaches, represented for example by the SECI model [9], emphasize collective creativity, structured lifelong learning, and technological integration into organizational processes. In the Asian context, AI and digital tools are often seen as partners that support the optimization of innovation cycles and collective creativity.

Empirical data from Central European industrial enterprises point to moderate effectiveness of in-house training programmes. The most significant barriers identified include ineffective onboarding of new employees (65%), inadequate measurement of learning outcomes (55%) and low motivation to learn (50%). Another major issue is information flow, with 85% of respondents reporting frequent or occasional use of outdated processes due to communication gaps. These barriers limit organisational learning, slow down employee adaptation and prevent the effective application of creative thinking in practical decision-making processes. Thus, the findings show that simply adopting Western or Asian models of creativity without adapting them to the local context is insufficient. This conclusion aligns with [46], who emphasized that performance measurement and management systems must be regionally adapted within Central Europe to reflect diverse organisational environments. These barriers limit organisational learning, slow down employee adaptation and prevent the effective application of creative thinking in practical decision-making processes. Similar challenges related to technological adaptation and innovation-driven creativity have been reported in industrial research [47], confirming that creative approaches are essential to overcome structural barriers in production-oriented enterprises. For Central European organisations, a systematic intervention that takes into account the specificities of the cultural and organisational environment is essential.

The study also highlights the importance of ethical and organisational challenges related to the development of creativity. Key aspects are protecting the creative autonomy of managers, ensuring the transparency of decision-making processes, controlling the quality of outputs and preventing the risk of cognitive biases such as automation bias. These aspects are particularly important in the context of the use of digital tools and information technologies, which can significantly influence the way ideas are generated and evaluated. The need to develop 'meta-creative competences' is proving to be crucial - the ability not only to generate new ideas, but also to critically evaluate their quality, origin, ethical and organisational implications.

In practical terms, the study recommends that organisations adopt a hybrid approach to creativity development that strategically combines the European emphasis on individual initiative, ethics and critical thinking with the Asian focus on collective responsibility, systematic learning and technological support. The efficiency of such hybrid approaches is also supported by [48], who demonstrated that process quality improvements and innovation-driven management directly influence company performance and creativity outcomes. Such an approach enables organisations not only to effectively develop individual managerial skills, but also to foster team and organisational creativity, thereby enhancing the innovation potential of the whole enterprise.

Future research should cover three key areas. First, longitudinal studies tracking the long-term effects of managerial creativity development and the implementation of hybrid strategies are needed to verify the sustainability of increased motivation, the effectiveness of learning processes, and the impact on organizational competitiveness. Integrating digital learning and innovative educational models, as proposed by [49], represents a promising direction for fostering creative competence in engineering and management education. Second, cross-regional validation and cultural adaptation will allow to validate the effectiveness of approaches in different cultural contexts, thus optimizing the combination of individual and collective creativity development. Third, advanced metrics need to be developed to assess collective innovation capital and organizational ambidexterity, i.e. the balance between creativity and productivity, which is critical for practical industrial settings.

In conclusion, managerial creativity, supported by systematic and culturally adapted strategies, is key to the long-term competitiveness and adaptability of organizations. The integration of empirical knowledge, comparative studies and ethical frameworks provides businesses with a robust theoretical and practical basis for the development of creativity in a digital and globalized economy. Organizations that can strategically combine individual and collective approaches, while ensuring transparency and ethical control, can effectively develop high levels of managerial creativity, thereby fostering sustainable growth and innovative excellence.

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AUTHOR CONTRIBUTIONS

M. Mandáková: Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft.

H. Hrablik Chovanová: Supervision, Validation, Review and editing, Visualization, Project administration.

DISCLOSURE STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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