

Jacek BENDKOWSKI¹, John Teboah MUZAM²

ENHANCING KNOWLEDGE WORKER COMPETENCIES IN THE DIGITAL ECONOMY

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In the digital economy, knowledge has become the primary source of competitive advantage. Consequently, the nature of work is undergoing profound transformation. Knowledge workers, characterised by their ability to acquire knowledge, process information, and solve complex, non-routine problems, constitute a key organisational resource. The rapid pace of technological change and the increasing complexity of work have led to the emergence of a significant competency gap, thereby highlighting the need to develop effective methods and tools for competency development. The main objectives of this paper are, firstly, to examine the nature of competency development among knowledge workers in the digital economy and, secondly, to identify methods and tools that may support the future development of knowledge worker competencies. The study was conducted using the expert panel technique, involving seventeen experts specialising in consulting and professional services, knowledge management, competency development, and other areas closely associated with knowledge-based work. The findings indicate that the development of knowledge workers in the context of future requirements is not solely a technological challenge but primarily a strategic, cultural, and systemic issue. Effective competency development requires the integration of technology-enabled, personalised, and collaborative learning strategies embedded in everyday work practices. The study contributes to narrowing the gap between theory and practice by providing guidance for organisations seeking to upskill and reskill employees in the digital economy, where knowledge constitutes the principal source of competitive advantage.

Keywords: digital transformation, digital economy, knowledge worker competencies, networked learning, competency enhancement, employee upskilling and reskilling, expert panel

¹ WSB University. ORCID: 0000-0002-8711-1728.

² Silesian University of Technology, Faculty of Organization and Management. ORCID: 0000-0002-5163-7576.



1. INTRODUCTION

Digital transformation is reshaping industries, redefining job roles, and fundamentally altering the way we work. In this new paradigm, knowledge has emerged as the most valuable asset, surpassing traditional factors of production like land, labour, and capital (Davenport, Prusak, 1998; Drucker, 1993). The ability to create, share, and apply knowledge is now the primary driver of economic value and competitive advantage, where businesses increasingly rely on the intellectual capital of their workforce to innovate, adapt, and thrive (Bontis, 1998; Hernandez-de-Menendez et al., 2020).

The changing nature of work is also reflected in the evolving role of employees. The traditional routine task performance models are being replaced by a demand for “knowledge workers” who can leverage their intellectual capabilities to drive innovation and solve complex problems (Jemielniak, 2012). These knowledge workers are not just merely employees but strategic assets who contribute to the organisation’s competitive advantage through their expertise and creativity (Jacobs, 2017; Ruostela et al., 2015). However, this transition is not without its challenges. The rapid pace of technological change and the increasing complexity of work are creating a growing skills gap (Van Laar et al., 2017). The competencies required for success in the digital economy are not always readily available in the existing workforce (McKinsey, 2020). This requires organisations to undertake coordinated upskilling and reskilling initiatives to ensure that employees possess the competencies necessary to succeed in the digital era.

However, while much has been written on knowledge workers’ competencies necessary to effectively perform their tasks, a significant gap remains in defining methods and tools dedicated which necessary to enhance knowledge worker competences to thrive in this evolving landscape.

The main goals of this paper are as follows: firstly, to explore the nature of knowledge worker competency development in the digital economy; secondly, to identify the methods and tools that enhance knowledge worker competencies in future.

The expert panel approach was adopted to gather insights from professionals and academics with expertise in knowledge work, digital transformation, and related fields. The 17 experts participating in the panel were highly experienced professionals and researchers specialising in professional services, knowledge management, competency development, and other fields closely associated with knowledge work. Among them were CEOs, authors, theorists, policymakers, and influential practitioners in their respective domains.

This paper is organised as follows: After the introduction, we discuss the theoretic foundation of knowledge work in the digital economy. Then, we analyse the nature of knowledge worker competency development in the context of progressing digitalisation emphasising necessity for a re-evaluation of the traditional learning theories, particularly in relation to competency development across individual,

group, and network perspectives. We then present the research methodology and subsequently the research results. This provides a platform to interpret and discuss the research results before indicating the limitations of our study and making suggestions for further research.

2. THEORETICAL BACKGROUND

2.1. Knowledge work in the digital economy

According to (WEF, 2023), the advent of the digital age has profoundly impacted the landscape of knowledge work. While traditional skills like research and analysis remain vital, new competencies have emerged as essential. For instance, digital literacy, data analysis skills, and the ability to collaborate effectively in virtual environments are now crucial for knowledge workers (Großer, Baumöl, 2022; Rainie, Wellman, 2018). Furthermore, the digital transformation has ushered in new work practices, including remote work and agile methodologies, necessitating adaptability and comfort with technology (Jemielniak, 2012; Worldbank, 2019).

Knowledge work refers to activities that involve handling or processing information and generating new knowledge rather than producing physical goods. The term, first coined by Peter Drucker (1993), emphasises the intellectual aspect of work driven by applying specialised knowledge (El-Farr, 2009). Knowledge work distinguishes itself from other forms of labour through its emphasis on cognitive processes (Jacobs, 2019). Unlike manual or task-based roles, knowledge work is characterised by complexity, and demands creativity, problem-solving, continuous learning, and the ability to work with abstract concepts. There exist several characteristics of knowledge work, and some main factors include:

- high cognitive demands,
 - non-routines and complex tasks,
 - intensive use of information technology,
 - collaborative nature,
 - continuous learning and development.
- 1) High Cognitive Demand: Knowledge work usually revolves around people doing work that requires considerable amounts of brainpower. However, what kind of work is brainwork, and what does it involve? According to Davenport (2005), we know that knowledge work involves non-routine tasks that require low-level to high-level cognitive processes tasks in which the worker must use his or her various forms of knowledge (content, process, or personal) to either solve a problem, make a decision, or do something else that is “syntactically” or “semantically” meaningful. Hence, knowledge work typically involves tasks that require significant cognitive effort, such as problem-solving, critical thinking,

and decision-making. These tasks often include analysing data, synthesising information from various sources, and applying specialised expertise to develop solutions.

- 2) **Non-Routine and Complex Tasks:** Knowledge work is often characterised by its complexity and non-routine nature (Dewhurst et al., 2013). The tasks involved are not repetitive and require a high level of creative and innovative approaches. Knowledge workers regularly encounter unique challenges with no predetermined solutions needing adaptable and flexible thinking (Hagel et al., 2018).
- 3) **Intensive Use of Information Technology:** Knowledge work heavily relies on information and communication technologies (ICT) for gathering, processing, and disseminating information (Olaisen, Jevnaker, 2022). Such ICT tools facilitate collaboration and enhance productivity. They, and are an integral part of knowledge workers' day-to-day activities, enabling them to access and analyse information quickly and effectively.
- 4) **Collaborative Nature:** Knowledge workers often operate in a kind of 'knotworking' and landscape of practice. This environment is usually fluid and requires adaptive collaboration to address unexpected changes or "runaway objects" (Engeström, 2008; Pyrko et al., 2019). As highlighted by Nonaka and Takeuchi (1995), collaborative efforts and social interactions enhance the creation and dissemination of knowledge.
- 5) **Continuous Learning and Development:** The dynamic nature of knowledge work necessitates constant learning and professional development (Kersh, 2015). Knowledge workers must stay updated with the latest advancements in their field, which requires continuous learning and skill enhancement (Senge, 1990). This constant learning cycle is crucial for maintaining the relevance and effectiveness of their expertise.

Knowledge workers play a central role in creating, sharing, and applying knowledge within organisations. The term "knowledge worker", first introduced by Drucker (1969), refers to individuals whose primary role involves the handling and application of knowledge. Knowledge workers are distinguished from other employees by their capacity to solve complex problems and develop new products or services within their areas of expertise (De Sordi et al., 2021; Surawski, 2019). By contrast, non-knowledge workers typically require a lower level of education and possess fewer specialised skills than knowledge workers (De Munck, 2019). They are often required to follow specific instructions and procedures rather than making decisions based on their expertise and judgment (Davenport, 2005). According to Matthews and Candy (1999), knowledge workers are loyal to their professions, networks, and peers rather than to the organisation and career systems. Their work environment is fast-changing, which necessitates the rapid development of their skills and competencies to meet the demands of the market.

Knowledge workers are therefore the cornerstones of the modern knowledge economy and are defined by their specialised expertise and intellectual skills (Surawski, 2019). They use their deep knowledge of their field, often complemented by formal training and practical experience, to address complex problems and to develop innovative solutions. They thrive in an environment that values autonomy and self-direction and can use their decision-making skills and adaptability to navigate the constantly evolving landscape of knowledge-intensive tasks (Leary et al., 2019). Beyond their technical knowledge, knowledge workers have strong communication and collaboration skills that allow them to clearly express complex ideas, effectively share knowledge and promote productive teamwork across a variety of disciplines (Engeström, 2018; Olaisen, Jevnaker, 2022). Their inherent creativity stimulates innovation within the organisation, continually generates new ideas, and drives continuous improvement. In a world marked by rapid technological changes, knowledge workers see lifelong learning as a fundamental principle, guaranteeing the relevance and adaptability of skills and knowledge and consolidating their valuable assets in the knowledge-oriented era (Walsh, Volini, 2017).

2.2. Competencies in the knowledge work context

The concept of competencies in knowledge work has evolved significantly from traditional views of skills and knowledge. While knowledge and skills remain fundamental, the concept of competencies encompasses a broader set of attributes, including skills, abilities, behaviours, and personal traits that enable individuals to perform effectively in their roles (Finegold, Notabartolo, 2016b). In the context of knowledge work, competencies extend beyond technical expertise and encompass a broad range of skills, including critical thinking, problem-solving, creativity, communication, and collaboration (Candrell, 2024).

Enhancing the competencies and skills of knowledge workers is a vital component of achieving organisational success. Nevertheless, enhancing their skills and abilities in the workplace is a complex process that requires resolving gaps in traditional approaches (Hilsen, Olsen, 2021). The concept has become increasingly important in the field of organisational practices. However, there is a discrepancy between theoretical understanding and its practical application. The competency approach has been compared to other organisational theories, emphasising its relevance in the 21st century. These theories and research provide insights into many aspects of skill development in knowledge workers.

Competency development entails expanding employees' expertise through the interchange of knowledge inside the firm (Finegold, Notabartolo, 2016). The core competencies management model highlights the significance of self-directed knowledge workers who prioritise competencies such as critical thinking skills and ongoing learning (De Sordi et al., 2021a). In order to improve the performance of knowledge workers, it is necessary to expand their skills and provide

them with learning opportunities readily available in their work environments (Reese, 2020). Bersin et al. (2019) describes it as embedded learning in the flow of work.

This new learning paradigm in the digital age necessitates a re-evaluation of traditional learning theories, particularly in relation to competency development across individual, group, and network perspectives. Table 1 summarises the main theories from these three perspectives, showing how they translate from theoretical foundations to practical applications in modern learning environments.

The *individual perspective* explains how traditional constructivist approaches have adapted to the digital context, using technologies like simulations and interactive tools to enhance personalised, constructive learning (Whitman, 1993). This adaptation is referred to as “digital constructivism”. These environments use digital tools to enable learners to take charge of their own learning through customised resources and self-paced strategies, known as Personal Learning Environments (PLEs). This evolution highlights the adaptation of experiential methods through immersive environments, where virtual reality plays a key role in offering experiential contexts for learning (Baptista et al., 2020; Cosa, 2023).

The *group perspective*, exemplified by computer-supported collaborative learning, indicates the shift from in-person social learning to digital spaces where learners collaborate through technological platforms such as discussion forums or group projects (Morris, 2019). This evolution highlights how contextually situated and practice-based learning can now occur within virtual communities, where the situational aspect is simulated online, known as Virtual Communities (Field, Chan, 2018; Wenger et al., 2002). Digital Team-Based Learning represents the digital transformation of traditional collaborative approaches, increasingly facilitated by online collaboration tools that allow team-based tasks to be conducted remotely (Stahl, Hakkarainen, 2021).

The *network perspective* depicts the theory of connectivism, which is already suited to understanding learning in a digital context (Siemens, 2006). Artificial intelligence further enhances it, indicating how AI can support and expand network-based learning connections, referred to as AI-Enhanced Networks (Collings et al., 2018b; Engestrom, Kerosuo, 2007; Morris, Blaney, 2013). Distributed Learning emphasises a move toward a more distributed approach, where learning is networked and decentralised, allowing access to diverse information and learning peers across multiple digital platforms. Social Media Learning reflects a digital transformation where learning through observing others is facilitated by social media platforms. Such platforms offer opportunities for informal, community-based, and user-generated learning interactions (Katz, Shapiro, 1994; Marques et al., 2020; Rainie, Wellman, 2018a).

Table 1. Comprehensive overview of learning theories in the digital age

Theory	Major theorists	Key concepts	Examples in practice	Learning perspective
Constructivism	Jean Piaget (1929), Jerome Bruner (1960)	Active knowledge construction, schema development, personal meaning-making	Digital portfolios, self-paced online modules, interactive simulations	Individual
Social constructivism	Lev Vygotsky (1978)	Zone of proximal development, social interaction, collaborative learning	Group projects, online discussions, virtual team activities	Group
Situated learning	Jean Lave, Etienne Wenger (1991)	Learning in context, communities of practice, authentic activities	Real-world problem-solving, apprenticeships, case studies	Group
Experiential learning	David Kolb (1984)	Learning through experience, reflection cycle, active experimentation	Hands-on laboratories, fieldwork, project-based learning	Individual
Connectivism	George Siemens (2006), Stephen Downes (2005)	Network-based learning, digital connections, distributed knowledge	MOOCs, social media learning, professional learning networks	Network
Self-Directed learning	Malcolm Knowles (1975)	Learner autonomy, personal goal setting, self-regulation	Personal learning environments, adaptive learning systems, learning analytics	Individual

Source: own elaboration.

The learning theories, their key concepts, and examples in practice show how various traditional learning theories adapt to digital transformations. It reveals the transition from traditional, often face-to-face or resource-limited contexts to more digitally empowered and distributed environments. Each theory's evolution is facilitated by digital technologies, providing new ways for individuals, groups, and networks to interact and learn effectively. This adaptation is crucial for competency development in the digital age, as learners need to acquire and refine skills in an environment that is becoming increasingly digitised and interconnected. The

transformation across different perspectives emphasises personalised, collaborative, and networked ways of learning that align with the growing importance of digital literacy and technology-mediated competencies.

3. RESEARCH METHODS

The study employs an expert panel methodology, which involves gathering insights from professionals and academics with expertise in knowledge work, digital transformation, and related fields (Bertens et al., 2013; Keeney et al., 2011). Given the dynamic nature of knowledge work, expert panels help bridge the gap between theoretical frameworks and contemporary workplace demands by providing professional insights and validating literature-based findings (Green, 2014).

The experts participating in the panel were highly experienced professionals and researchers specialising in professional services, knowledge management, competency development, and other fields closely related to knowledge work. Some held positions as CEOs, authors, theorists, policymakers, and influential practitioners in their respective domains. Their views were recorded without any modification that could alter the intended context. Similar viewpoints were grouped together or omitted to avoid redundancy. The content analysis method was used to analyse the expert's answers. The coding system included starter coding, open coding, and axial coding (Miles, Huberman, 1994).

Table 2 presents the countries from which the respondents originated.

All the experts had worked with leading multinational organisations and were considered to possess substantial knowledge of current workforce trends, emerging skill requirements, and developments in the global market. Consequently, the criteria for selection were as follows:

- Well-recognised experts or researchers or scientists in their field. For example, they may have published research, received awards, or contributed significantly to their domain.
- Experts should possess and demonstrate leadership capabilities. This could include leading teams, projects, or initiatives.
- Have experience in managing or building workplace relationships.
- Have a minimum of 10 years of professional experience: Experts should have substantial experience in their field. This ensures depth of knowledge and practical insights.
- Industry alignment: Experts must come from areas directly related to knowledge work. Sectors such as education, professional services, manufacturing, and ICT were prioritised. Their industry-specific knowledge adds value.

A total of 25 experts were contacted via email and LinkedIn to participate in the survey. Of these, 20 agreed to participate, while 17 ultimately provided their views.

With regard to supervisory experience, 70.6% of the experts had more than 21 years of experience in supervisory roles, 11.8% had between 16 and 20 years of experience, 11.8% had between 11 and 15 years, and 5.9% had between 1 and 5 years of experience.

Table 2. The geographical coverage of the study

Country	Number of experts	Percentage
Poland	2	11.76
Canada	2	11.76
United Kingdom	2	11.76
Croatia	1	5.88
Hong Kong	1	5.88
Ireland	1	5.88
Thailand	1	5.88
Netherlands	1	5.88
United States	1	5.88
Germany	1	5.88
Israel	1	5.88
Brazil	1	5.88
Spain	1	5.88
Cameroon	1	5.88
Total	17	100.00

Source: own elaboration.

In terms of areas of expertise, respondents were allowed to select one or more domains where applicable. The experts represented the following fields: Learning and Development (41.2%), Business Management (5.9%), Education (5.9%), Professional Services (17.6%), Knowledge and Innovation Management (5.9%), and IT Services and IT Consulting (17.6%).

The educational background of the experts indicated that 47.1% held a doctoral degree (PhD), 41.2% possessed a master's degree, and 11.8% held a bachelor's degree.

The expert panel process, conducted from October 2023 to January 2024, involved a structured approach, including scoping, participant selection, data collection, synthesis, and recommendation development; this ensured a comprehensive

and rigorous examination of knowledge worker competencies. The experts were asked to answer the following questions:

- 1) Considering the rise of new mobile technologies, AI, and the digitalisation of processes, what future methods or tools do you anticipate will become crucial for competency development?
- 2) Based on your expertise, what advice would you give to organisations aiming to enhance the competency development of their knowledge workers in the modern digital era?

4. RESEARCH RESULTS

4.1. Methods and tools for competency development

Regarding the question on future methods and tools for competency development, which asks: “Considering the rise of new mobile technologies, AI, and the digitalisation of processes, what future methods or tools do you anticipate will become crucial for competency development?”, the following responses were provided.

Table 3 presents a forward-looking typology of methods and tools shaping competency development in the digital economy. The distribution of responses reveals a strong prioritisation of AI-driven personalised learning paths (10 mentions), followed by immersive technologies (AR, XR, metaverse), social competencies, AI literacy, just-in-time learning, and ethical capabilities. Lower-frequency mentions (e.g., chatbots, AI-supported knowledge management, AI-based judgment tools such as ChatGPT developed by OpenAI) nonetheless indicate emerging micro-trends within digital learning ecosystems.

Table 3. Future methods and tools for competency development

Method/tool	Number of mentions	Potential benefits
AI-driven personalised learning paths	10	Tailoring learning to individual needs and pace increase efficiency and relevance.
Augmented Reality training modules	3	Enhance engagement and provide immersive and interactive learning experiences.
Social competencies	3	Facilitate collaboration, communication, and teamwork in a more digital world.
Skills to understand and work with AI/ML tools	2	Enable effective use and collaboration with AI technologies.

Method/tool	Number of mentions	Potential benefits
Just-in-time learning	2	Deliver learning in the moment of need and improve knowledge application.
Extended Reality (XR) and Metaverse	2	Offer new learning environments and possibilities for collaboration.
Trusted human relationships	2	Provide guidance, support, and mentorship in a changing landscape.
Chatbots	1	Assist with learning and offer basic information or guidance.
Ethical competencies	1	Ensure responsible use of AI and technology in knowledge management.
Using AI for knowledge management	1	Improve knowledge capture, sharing, and accessibility.
Tools like ChatGPT for judgement & analysis	1	Utilize AI-powered tools for critical thinking and evaluation.

Source: own elaboration.

4.2. Expert recommendations for enhancing knowledge worker competencies

Table 4 presents the responses regarding the question on recommendations for enhancing knowledge workers competencies “Based on your expertise, what advice would you give to organisations aiming to enhance the competency development of their knowledge workers in the modern digital era?”

Table 4. Expert recommendations for enhancing knowledge worker competencies

Advice	Number of Mentions
Embrace Flexibility and Adaptability	2
Develop Critical Thinking Skills	1
Combine Organisational and Specialist Talent	1
Raise Awareness and Increase Change Speed	1
Encourage Open Communication and Collaboration	2
Invest in Young Talent and Empower Them	1

Advice	Number of Mentions
Implement Regular Competency Assessments and Development Plans	1
Set a Clear Vision and Empower Employee Choice in Learning	1
Connect Learning Directly to Work	1
Foster Peer-to-Peer Learning	1
Invest in a Comprehensive Knowledge Management Strategy	1
Demonstrate Top Management Commitment and Allocate Resources	1
Define and Manage Competency Development as Part of Organisational Strategy	1
Offer Personalised Learning Paths and Cater to Diverse Learning Styles	2
Build Strong Partnerships with Academia	1

Source: own elaboration.

Although the frequency of mentions is relatively dispersed, several thematic clusters emerge, most notably around flexibility and adaptability, communication and collaboration, and personalised learning paths (each receiving two mentions). While the remaining recommendations appear only once, collectively they reveal a coherent systemic logic.

5. DISCUSSIONS

The results indicate that competency development in the digital era is increasingly perceived as a personalised, technology-supported, and work-integrated process rather than as a traditional, standardised training activity. The strongest finding concerns the clear dominance of AI-driven personalised learning paths, which received the highest number of mentions. This suggests that experts expect artificial intelligence to play a central role in adapting learning content, pace, and methods to the individual needs of knowledge workers. Such an approach reflects a broader shift from uniform training programmes towards flexible learning ecosystems, in which employees can develop competencies according to their current roles, knowledge gaps, learning styles, and professional aspirations. In this sense, AI is not only viewed as a technological tool, but also as an enabler of more precise, efficient, and relevant competency development.

At the same time, the results reveal how future competency development will not be based solely on AI-based personalisation. The mentions of augmented

reality, extended reality, the metaverse, chatbots, and AI-supported knowledge management point to the growing importance of immersive, interactive, and digitally mediated learning environments. These tools may help organisations create more engaging and practice-oriented learning experiences, especially in contexts where employees need to test decisions, solve problems, or develop skills in simulated environments. The presence of just-in-time learning also indicates that future competency development will increasingly be embedded in everyday work processes. Rather than separating learning from work, organisations may need to provide knowledge and support at the exact moment when employees face a specific task or problem.

An important observation is that technological tools are accompanied by strong references regarding social and relational competencies. Social competencies, trusted human relationships, communication, collaboration, mentoring, and peer-to-peer learning all appear in the results. This suggests that experts do not see digital transformation as a purely technological process; on the contrary, the effective development of knowledge workers requires combining advanced digital tools with human interaction, trust, and knowledge sharing. This is particularly important in the case of knowledge work, which is often complex, ambiguous, and dependent on collaboration across organisational and professional boundaries. The results therefore support the view that future competency development should integrate digital learning systems with communities of practice, mentoring relationships, teamwork, and open communication.

The recommendations provided by experts reinforce this systemic interpretation. Although the frequency of individual recommendations is relatively dispersed, several key themes emerge. Flexibility and adaptability, open communication and collaboration, and personalised learning paths received repeated attention. These themes indicate that organisations should not treat competency development as a one-off intervention, but as a continuous organisational capability. Knowledge workers need to be prepared for changing technologies, evolving job roles, and uncertain market conditions. Therefore, competency development should help them adapt quickly, learn continuously, and cooperate effectively in dynamic environments.

The results also highlight the strategic role of organisational leadership and management systems. Recommendations such as defining competency development as part of organisational strategy, demonstrating top management commitment, allocating resources, implementing regular competency assessments, and investing in knowledge management suggest that competency development cannot be left only to individual employees: organisations need clear structures, resources, and leadership support to make learning systematic and sustainable. This is particularly relevant in the digital era, where the pace of technological change may create skill gaps faster than traditional training systems can respond. A strategic approach allows organisations to align employee development with business goals, technological transformation, and long-term competitiveness.

Another significant implication concerns the need to connect learning directly with work. The recommendation to link learning with work, together with the emphasis on just-in-time learning and AI-supported knowledge management, shows that experts value practical applicability. Competency development should not be limited to formal courses or abstract knowledge acquisition. Instead, it should support employees in solving real problems, improving decision-making, and applying knowledge in specific organisational contexts. This finding is especially relevant for knowledge workers, whose effectiveness depends not only on what they know, but also on how they use knowledge creatively, critically, and collaboratively.

The results also point to emerging ethical and critical dimensions of competency development. Although ethical competencies and tools such as ChatGPT for critical judgement and analysis were mentioned less frequently, their presence is meaningful. As organisations increasingly rely on AI and digital tools, knowledge workers need the ability to critically evaluate outputs, understand the limitations of algorithmic systems, and use technology responsibly. This suggests that future competency frameworks should include not only technical and digital skills but also critical thinking, ethical awareness, and judgement.

Overall, the findings suggest that the future of knowledge worker competency development lies in an integrated model combining AI-enabled personalisation, immersive technologies, social learning, ethical awareness, and strategic organisational support. The relatively dispersed character of the recommendations should not be interpreted as a lack of consensus, but rather as evidence that competency development is multidimensional. Organisations aiming to enhance the competencies of knowledge workers should therefore avoid narrow, technology-centred solutions. Instead, they should build flexible learning ecosystems that are personalised, collaborative, embedded in work, supported by leadership, and aligned with the organisational strategy.

6. CONCLUSION

Organisations seeking sustainable competitive advantage in the digital economy should move beyond isolated training programmes and develop integrated competency ecosystems. Such hybrid socio-technical ecosystems combine adaptive capacity, cognitive depth, relational intelligence, and institutional governance mechanisms to ensure long-term resilience and innovation capability.

The knowledge worker in the digital economy is therefore best conceptualised as:

- an adaptive learner within AI-mediated systems,
- a collaborator with intelligent technologies,

- a participant in immersive digital environments,
- a decision-maker exercising ethical and critical judgment, and
- a relational actor embedded in networks of trust.

The expert recommendations demonstrate that building a future-ready knowledge workforce is not solely a technological challenge but a strategic, cultural, and systemic undertaking. The central insight is that competency development must be:

- strategically aligned,
- personally tailored,
- embedded in daily work,
- supported by leadership,
- reinforced through collaborative networks,
- anchored in robust knowledge infrastructures.

7. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

While the expert panel provided valuable forward-looking insights, several limitations must be acknowledged. Firstly, the composition of the panel may have introduced selection bias. Experts were likely chosen based on accessibility, reputation, or professional networks, which can limit the diversity of perspectives. As a result, the findings may reflect convergence around mainstream viewpoints rather than genuinely innovative or dissenting perspectives.

Secondly, the study's reliance on subjective judgments limits the generalisability of the conclusions. Expert opinions, although informed, remain interpretative and context-dependent. Without complementary empirical validation (e.g., longitudinal data or large-scale surveys), it is difficult to assess the predictive accuracy of the panel's recommendations.

Thirdly, temporal constraints must be considered. Expert assessments are shaped by current technological, economic, and institutional conditions. In rapidly evolving environments, particularly in areas related to digital transformation and knowledge work, projections may quickly become outdated.

Finally, the qualitative nature of the panel limits replicability. Although procedural transparency can enhance reliability, reproducing identical expert configurations and contextual conditions is unlikely. Consequently, findings should be interpreted as analytically rich yet exploratory, serving as a foundation for further empirical investigation rather than providing definitive conclusions.

Future empirical research should investigate the effectiveness of integrated competency governance models and examine the interaction between personalised learning systems and collaborative knowledge structures in enhancing organisational performance.

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PODNOŚCENIE KOMPETENCJI PRACOWNIKÓW WIEDZY W GOSPODARCE CYFROWEJ

Streszczenie

W gospodarce cyfrowej wiedza staje się głównym źródłem przewagi konkurencyjnej. W konsekwencji charakter pracy ulega głębokiej zmianie. Pracownicy wiedzy, charakteryzujący się umiejętnością zdobywania wiedzy, przetwarzania informacji i rozwiązywania złożonych, niestandardowych problemów, stanowią kluczowy zasób organizacji. Wysokie tempo zmian technologicznych oraz rosnąca złożoność pracy doprowadziły w konsekwencji do powstania istotnej luki kompetencyjnej, co podkreśla potrzebę opracowania skutecznych metod i narzędzi rozwoju kompetencji. Głównym celem niniejszego artykułu jest, po pierwsze, zbadanie charakteru rozwoju kompetencji pracowników wiedzy w gospodarce cyfrowej, a po drugie, identyfikacja metod i narzędzi wspierających rozwój kompetencji pracowników wiedzy w przyszłości. Badanie zrealizowano z wykorzystaniem techniki panelu eksperckiego, w którym udział wzięło 17 ekspertów specjalizujących się w doradztwie i świadczeniu usług specjalistycznych, zarządzaniu wiedzą, rozwoju kompetencji oraz innych obszarach ściśle związanych z pracą opartą na wiedzy. Wyniki wskazują, że rozwój pracowników wiedzy w kontekście przyszłych wymagań nie jest wyłącznie wyzwaniem technologicznym, lecz przede wszystkim problemem o charakterze strategicznym, kulturowym i systemowym. Skuteczne rozwijanie kompetencji wymaga połączenia zindywidualizowanych strategii kooperatywnego uczenia się z wykorzystaniem innowacyjnych technologii wplecionych w codzienną pracę. Badanie przyczynia się do zmniejszenia luki między teorią i praktyką, oferując wskazówki dla organizacji dążących do podnoszenia i zmiany kwalifikacji pracowników w gospodarce cyfrowej, w której głównym źródłem przewagi konkurencyjnej jest wiedza.

Słowa kluczowe: gospodarka cyfrowa, transformacja cyfrowa, kompetencje pracowników wiedzy, sieciowe uczenie się, podnoszenie kompetencji, podnoszenia i zmiany kwalifikacji pracowników, badanie metodą panelu ekspertów

