# DIGITAL SKILLS IN A DIGITAL SOCIETY: REQUIREMENTS AND CHALLENGES

## MONOGRAPH

*Monograph dedicated to the 5th anniversary*
*of Scientific Center of Innovative Research's activities*

# DIGITAL SKILLS IN A DIGITAL SOCIETY: REQUIREMENTS AND CHALLENGES

***Collective monograph edited by***
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*The monograph brings attention to a crucial aspect of contemporary economic and social development—the role of digital skills in modern society. The increasing reliance on digital tools and platforms has made digital literacy an essential competency for individuals, businesses, and governments. This work aims to provide a comprehensive exploration of digital skills, their impact on economic stability, and their relevance in different fields such as business, education, governance, and personal well-being.*

*The authors of this monograph address key issues related to digital transformation, including the legal perspectives of digital citizenship, the importance of digital skills in financial and economic processes, and their role in ensuring business resilience and reputation. Special attention is given to the impact of digitalization on leadership, mental health, and education across different global contexts.*

*This monograph will be useful for educators, economists, business professionals, policymakers, and students who seek a deeper understanding of how digital competencies shape the modern economy and workforce. The findings presented in this research contribute to the ongoing discourse on digital inclusion and skill development, offering practical recommendations for fostering digital literacy at different levels of society.*

*The authors express their gratitude to all readers, especially those who engage with the content critically and contribute their insights on the ideas discussed in this work.*

*This monograph is dedicated to the 5th anniversary of the Scientific Center of Innovative Research.*

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## Introduction

*The rapid digital transformation of economies, industries, and societies has reshaped the way individuals and organizations function in the modern world. As digital technologies permeate all aspects of life, digital skills have emerged as an essential requirement for effective participation in social, economic, and professional spheres. The monograph presented here explores the multifaceted nature of digital skills, their role in economic development, and the broader implications for businesses, governance, and education.*

*The increasing reliance on digital tools and platforms has positioned digital literacy as a fundamental necessity rather than an optional competency. In an era where artificial intelligence, big data, and automation are transforming industries, the ability to navigate digital environments is crucial for individuals and organizations alike. Moreover, digital skills contribute to economic resilience, competitiveness, and innovation, making them indispensable for sustainable development. The research conducted in this monograph highlights key challenges, strategies, and frameworks essential for fostering digital competencies across different sectors.*

*The primary objective of this monograph is to systematically analyze the role of digital skills in shaping modern economies, education, and business practices. It aims to provide a comprehensive overview of the frameworks required to bridge digital skill gaps, enhance workforce adaptability, and integrate digital competencies into institutional structures. The study also examines the implications of digital skills for leadership, economic security, and well-being, offering insights into best practices for fostering digital inclusion and equity.*

*The research in this monograph employs a multidisciplinary approach, combining theoretical analysis, empirical studies, and case-based evaluations. A variety of qualitative and quantitative methodologies have been utilized to assess the impact of digital skills across different domains. Comparative analyses of global best practices, policy evaluations, and sector-specific examinations contribute to a holistic understanding of digital competency frameworks. The study also draws on real-world examples to demonstrate the practical implications of digital transformation in business, education, and governance.*

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*The monograph consists of an introduction, five chapters, conclusions, and a list of references.*

*Section 1: Foundations of Digital Transformation. This section establishes digital skills as a fundamental right and examines their legal and societal implications. The findings highlight how digital literacy is becoming a prerequisite for digital citizenship, emphasizing the need for policy frameworks that ensure equitable access to digital resources.*

*Section 2: Digitalization in Business and Financial Processes. The research in this section explores the role of digitalization in optimizing business and financial operations. Key results indicate that the adoption of digital tools enhances efficiency, reduces costs, and improves decision-making capabilities. Additionally, artificial intelligence and automation are identified as transformative forces in financial analysis and reporting.*

*Section 3: Digital Skills for Economic Security and Resilience. This section reveals the critical role of digital competencies in ensuring economic stability and organizational resilience. The research demonstrates how digital skills enhance business reputation, facilitate crisis management, and contribute to economic security. The integration of digital competencies into human capital management is highlighted as a key factor in workforce optimization.*

*Section 4: Leadership and Well-being in the Digital Era. The study underscores the importance of digital leadership and digital empathy in fostering effective communication and collaboration. Findings show that digitalization has significant psychological and social implications, necessitating strategies for maintaining mental well-being in increasingly virtual work environments.*

*Section 5: Global Perspectives on Digital Skills and Education. The research presents a comparative analysis of digital education initiatives in various regions, including Europe and Asia. The findings suggest that countries investing in digital skill development see higher economic competitiveness and innovation rates. The study highlights the importance of integrating digital skills into national education policies to bridge the global digital divide.*

*This monograph provides a theoretical foundation and practical insights into the development and implementation of digital skills in contemporary society. The research contributes to academic discourse by proposing new frameworks for digital competency integration. From a practical standpoint, the*

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*findings offer policymakers, educators, and business leader's actionable strategies for fostering digital inclusion and technological adaptability.*

*Future research should explore the evolving nature of digital skills in response to emerging technologies such as artificial intelligence, blockchain, and quantum computing. Additionally, further studies could investigate the socioeconomic impacts of digital literacy and the role of governments in regulating digital education and workforce development. Expanding research into interdisciplinary approaches to digital skill cultivation will be essential for sustaining digital transformation initiatives globally.*

*The digital skills are no longer an option but a necessity for navigating the complexities of the modern world. This monograph serves as a crucial resource for understanding and advancing digital competency frameworks, ensuring that individuals and organizations are equipped to thrive in an increasingly digitalized future.*

*Chief editor of the monograph*
*Dr., Prof. Mykola Denysenko*

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# SECTION 1:
# FOUNDATIONS OF DIGITAL TRANSFORMATION

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# Chapter 1.1. Digital Skills as a Fundamental Right: Legal Perspectives on Digital Citizenship

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***Abstract.*** *In today's fast-paced world, the unprecedented growth of digital technologies has dramatically reshaped how individuals and society's function, impacting communication, governance, economics, and culture on a global scale. The digital transformation has permeated nearly every aspect of daily life, altering how we work, learn, and connect. As these technologies become increasingly vital, possessing a certain level of digital competence is no longer a luxury but an essential requirement for participation in modern society. This necessity transcends individual economic and social benefits, positioning digital literacy as a critical foundation for human development and inclusion. It underscores the emerging view that access to digital skills and technologies is not merely a privilege but a fundamental right. The concept of "digital citizenship" serves as a framework for understanding this shift. Digital citizenship moves beyond the notion of mere access to technology, emphasizing the need for individuals to engage with digital tools thoughtfully, responsibly, and critically. It embodies a multidimensional skill set, including media literacy, cybersecurity awareness, ethical online behavior, and the ability to navigate complex digital landscapes. These competencies are vital for fostering informed participation in digital spaces, promoting equity, and safeguarding individual and collective rights. From a legal and policy standpoint, this transformation brings forth complex questions about the role of governments, institutions, and private entities in ensuring equitable access to digital resources. Should digital literacy and connectivity be treated as rights akin to education or healthcare? If so, what legal frameworks are needed to guarantee these rights while addressing disparities in digital access, such as those caused by socioeconomic inequalities or geographical constraints? Recognizing digital competence as a fundamental right implies a reimagining of legal, educational, and economic policies to bridge the digital divide. Moreover, this recognition extends to global governance challenges, particularly in addressing digital inequality across nations. It calls for collaborative efforts to establish standards for universal digital inclusion, which is crucial in ensuring that technological advancements benefit humanity as a whole.*

***Keywords:*** *digital skills; digital rights; digital citizenship; digital literacy; legal frameworks; e-governance; human rights in the digital age.*

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**1. Conceptual Definition of Digital Skills.** The contemporary global landscape is undergoing an unprecedented digital transformation, fundamentally reshaping how societies function, communicate, and progress. Digital technologies have rapidly evolved from peripheral tools to central infrastructures that mediate nearly every aspect of human interaction, economic activity, and social engagement. This transformative process transcends mere technological adoption, representing a comprehensive restructuring of societal systems, institutional frameworks, and individual capabilities.

In this digital era, digital skills have emerged as critical competencies that determine individual and collective adaptive potential. Far beyond simple technical proficiency, these skills are now essential determinants of social mobility, economic participation, and personal empowerment.

Our research posits that digital skills representation is a complex socio-legal phenomenon that demands a holistic, interdisciplinary approach. By examining the intricate relationships between individual digital capabilities, societal infrastructure, and constitutional guarantees of access and opportunity, we aim to develop a comprehensive framework that conceptualizes digital skill development as a critical component of contemporary social justice and human development.

Digital skills represent a comprehensive ecosystem of capabilities that empower individuals to navigate, utilize, and transform digital technologies in ways that are strategically effective, ethically responsible, and socially constructive. These skills transcend traditional technological understanding, forming a complex, interconnected framework of competencies that enable meaningful engagement in increasingly digital-mediated societies.

The European Commission's "Digital Competence Framework for Citizens (DigComp)" (2018) categorizes digital skills into five key areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. In educational contexts, integrating digital skills into curricula has proven essential for preparing students for the demands of a digital economy. For instance, Estonia's national curriculum includes mandatory coding classes starting in primary school, ensuring students acquire foundational programming skills early.

The conceptualization of digital skills is structured across three fundamental and interdependent domains: technological competencies, information literacy, and digital citizenship. These domains collectively constitute the holistic

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framework of digital fluency, representing not just technical proficiency, but a sophisticated understanding of digital ecosystems' social, ethical, and functional dimensions.

***Technological Competencies***. Technological competencies refer to the set of knowledge, skills, and attitudes necessary for individuals to effectively engage with, adapt to, and leverage technology in diverse personal, professional, and societal contexts. These competencies extend beyond basic digital literacy, encompassing the ability to assess, select, and implement technological tools to solve complex problems, enhance productivity, and foster innovation.

For instance, in healthcare, technological competence involves using electronic health record systems, telemedicine platforms, and medical imaging software, ensuring quality care delivery and improved patient outcomes (Topol, 2019).

In the education sector, educators demonstrate technological competencies by integrating tools like learning management systems (e.g., Moodle or Canvas) and virtual reality applications to enhance teaching methodologies and student engagement (Redecker, 2017). The Technological Pedagogical Content Knowledge (TPACK) framework further emphasizes the integration of technology with pedagogical and content expertise, underlining the importance of contextually appropriate use of tools. Additionally, technological competencies are vital for addressing emerging challenges, such as adopting artificial intelligence in supply chain management to optimize operations or deploying renewable energy technologies to combat climate change. Initiatives like UNESCO's ICT Competency Framework for Teachers (2011) aim to provide systematic approaches for developing these skills globally, ensuring equitable access to technology's benefits. As rapid technological advancements reshape industries and societies, fostering technological competencies becomes a cornerstone of sustainable development, inclusivity, and global competitiveness.

In the intricate landscape of digital skills research, technological competencies emerge as a sophisticated theoretical construct that goes far beyond traditional notions of technical proficiency. Imagine our interaction with technology not as a simple tool-using experience, but as a complex, dynamic cognitive ecosystem where human intelligence and technological interfaces engage in a profound, continuous dialogue.

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At the heart of this construct lies a multidimensional framework that reveals how we truly interact with digital technologies. Rather than viewing technological skills as a set of mechanical procedures, researchers now understand them as a intricate system of interdependent cognitive capabilities that fundamentally reshape how we perceive, process, and interact with technological environments.

The journey of understanding technological competencies can be explored through three primary theoretical domains, each revealing a different facet of our cognitive adaptation to digital landscapes.

Operational proficiency represents the first dimension, a cognitive-instrumental realm that transforms how we manipulate digital tools. This isn't merely about knowing which buttons to press, but about developing a deep, intuitive understanding of interface architectures. Empirical research reveals something fascinating: when we interact with digital technologies, our brains don't just learn a procedure – they physically reconfigure neural pathways.

Technical problem-solving emerges as the second critical dimension, representing an analytical-diagnostic capability that extends far beyond simple troubleshooting. This domain encompasses systematic diagnostic reasoning, complex system analysis, and the development of algorithmic thinking. Neuropsychological research reveals that these problem-solving skills activate multiple cognitive networks, particularly in the prefrontal cortex – the brain's executive function center associated with complex reasoning.

The third domain, technological adaptability, represents perhaps the most profound aspect of our digital competencies. This meta-cognitive dimension embodies our capacity for continuous learning, cognitive resilience, and dynamic knowledge reconstruction. It's the mechanism that allows us to not just survive but thrive in an era of rapid technological transformation.

Cognitive flexibility becomes our primary adaptation mechanism. Like water finding its path around obstacles, our brain learns to continuously reshape its understanding, embracing new technological paradigms with remarkable plasticity. Neurological research suggests that this adaptability is not just a skill but a fundamental characteristic of human cognitive evolution.

What emerges from this exploration is a revolutionary understanding: technological competencies are not static skills to be acquired, but dynamic, living systems of cognitive adaptation. We are not passive users of technology, but

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active participants in a complex, ongoing dialogue of technological transformation.

Our digital skills represent nothing less than a profound evolutionary mechanism – a way for human intelligence to extend, reshape, and reimagine itself in an increasingly complex technological world.

***Information Literacy.*** Information literacy is the ability to recognize when information is needed and to locate, evaluate, and use that information effectively for problem-solving and decision-making. As a critical skill in the 21st century, it underpins academic, professional, and personal success by enabling individuals to navigate the vast and complex information landscape. For instance, students conducting research must critically assess the credibility of sources, differentiate between peer-reviewed studies and unverified online content, and synthesize information from multiple perspectives to construct informed arguments. This competency is guided by established frameworks, such as the Association of College and Research Libraries (ACRL) Framework for Information Literacy for Higher Education (2016), which outlines six core concepts, including the ability to assess authority, manage research processes, and apply ethical standards.

In professional contexts, information literacy is crucial for informed decision-making. Healthcare professionals, for example, utilize information literacy to access the latest medical research, evaluate treatment efficacy, and implement evidence-based practices to improve patient outcomes (Topol, 2019). Similarly, in business, executives rely on data-driven insights gathered through strategic information analysis to adapt to market changes and maintain competitiveness. The ethical dimension of information literacy is equally vital, as demonstrated by the need to avoid plagiarism in academic writing or ensure compliance with data protection laws like the General Data Protection Regulation (GDPR, 2016) in corporate settings.

As the digital age amplifies the volume and complexity of information, fostering information literacy becomes a cornerstone of lifelong learning. Governments and educational institutions worldwide, such as Finland's integration of media literacy into school curricula, aim to empower citizens with the skills to critically assess and responsibly use information. This ensures societal resilience against misinformation and enhances the ability to harness information for sustainable development.

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In the contemporary digital epoch, information literacy emerges as a sophisticated cognitive construct that transcends traditional paradigms of information consumption. This intellectual framework represents a nuanced, multidimensional approach to comprehending, critically evaluating, and ethically managing digital knowledge ecosystems.

Information literacy can be conceptualized as a complex cognitive toolkit – an epistemological navigation system that enables individuals to traverse the intricate and often opaque landscapes of digital information. It is not merely a passive receptacle for data, but an active, dynamic mechanism of intellectual discernment and knowledge construction.

The architectural complexity of information literacy is manifest through three interconnected cognitive domains:

*1. Critical Evaluation: The Epistemological Filter*. Critical evaluation represents a sophisticated cognitive mechanism of intellectual discernment. This domain transforms information consumption from a passive reception of data to an active, analytical cognitive process. During global phenomenological challenges – such as the COVID-19 pandemic – this epistemic competency became critically apparent.

When confronted with complex informational landscapes, individuals with advanced information literacy demonstrate:

- Sophisticated discrimination between authoritative scientific communications;
- Advanced navigational capabilities through conflicting informational streams;
- Nuanced prioritization of evidence-based epistemic constructs.

The neurological underpinnings of this process involve complex neural network activations, engaging multiple cognitive domains:

- Prefrontal cortex analytical processing mechanismsl
- Working memory verification systemsl
- Sophisticated comparative reasoning capabilities.

*2. Ethical Information Management: Knowledge Governance*. Beyond mere informational consumption, this domain emphasizes a normative framework for responsible knowledge interaction. It encompasses the ethical dimensions of information utilization, including:

- Intellectual property preservation;
- Academic integrity maintenance;
- Responsible information dissemination strategies.

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Academic institutions have developed advanced technological and methodological mechanisms to support this ethical framework, including:
- Sophisticated plagiarism detection algorithms;
- Comprehensive citation management systems;
- Rigorous research integrity protocols.

These are not merely bureaucratic procedures, but represent a fundamental epistemic commitment to knowledge authenticity and scholarly rigor.

*3. Strategic Research Capabilities: Knowledge Extraction and Synthesis*. This domain constitutes an advanced methodological approach to digital knowledge navigation. It transcends simplistic information retrieval, representing a complex cognitive strategy of knowledge generation and synthesis.

Researchers employing advanced information literacy capabilities:
- Interrogate specialized databases with sophisticated analytical techniques;
- Conduct comprehensive cross-disciplinary literature reviews;
- Generate intricate knowledge mapping strategies that reveal profound interconnections between conceptual domains.

Information literacy emerges not merely as a skill set, but as a profound cognitive adaptation mechanism. In our increasingly complex digital environment, it functions as:
- A sophisticated defense against misinformation;
- A mechanism of intellectual resilience;
- A dynamic framework for comprehending intricate, interconnected information ecosystems.

By synthesizing critical evaluation, ethical management, and strategic research capabilities, information literacy empowers individuals to become sophisticated knowledge navigators. It reflects a transformative evolution in our relationship with information – transitioning from passive consumption to active, discerning participation in a global knowledge ecosystem.

This construct represents more than a technological skill – it is a fundamental cognitive adaptation, reflecting humanity's ongoing negotiation with increasingly complex digital knowledge systems.

***Digital Citizenship.*** Digital citizenship refers to the responsible and ethical use of digital technologies to engage in society, participate in civic activities, and contribute to digital communities. It encompasses a broad range of competencies, including digital literacy, online etiquette, cybersecurity awareness, and respect

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for intellectual property rights. At its core, digital citizenship promotes a balance between leveraging technology for personal and collective benefit while mitigating potential harms such as misinformation, cyberbullying, and data breaches. For instance, initiatives like the International Society for Technology in Education (ISTE) Standards for Digital Citizenship provide guidelines for educators and students to foster positive digital engagement. These include respecting privacy, understanding digital footprints, and evaluating online information critically.

In our rapidly evolving digital world, the concept of citizenship has undergone a profound transformation. Digital citizenship represents far more than simply using technology – it's a sophisticated sociological framework that defines how we interact, communicate, and participate in increasingly interconnected digital ecosystems.

To truly understand digital citizenship, we must first recognize it as more than a set of technical skills. It's a comprehensive approach to human interaction in the digital age – a complex navigation system that guides individuals through the intricate terrain of technological social interaction.

At its core, digital citizenship is about developing a nuanced, ethical, and responsible approach to our digital existence. Imagine it as a sophisticated compass that helps us navigate the complex moral, social, and technological landscapes of our interconnected world.

Three Fundamental Domains of Digital Citizenship:

*1. Digital Safety and Privacy: The Protective Dimension*. Digital safety and privacy constitute the protective dimension of digital engagement, focusing on safeguarding individuals, organizations, and communities from cyber threats while ensuring the ethical and secure management of personal data. This concept encompasses a wide array of practices, including cybersecurity measures, privacy preservation, and digital literacy, aimed at mitigating risks such as identity theft, phishing, malware attacks, and unauthorized surveillance. For instance, multifactor authentication (MFA) and end-to-end encryption have become standard tools for enhancing digital safety, providing robust protection against breaches in personal and organizational systems. Governments and organizations have established frameworks like the European Union's General Data Protection Regulation (GDPR, 2016), which mandates strict guidelines for data collection,

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storage, and processing, ensuring individuals retain control over their personal information.

Digital safety represents a multi-layered protective mechanism that extends far beyond traditional security measures. Consider it a sophisticated shield that guards not just our technological interactions, but our fundamental sense of personal sovereignty in the digital realm.

To illustrate this concept, let's explore an everyday example: two-factor authentication. This security mechanism is far more than a simple login procedure. It's a complex cognitive and technological dance that:

- Actively engages individuals in their own digital protection;
- Develops an internalized awareness of potential cyber threats;
- Creates adaptive security environments that respond to emerging risks.

The neurological underpinnings of digital safety are particularly fascinating. Researchers have discovered that effective digital protection involves:

- Intricate risk assessment neural networks;
- Advanced threat recognition mechanisms;
- Adaptive behavioral modification strategies.

*2. Constructive Digital Communication: Reimagining Human Interaction*. Digital communication has transcended traditional interpersonal interactions, emerging as a sophisticated system of mediated social exchanges. Platforms like Slack and Microsoft Teams are not mere communication tools –they are complex technological ecosystems that fundamentally reshape how we collaborate, communicate, and connect.

These platforms represent more than technological infrastructure. They are:

- Dynamic knowledge generation spaces;
- Cognitive extension mechanisms;
- Adaptive communication frameworks that break down traditional geographical and organizational barriers.

*3. Civic Participation: Democracy in the Digital Age*. Perhaps the most transformative aspect of digital citizenship is its reimagining of civic engagement. Movements like #MeToo demonstrate the incredible power of digital platforms to:

- Transcend geographical limitations;
- Enable rapid, distributed collective mobilization;
- Create alternative spaces for social negotiation and power dynamics.

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Digital citizenship is not a static concept, but a dynamic adaptation strategy that reflects humanity's ongoing negotiation with technological transformation. It aims to:

- Promote inclusive digital environments;
- Establish equitable technological participation mechanisms;
- Create spaces where individual and collective potential can flourish.

By developing sophisticated digital citizenship practices, societies can:

- Mitigate risks of technological exclusion;
- Build more resilient social communication systems;
- Empower individuals through technological literacy.

**2. Constitutional Perspectives on Digital Rights.** In the contemporary technological landscape, the conceptualization of constitutional rights has undergone a fundamental epistemological transformation. The digital age demands a sophisticated reconfiguration of legal and philosophical frameworks to address the complex rights and protections inherent in a technology-mediated societal infrastructure.

The emergence of digital rights represents a critical juncture in constitutional theory, requiring a nuanced examination of how fundamental human rights intersect with technological paradigms. This discourse is not merely an academic exercise, but a profound exploration of individual sovereignty within increasingly complex technological ecosystems.

Constitutional perspectives on digital rights involve examining how fundamental rights, traditionally outlined in national constitutions, apply in the context of the digital age, where issues such as privacy, free expression, and access to information have become increasingly complex. As technology evolves, so too must constitutional protections to ensure that digital citizens are afforded the same rights and protections as they are in the physical world. For example, the European Union’s General Data Protection Regulation (GDPR, 2016) has become a pivotal legal instrument that reflects the constitutional value of privacy in the digital context, ensuring individuals have control over their personal data. In the United States, the First Amendment guarantees the freedom of speech, yet digital platforms like social media have raised new challenges regarding the balance between free expression and combating harmful content, such as hate speech or misinformation. The legal framework around these issues is still evolving, with landmark cases like Packingham v. North Carolina (2017), where the U.S.

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Supreme Court ruled that a law preventing registered sex offenders from accessing social media violated the First Amendment, underscoring the intersection of constitutional rights and digital spaces.

In addition to privacy and freedom of expression, digital rights also encompass access to information and digital equality. The right to access the internet and digital services is increasingly seen as integral to enjoying a wide array of other rights, such as education, employment, and political participation. Countries like Estonia have taken a proactive approach by recognizing internet access as a fundamental right in their constitution, providing citizens with a secure and inclusive digital infrastructure. Furthermore, constitutional frameworks must grapple with the implications of digital surveillance, as evidenced by the Carpenter v. U.S. case (2018), where the Supreme Court ruled that accessing historical cell phone data without a warrant violated constitutional privacy protections. These cases reflect the ongoing legal debates surrounding digital rights, where constitutional principles are being tested and reinterpreted in the face of rapidly advancing digital technologies. As digital spaces continue to play a central role in public and private life, ensuring robust constitutional protections for digital rights is essential to upholding democracy, equity, and individual freedoms in the digital age.

***The right to information.*** The right to information is a fundamental aspect of democratic societies, ensuring that individuals have access to the information necessary to participate fully in public life and make informed decisions. In the digital age, this right has expanded beyond traditional forms of communication, encompassing digital platforms and technologies. The right to access information is enshrined in various international human rights frameworks, such as Article 19 of the Universal Declaration of Human Rights (1948), which guarantees the freedom to seek, receive, and impart information through any media. In practice, this right has gained significant traction in the context of digital governance, where governments and institutions are increasingly held accountable for transparency and openness. The European Union's Right to Information directive, for instance, mandates that public sector information be accessible and reusable by citizens, promoting openness and reducing corruption. Similarly, countries like India have adopted robust freedom of information laws, such as the Right to Information Act of 2005, which empowers citizens to request information from public authorities, increasing governmental accountability.

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However, the right to information in the digital context is fraught with challenges, especially concerning data privacy, censorship, and misinformation. For example, while governments and institutions are required to provide access to public data, they must also ensure that the information does not compromise national security or violate privacy rights. The Cambridge Analytica scandal, where personal data from millions of Facebook users were harvested for political purposes without consent, highlighted the tension between the right to access information and the need to protect personal data in the digital space. Additionally, as digital platforms like Google and Facebook dominate the information ecosystem, concerns have arisen about the concentration of control over access to information, which may limit the diversity of viewpoints and potentially undermine the right to a free flow of information. Thus, while the right to information remains a cornerstone of democracy, it must be continually redefined in response to the evolving digital landscape to balance transparency, privacy, and the protection of democratic values.

The right to information transcends traditional conceptualizations of access, representing a sophisticated epistemological framework of knowledge acquisition and dissemination. This constitutional consideration fundamentally reimagines information as a critical mechanism of individual and collective empowerment.

Imagine information access as a complex cognitive infrastructure that guarantees individuals the ability to navigate diverse knowledge landscapes. This right goes beyond simple data retrieval, encompassing protections against systemic information manipulation and providing mechanisms for critical evaluation of digital knowledge sources. It recognizes that in our technological era, the ability to access, understand, and critically analyze information is as fundamental as the right to physical safety.

***Privacy rights.*** Privacy in the digital context emerges as a multilayered constitutional protection that extends far beyond traditional notions of personal space. It represents a complex mechanism of personal boundary maintenance and a critical defense of individual autonomy in interconnected digital environments.

The constitutional implications are profound and multifaceted. Modern privacy rights must address intricate challenges such as comprehensive data collection methodologies, algorithmic decision-making processes, and the increasingly sophisticated technological infrastructures of personal information management. This is not merely about preventing unauthorized access, but about

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maintaining fundamental human dignity in an era of pervasive technological surveillance.

Privacy rights, as a cornerstone of individual freedom and autonomy, have gained increasing significance in the digital era, where personal information is more easily collected, processed, and shared than ever before. Rooted in constitutional principles such as the right to personal security and freedom from unwarranted government interference, privacy rights ensure that individuals can control their personal information and maintain their dignity in both physical and digital spaces. International frameworks, like Article 12 of the Universal Declaration of Human Rights (1948), underscore the importance of protecting individuals from arbitrary interference with their privacy, family, home, and correspondence. Within the European Union, the General Data Protection Regulation (GDPR, 2016) represents one of the most comprehensive privacy protection laws, guaranteeing individuals control over their data and holding organizations accountable for data breaches, with stringent penalties for non-compliance. GDPR's provisions, such as the right to data portability and the right to be forgotten, empower users to manage their digital footprint and protect against misuse by corporations or unauthorized third parties.

Despite these legal protections, the digital landscape poses significant challenges to privacy rights. One major concern is the extent to which personal data is harvested by private companies for commercial purposes. For example, in the Cambridge Analytica scandal, millions of Facebook users' data were exploited without consent to influence political outcomes, highlighting the risks to privacy when large tech companies mishandle user data. Similarly, surveillance practices by governments, often justified by security concerns, raise questions about the balance between privacy and national security. The Snowden revelations in 2013, which exposed the extent of global surveillance by the U.S. National Security Agency (NSA), ignited a global debate about privacy rights in the digital age, with many arguing that mass data collection infringes on individual freedoms. Furthermore, the advent of technologies like facial recognition and location tracking has expanded the scope of surveillance, raising concerns about the erosion of privacy in public spaces. As a result, privacy rights must evolve alongside technological advancements to ensure that individuals can maintain control over their personal data while also addressing the complex challenges of modern governance, security, and digital engagement.

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***Digital Equality.*** Digital equality is the principle that all individuals, regardless of socioeconomic status, geographic location, or other demographic factors, should have equal access to and opportunities within the digital world. It encompasses not only access to digital technologies and the internet but also the ability to effectively participate in the digital economy, education, and governance. In a world increasingly defined by technological innovation, ensuring digital equality is crucial for promoting social inclusion, economic development, and democratic participation. The digital divide, which refers to the gap between those who have access to digital technologies and those who do not, remains a significant challenge. According to the International Telecommunication Union (ITU, 2023), approximately 33% of the global population still lacks access to the internet, with rural areas, lower-income countries, and certain marginalized groups disproportionately affected. This divide can exacerbate existing inequalities in education, employment, and civic participation, as those without digital access are unable to take advantage of the vast opportunities available online.

To combat this, governments and organizations have initiated various efforts to promote digital inclusion. For instance, the European Union's Digital Agenda for Europe (2024) aims to ensure high-speed internet access across all EU regions, while also promoting digital literacy and skills development to enable individuals to use digital tools effectively. In the United States, initiatives such as the E-Rate Program provide discounted internet access to schools and libraries, particularly in underserved communities, to ensure that students from all backgrounds have equal access to educational resources. Moreover, in countries like India, the Digital India program seeks to provide affordable internet access, improve digital literacy, and create more inclusive e-government services. Despite these efforts, digital equality remains a multifaceted challenge. Issues such as the affordability of internet services, the quality of infrastructure in rural or remote areas, and the lack of digital literacy are ongoing barriers that require continuous policy innovation and investment. Ensuring digital equality is not only about infrastructure but also about creating a culture of digital empowerment that enables individuals from all walks of life to participate fully in the digital world, thereby fostering social equity and global development in the 21st century.

Digital equality represents a critical constitutional imperative that addresses the potential for technological stratification. This dimension is fundamentally

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about preserving human capabilities in an increasingly technology-mediated social landscape.

Beyond mere technological distribution, digital equality encompasses guaranteed technological access, protection against digital discrimination, and robust mechanisms for technological skill development. It recognizes that in our contemporary world, technological literacy is not a luxury but a fundamental human right that determines individual and collective potential.

The theoretical significance is profound: digital equality seeks to prevent the creation of new forms of societal marginalization based on technological access and capability. It demands that societies develop comprehensive strategies to ensure that technological advancement does not create new dimensions of social exclusion.

These digital rights are not abstract theoretical constructs, but critical mechanisms for maintaining individual sovereignty in a rapidly evolving technological environment. They represent a dynamic framework for technological engagement and a sophisticated approach to preserving human agency.

The constitutional discourse surrounding digital rights must continuously adapt to emerging technological paradigms, evolving social interaction models, and the complex ethical considerations inherent in technological development. This is an ongoing philosophical negotiation, not a static set of rules.

As we contemplate these constitutional dimensions, profound questions emerge about the nature of human rights in a technological age. How do technological advancements challenge existing legal frameworks? In what ways can constitutional protections evolve to address emerging digital realities? What mechanisms can ensure that technological development remains aligned with fundamental human rights?

The discourse of digital rights is not a static field, but a dynamic, evolving theoretical landscape that requires continuous critical examination and philosophical recalibration.

This constitutional exploration represents more than a legal exercise – it is a profound meditation on human agency, technological sovereignty, and the ongoing negotiation between individual rights and technological infrastructure.

**3. Constitutional legal landscape of digital skills.** The constitutional legal landscape of digital skills refers to the intersection of constitutional law and the

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necessary competencies required to navigate the digital world effectively. As digital technologies increasingly shape the socio-economic and political fabric of societies, the development and protection of digital skills have become essential to ensuring that individuals can fully exercise their rights and participate in democratic processes. In many constitutions, the right to education is a fundamental pillar, and in the context of the digital age, this extends to the acquisition of digital literacy and skills. For example, Article 26 of the Universal Declaration of Human Rights (1948) asserts that everyone has the right to education, which now must include digital education, enabling citizens to engage with technology in an informed and responsible manner. Likewise, national constitutions, such as that of Estonia, have adapted to include the right to digital literacy as part of their commitment to a knowledge-based society, where the ability to use digital tools is seen as integral to one's participation in civic, economic, and political life.

Constitutional protections around digital skills are also shaped by the recognition that access to technology is a fundamental enabler of other rights. For instance, Charter of Fundamental Rights of the European Union (2000) guarantees citizens' right to access the internet and the protection of personal data, which necessitates a population skilled in safeguarding privacy and security online. Moreover, the rise of digital technologies has brought about calls for a constitutional recognition of the right to digital education, as seen in initiatives like the Digital Agenda for Europe (2024), which emphasizes the need for digital skills as a core component of the educational framework. In the United States, there has been a growing recognition that digital literacy is not just a matter of personal empowerment but also a constitutional concern tied to broader social rights. Legal scholars argue that, in a society where digital tools are integral to communication, commerce, and public participation, digital skills should be considered as critical as traditional literacy in safeguarding one's full participation in democratic processes. Therefore, embedding digital skills within the constitutional legal framework is not only a question of equity but of ensuring that citizens are equipped to fully exercise their fundamental rights, including freedom of expression, access to information, and participation in the democratic process, in an increasingly digital world. As technology continues to advance, the legal landscape around digital skills must evolve to ensure that all individuals have the

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tools to navigate and benefit from the digital age in a manner that is equitable and just.

*Emerging Legal Principles.* Emerging legal principles in the context of digital skills and rights reflect the need to adapt traditional legal frameworks to the rapidly evolving technological landscape. As digital technologies increasingly influence every aspect of life, new legal principles are emerging to safeguard individual rights, promote digital equity, and ensure that the benefits of technology are accessible to all. One key emerging principle is the concept of digital sovereignty, which refers to the right of individuals and nations to control their digital identity, data, and interactions in a way that respects their autonomy and values. This principle has gained prominence in the context of global data flows and the influence of multinational corporations over personal data. For instance, the European Union's General Data Protection Regulation (GDPR, 2016) embodies this principle by granting individuals greater control over their personal data, enforcing stringent requirements on companies, and promoting transparency in data handling. The GDPR has set a benchmark for global privacy laws, inspiring similar regulations in countries like Brazil (LGPD) and California (CCPA), illustrating the spread of this emerging legal principle.

Another emerging principle is digital inclusion, which emphasizes the need for equitable access to technology and digital skills across diverse populations. The principle of digital inclusion addresses the risks of social exclusion, economic disparity, and political marginalization in an increasingly digital world. The UN's Broadband Commission for Sustainable Development has emphasized that digital inclusion is crucial for achieving the Sustainable Development Goals (SDGs), particularly Goal 9 (Industry, Innovation, and Infrastructure) and Goal 10 (Reduced Inequality). The Digital India initiative, launched in 2015, aims to bridge the digital divide by ensuring that all citizens, particularly those in rural and underserved areas, have access to digital infrastructure, education, and government services. Similarly, in the United States, the E-Rate Program provides affordable internet access to schools and libraries, ensuring that underserved students can access educational content and participate in the digital economy. These initiatives reflect a growing recognition that digital equality is a fundamental legal principle in the 21st century.

Additionally, the principle of digital rights has emerged as a legal response to the challenges posed by digital technologies. Digital rights encompass a broad

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range of rights, including privacy, freedom of expression, and access to information in the digital realm. A notable example is the right to be forgotten, enshrined in the EU's GDPR, which allows individuals to request the removal of personal data from online databases under certain conditions. This principle challenges the traditional notion of permanent data retention and reflects a shift in how rights are conceptualized in the digital age. Similarly, the freedom of expression in the digital space is now increasingly recognized as a vital constitutional right, as evidenced by court rulings in countries like the United States and India, which have affirmed that individuals retain their right to free speech and assembly online, including on social media platforms.

These emerging legal principles – digital sovereignty, digital inclusion, and digital rights – reflect the need for a dynamic and adaptive legal framework that can respond to the complexities of the digital age. As technology continues to evolve, these principles will likely play an increasingly central role in shaping the legal landscape of the digital world, ensuring that individuals' rights are protected while fostering innovation and equitable access.

Based on the results of the research, we systematized digital skills as a fundamental right for digital citizenship. This framework is important for promoting equitable access to and participation in the digital society. Table 1 systematizes digital skills, structured around three key pillars of digital citizenship (Table 1.1).

This systematization reflects the critical role digital skills play in enabling full participation in the digital age, addressing issues of equity, inclusion, and ethical digital engagement. By integrating these skills into legal and educational frameworks, societies can uphold the principles of digital citizenship and ensure a fair and just digital transformation.

Based on the results of the conducted research, the future research perspectives are identified regarding digital skills, rights, and their role in modern societies:

– *Exploration of digital skills as a fundamental right* - research can further analyze the legal and philosophical foundations of treating digital skills as a fundamental human right, akin to education and healthcare. This includes examining the implications of codifying these rights in national constitutions and international frameworks;

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**Table 1.1. The digital skills as a fundamental right for digital citizenship**

| Skill/Competency | Description |
|---|---|
| *Technological Competencies* | |
| Operational Proficiency | Basic skills for operating devices, managing software applications, and navigating the internet. |
| Problem-Solving | Analytical abilities to troubleshoot technical issues and adapt to new technologies. |
| Adaptability | Capacity to learn emerging technologies and integrate them into personal and professional settings. |
| Contextual Integration | Use of domain-specific technologies, such as electronic health records or enterprise software. |
| *Information Literacy* | |
| Critical Thinking | Assessing the credibility and reliability of online information to counter misinformation. |
| Ethical Use of Information | Understanding data privacy, intellectual property rights, and ethical practices in sharing information. |
| Strategic Research Skills | Navigating digital systems like databases and big data tools to synthesize knowledge for decision-making. |
| Media Literacy | Identifying bias, detecting manipulation, and understanding digital content's social and political impact. |
| *Digital Citizenship Competencies* | |
| Safety and Privacy Awareness | Safeguarding personal information and practicing cybersecurity measures such as using strong passwords. |
| Constructive Online Communication | Ethical and respectful interaction on digital platforms, emphasizing collaboration and inclusivity. |
| Civic Engagement | Using digital tools for activism, informed voting, and political participation. |
| Digital Inclusion and Equity | Ensuring equal access to technology and opportunities to close the digital divide. |
| *Legal and Ethical Dimensions* | |
| Digital Rights | Equitable access to digital technologies as a constitutional right, akin to education and healthcare. |
| Policy Initiatives | Frameworks like the European e-Competence Framework and UNESCO's ICT Competency Framework for Teachers. |
| International Examples | Examples such as Estonia's recognition of internet access as a fundamental right and India's Digital India initiative. |

*Source: compiled by the authors*

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- *Bridging the digital divide* - future studies should focus on policies and strategies for reducing digital inequalities. This includes addressing socioeconomic disparities, regional disparities, and accessibility issues in both developed and developing nations;
- *Integration of digital citizenship in education* - investigating the development of digital citizenship curricula across educational systems worldwide, particularly focusing on integrating ethical and critical aspects of digital engagement into early education;
- *Technological adaptability and lifelong learning* - further exploration is needed on fostering lifelong learning environments that adapt to rapid technological changes. This could include analyzing innovative models like micro-credentialing and personalized e-learning pathways;
- *Legal frameworks for digital inclusion* - studies could investigate how governments and international organizations are adapting legal frameworks to promote digital inclusion and how these frameworks address privacy, equity, and accessibility challenges;
- *Digital rights and governance in emerging technologies* - research can focus on the interplay between digital rights and the governance of emerging technologies such as artificial intelligence, blockchain, and the Internet of Things (IoT). This includes ethical concerns, regulatory mechanisms, and equitable access;
- *Global standards for digital competence* - examination of global initiatives, such as the European Union's DigComp framework, and their scalability to other regions. Research should evaluate their effectiveness in building digital competencies and facilitating workforce mobility;
- *The impact of artificial intelligence on digital skills* - investigating how AI tools are reshaping the requirements for digital skills, particularly the balance between human capabilities and AI-driven automation;
- *Privacy and data protection in the digital era* - future studies should address evolving privacy concerns and the need for stronger legal safeguards against misuse of personal data, particularly in the context of increasing reliance on digital platforms;
- *Intersection of digital skills and economic growth* - research on how enhanced digital skills contribute to economic development, productivity, and innovation

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at local, national, and global levels. Studies could also examine the return on investment for digital skill programs in various sectors;

– *Multidisciplinary approaches to digital skill development* - emphasizing interdisciplinary research that combines insights from education, law, sociology, and technology to create comprehensive frameworks for developing digital competencies.
– *Impact of cultural diversity on digital literacy* - exploring how cultural contexts influence the development and adoption of digital skills, including localized approaches to training and education.

These perspectives can guide future research agendas and policymaking to ensure that digital transformation benefits individuals and societies equitably and sustainably.

**Conclusion.** Digital skills are no longer a luxury but a necessity for meaningful participation in contemporary society. They represent a multidimensional competency framework that integrates technological, informational, and ethical dimensions to empower individuals in navigating the digital age. Recognizing digital skills as a fundamental right necessitates a collaborative effort among governments, institutions, and the private sector to create equitable access and robust legal protections.

Moving forward, the integration of digital competencies into legal frameworks and educational systems will be pivotal in bridging the digital divide. This will ensure not only that all individuals have the opportunity to thrive in the digital economy but also that they are equipped to engage responsibly and ethically in digital spaces. By fostering a culture of continuous learning and innovation, societies can ensure that technological advancements serve as a force for inclusive growth and human development.

**References:**

1. Charter of Fundamental Rights of the European Union. (2000). URL : https://www.europarl.europa.eu/charter/pdf/text_en.pdf
2. Digital agenda for Europe. (2024). URL : https://www.europarl.europa.eu/factsheets/en/sheet/64/digital-agenda-for-europe
3. Digital Competence Framework for Citizens (DigComp) (2018). Retrieved from: https://shorturl.at/M5G0j
4. ITU Report Reveals Two Digital Divides, Underscores the Importance of Inclusive Wireless Networks for Connecting the 2.6 Billion Unconnected Pop (2023) URL : https://shorturl.at/rLOZB.
5. Packingham v. North Carolina (2017). URL : https://www.supremecourt.gov/opinions/16pdf/15-1194_08l1.pdf
6. Punie, Y., editor(s), Redecker, C., European Framework for the Digital Competence of Educators: DigCompEdu , EUR 28775 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

92-79-73718-3 (print),978-92-79-73494-6 (pdf), doi:10.2760/178382 (print),10.2760/159770 (online), JRC107466.
7. The Association of College and Research Libraries (ACRL) Framework for Information Literacy for Higher Education. (2016). Retrieved from: https://www.ala.org/acrl/standards/ilframework
8. The Regulation (EU) 2016/679 (General Data Protection Regulation) in the current version of the OJ L 119, 04.05.2016; cor. OJ L 127, 23.5.2018 Retrieved from: https://gdpr-info.eu
9. The Right to Information Act of 2005. (2005). URL : https://rti.gov.in/rti%20act,%202005%20(amended)-english%20version.pdf
10. Topol, E.J. (2019) Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again. Basic Books.
11. UNESCO ICT Competency Framework for Teachers. Retrieved from: https://unesdoc.unesco.org/ark:/48223/pf0000213475_rus
12. Universal Declaration of Human Rights (1948). URL : https://www.un.org/en/about-us/universal-declaration-of-human-rights
13. US Supreme Court expands digital privacy rights in *Carpenter v. United States*. URL : https://www.dataprotectionreport.com/2018/06/scotus-expands-digital-privacy-rights-carpenter/#

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# Chapter 1.2. Competency Frameworks for Digital Economies: A Focus on IT Skills

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***Abstract.*** *The digitalization of the economy represents a transformative shift in how industries, governments, and individuals operate and interact. This study delves into the development of IT skills and competencies as pivotal drivers of economic growth, innovation, and competitiveness in the digital age. The research explores the implications of digital transformation for labor markets, educational systems, and organizational structures, highlighting the critical role of IT literacy and technical expertise in shaping the future economy. The main aim of this chapter is to propose a comprehensive framework for bridging the digital skills gap, enhancing workforce adaptability, and ensuring that economic systems can harness the full potential of IT-driven innovation and efficiency. The study identifies key trends in digital competency demands, including proficiency in data analytics, artificial intelligence (AI), cybersecurity, and cloud computing. It examines the challenges faced by various economic sectors in adapting to these changes, such as the skills gap, inadequate access to digital education, and resistance to adopting new technologies. Additionally, the research presents a comparative analysis of global best practices in fostering IT skills, offering actionable insights for policy-makers, educators, and industry leaders. By proposing a structured model for IT skill development, the study aims to bridge the gap between the skills required by the digital economy and the existing workforce capabilities. This includes short-term strategies for foundational training, medium-term goals for integrating advanced IT courses in educational curricula, and long-term plans for fostering a culture of lifelong learning and innovation. The findings underscore the necessity of aligning IT competency development with economic policies to ensure inclusive growth and resilience in the face of technological disruption.*

***Keywords:*** *Digitalization, IT skills, competencies, economic growth, workforce development, digital economy, innovation, Fourth Industrial Revolution, emerging technologies, artificial intelligence (AI), data analytics, cybersecurity, cloud computing, education, digital transformation, skills gap, lifelong learning, workforce adaptability, policy-making, economic competitiveness.*

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**1. The genesis of competency frameworks for digital economies.** In the rapidly evolving landscape of digital economies, competency frameworks have become indispensable for aligning workforce capabilities with the demands of technological innovation. These frameworks provide structured methodologies to define, assess, and enhance the skills necessary for individuals and organizations to thrive in an increasingly digitalized world. This document explores the evolution of competency frameworks, particularly with a focus on IT skills, and their pivotal role in shaping the workforce of the future.

*The genesis of competency frameworks*. Competency frameworks originated as tools for human resource development, aiming to outline the specific skills, knowledge, and behaviors required for various roles within organizations. Early frameworks were often broad, covering general professional competencies such as communication, problem-solving, and leadership. However, with the advent of the digital age, the need for specialized frameworks targeting technical skills, especially in IT, became apparent.

In their early stages, competency frameworks were largely reactive, developed in response to emerging industrial needs. They served as templates for defining job descriptions and performance appraisals, often tailored to address specific organizational goals. However, these initial iterations lacked the flexibility and granularity needed to address the dynamic nature of IT advancements, which soon became critical as digital technologies began to permeate every industry.

The concept of competency frameworks can be traced back to the mid-20th century when organizational psychologists and human resource practitioners began focusing on the alignment between individual capabilities and job requirements. McClelland's (1973) seminal work, "Testing for Competence Rather Than Intelligence," marked a significant shift in thinking. McClelland argued that traditional intelligence tests and academic qualifications were insufficient predictors of job performance. Instead, he proposed the identification of specific competencies—observable behaviors, skills, and attributes—as a more accurate approach.

Following McClelland's insights, the 1980s and 1990s witnessed a growing interest in competency-based approaches within organizations. Researchers such as Boyatzis (1982) emphasized the role of competencies in managerial effectiveness. Boyatzis' framework identified key clusters of competencies,

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including emotional intelligence, cognitive abilities, and social skills, that differentiated high-performing managers from their peers. This research laid the groundwork for broader applications of competency frameworks across various professional domains.

During this period, industries began to recognize the potential of competency frameworks as tools for workforce development. Early adopters included sectors with well-defined professional standards, such as healthcare, education, and engineering. For example, the development of nursing competencies in the United States and the United Kingdom demonstrated the value of structured frameworks in ensuring consistent quality and performance across diverse roles and settings (Delamare Le Deist & Winterton, 2005).

As competency frameworks evolved, they transitioned from being static documents to dynamic systems capable of adapting to changing organizational needs. This shift was influenced by advancements in human resource management practices, such as performance appraisal, talent management, and succession planning. The emergence of the competency movement in the 1990s further reinforced the importance of these frameworks in aligning workforce capabilities with strategic goals (Spencer & Spencer, 1993).

With the advent of digital technologies in the late 20th century, the scope of competency frameworks expanded to include technical and IT-related skills. Researchers and practitioners began emphasizing the need for frameworks that could address the unique demands of the digital economy. For instance, the European Union's introduction of the European e-Competence Framework (e-CF) in 2008 marked a significant milestone in the development of IT-specific competency frameworks. The e-CF provided a standardized reference for IT professionals, facilitating workforce mobility and aligning educational programs with industry needs (CEN, 2008).

*Digital transformation and the shift to IT-specific competencies*. The digital transformation of industries has driven significant shifts in the nature of work, necessitating a reevaluation of traditional competencies. As businesses embraced technologies like cloud computing, big data, artificial intelligence (AI), and cybersecurity, the demand for a workforce proficient in these domains skyrocketed.

IT-specific competency frameworks began to emerge in response to these trends. Organizations such as the European e-Competence Framework (e-CF) and

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the Skills Framework for the Information Age (SFIA) have been at the forefront, providing detailed guidelines for IT roles. These frameworks categorize skills into domains such as software development, data analysis, and IT governance, offering a standardized approach to workforce development in the digital economy.

Unlike their predecessors, modern IT-focused frameworks emphasize not only technical proficiency but also adaptability, innovation, and interdisciplinary skills. They aim to bridge the gap between traditional IT roles and the broader business contexts in which these roles operate, ensuring that IT professionals can contribute strategically to organizational objectives.

Digital transformation has redefined the competencies required for success across industries, placing IT skills at the forefront of workforce development. Researchers have extensively examined the intersection of digital transformation and competency frameworks, shedding light on the evolving demands of a technology-driven economy.

One of the earliest and most significant shifts highlighted in the literature is the integration of advanced technologies such as cloud computing, big data, artificial intelligence (AI), and cybersecurity into organizational workflows. Westerman, Bonnet, and McAfee (2014) argued in their book "Leading Digital" that businesses achieving digital mastery invest heavily in IT-specific competencies to maintain competitive advantage. These investments include not only technical expertise but also skills in digital strategy and innovation.

Carnevale, Smith, and Melton (2011) further underscored the rising demand for IT-specific skills, noting that as industries adopted digital tools, roles traditionally considered non-technical began requiring a baseline understanding of technology. For instance, marketing professionals now need to analyze data-driven insights, and manufacturing roles often demand familiarity with automation systems.

Competency frameworks evolved to address these requirements by categorizing IT-specific skills into comprehensive domains. The Skills Framework for the Information Age (SFIA) and the European e-Competence Framework (e-CF) are prominent examples of such frameworks. SFIA emphasizes competencies across a spectrum of IT-related domains, from software development to IT governance (SFIA Foundation, 2021). Meanwhile, the e-CF

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provides granular descriptions of skills, ensuring relevance to specific job roles while remaining adaptable to technological advancements (CEN, 2016).

Emerging fields like artificial intelligence, machine learning, and blockchain have further influenced competency frameworks. Research by Bughin et al. (2018) highlighted the growing importance of skills in designing and managing machine learning algorithms, interpreting AI outputs, and developing ethical frameworks for AI deployment. These competencies have been integrated into modern frameworks to prepare professionals for cutting-edge technological challenges.

Moreover, cybersecurity has become a critical focus in competency development due to the escalating frequency and sophistication of cyber threats. A study by the World Economic Forum (2020) identified cybersecurity skills as among the top priorities for organizations undergoing digital transformation. Competency frameworks now emphasize knowledge in threat analysis, risk mitigation, and compliance with regulatory standards such as GDPR and ISO/IEC 27001.

Soft skills, or human-centric competencies, have also gained prominence in IT-specific frameworks. Research by Majchrzak, Markus, and Wareham (2016) emphasized the need for IT professionals to collaborate across disciplines, communicate complex ideas effectively, and drive innovation through teamwork. These findings have driven the integration of communication, leadership, and project management skills into IT competency frameworks.

In response to global digital transformation, frameworks like the Singapore SkillsFuture initiative have emerged, focusing on lifelong learning and adaptability in IT roles. SkillsFuture exemplifies a dynamic approach to competency development, leveraging data analytics to predict future skill demands and tailor training programs accordingly (Singapore Government, 2018).

Acemoglu and Autor (2011) explored the interplay between skills, tasks, and technologies, emphasizing their implications for employment and income distribution. Their work highlights how digital skills shape labor markets and economic outcomes.

Brynjolfsson and McAfee (2014) investigated the impact of brilliant technologies on work and economic prosperity, emphasizing the necessity of digital competencies in adapting to the second machine age.

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Florida (2002) examined the relationship between technology, creative skills, and regional economic development, stressing the role of digital literacy in fostering innovation. Frey and Osborne (2013) focused on job susceptibility to automation, emphasizing the growing demand for IT skills to mitigate risks of job displacement. Mazzucato (2018) addressed the value of innovation and technology in the global economy, linking IT skills to economic productivity and equitable development. Michael E. Porter (1985) - highlighted the role of IT as a driver of competitive advantage, stressing its strategic significance for performance enhancement. World Economic Forum (2020) - analyzed future trends in employment, highlighting the increasing demand for digital skills and their role in shaping global labor markets.

Andriy Zahorulko (2021) - investigated strategic IT management in Ukrainian aviation, emphasizing its role in driving competitiveness and efficiency. Oksana Pyshnograeva (2022) - explored the impact of digital transformation on the Ukrainian aviation sector, focusing on IT-driven modernization and efficiency. Nataliia Zachosova, Zinaida Zhyvko et al. (2021): Discussed strategic priorities for security-oriented management in financial markets, emphasizing IT's role in ensuring operational resilience. Zavhorodnii A.V. (2020) - Highlighted IT's strategic role in enhancing competitiveness within Ukraine's economic framework.

This diverse body of research underscores the pivotal role of IT skills and competencies in driving innovation, competitiveness, and resilience across various economic domains.

*Digital transformation and the shift to IT-specific competencies***.** The digital transformation of industries has driven significant shifts in the nature of work, necessitating a reevaluation of traditional competencies. As businesses embraced technologies like cloud computing, big data, artificial intelligence (AI), and cybersecurity, the demand for a workforce proficient in these domains skyrocketed.

IT-specific competency frameworks began to emerge in response to these trends. Organizations such as the European e-Competence Framework (e-CF) and the Skills Framework for the Information Age (SFIA) have been at the forefront, providing detailed guidelines for IT roles. These frameworks categorize skills into domains such as software development, data analysis, and IT governance, offering a standardized approach to workforce development in the digital

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economy. Unlike their predecessors, modern IT-focused frameworks emphasize not only technical proficiency but also adaptability, innovation, and interdisciplinary skills. They aim to bridge the gap between traditional IT roles and the broader business contexts in which these roles operate, ensuring that IT professionals can contribute strategically to organizational objectives.

Based on the results of our research, we have systematized the main stages of the evolution of IT skills within the framework of competencies (Table 1.2).

**Table 1.2. Evolution of IT Skills in Competency Frameworks**

| Aspect | Description |
|---|---|
| Early Focus on Technical Expertise | The initial iterations of IT-focused competency frameworks emphasized technical skills such as programming, system administration, and hardware maintenance. These frameworks were role-centric, defining expertise for positions like network administrators and software developers. The focus was on ensuring deep technical expertise for task execution. |
| Integration of Soft Skills | As IT roles expanded to include client-facing and cross-functional responsibilities, the importance of soft skills like communication, teamwork, and project management became evident. Frameworks now include these to ensure holistic development, such as the ability to articulate technical concepts to non-technical stakeholders. |
| Inclusion of Emerging Technologies | The rapid pace of technological advancements necessitated updates to include competencies in fields like AI, blockchain, and IoT. Frameworks now cover skills such as machine learning algorithm design, blockchain architecture, and IoT device management, ensuring relevance to current technological trends. |
| Focus on Cybersecurity and Ethical Considerations | Frameworks evolved to prioritize cybersecurity skills and ethical competencies due to increasing concerns over data privacy and cyber threats. Knowledge of regulatory frameworks (e.g., GDPR) and skills in threat detection are now integral. Ethical considerations, such as responsible AI use, are also emphasized. |
| Customization for Industry-Specific Needs | Frameworks now offer customization tailored to specific sectors like healthcare, finance, and manufacturing. For example, health IT competencies may focus on electronic health records, while finance emphasizes blockchain and algorithmic trading systems. |

*Source: developed by the authors*

*The Role of Competency Frameworks in Workforce Development.* Competency frameworks play a crucial role in shaping and advancing workforce development in digital economies. They serve as a foundational tool to identify, assess, and enhance the skills and capabilities required to meet organizational and industry demands. One of the primary functions of competency frameworks is standardization. By establishing a common language for skills and competencies, these frameworks facilitate collaboration across industries and geographies. This

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standardization helps organizations benchmark workforce capabilities against industry norms and global best practices.

Another significant aspect of competency frameworks is their utility in conducting skill gap analyses. Organizations can leverage these frameworks to identify areas where their workforce may lack critical skills or competencies. This enables the development of targeted training and upskilling programs to address these gaps. For instance, a company transitioning to cloud-based solutions can use a competency framework to assess employees' proficiency in cloud technologies and implement initiatives to improve their expertise.

Competency frameworks also play a vital role in defining career pathways. They provide clear guidelines for career progression by outlining the skills and competencies required for advancement. This empowers employees to take ownership of their professional development and fosters talent retention by offering structured growth opportunities.

Furthermore, these frameworks align educational institutions with industry requirements. By collaborating with academia, organizations ensure that academic curricula are tailored to produce graduates equipped with relevant skills. This alignment between education and industry needs enhances the employability of graduates and ensures a steady supply of skilled professionals for the workforce.

Lastly, competency frameworks support workforce mobility by standardizing skill definitions. Professionals can use recognized competencies to explore opportunities across organizations and regions, contributing to a dynamic and interconnected labor market. This mobility fosters innovation and adaptability within the workforce, enabling organizations to remain competitive in an ever-changing digital economy.

Competency frameworks serve multiple purposes in digital economies (Figure 1.1).

Looking ahead, the integration of AI-driven tools and real-time labor market analytics can enhance the adaptability of competency frameworks. These technologies can provide dynamic updates, personalized recommendations, and predictive insights, ensuring that frameworks remain relevant in the face of continuous change.

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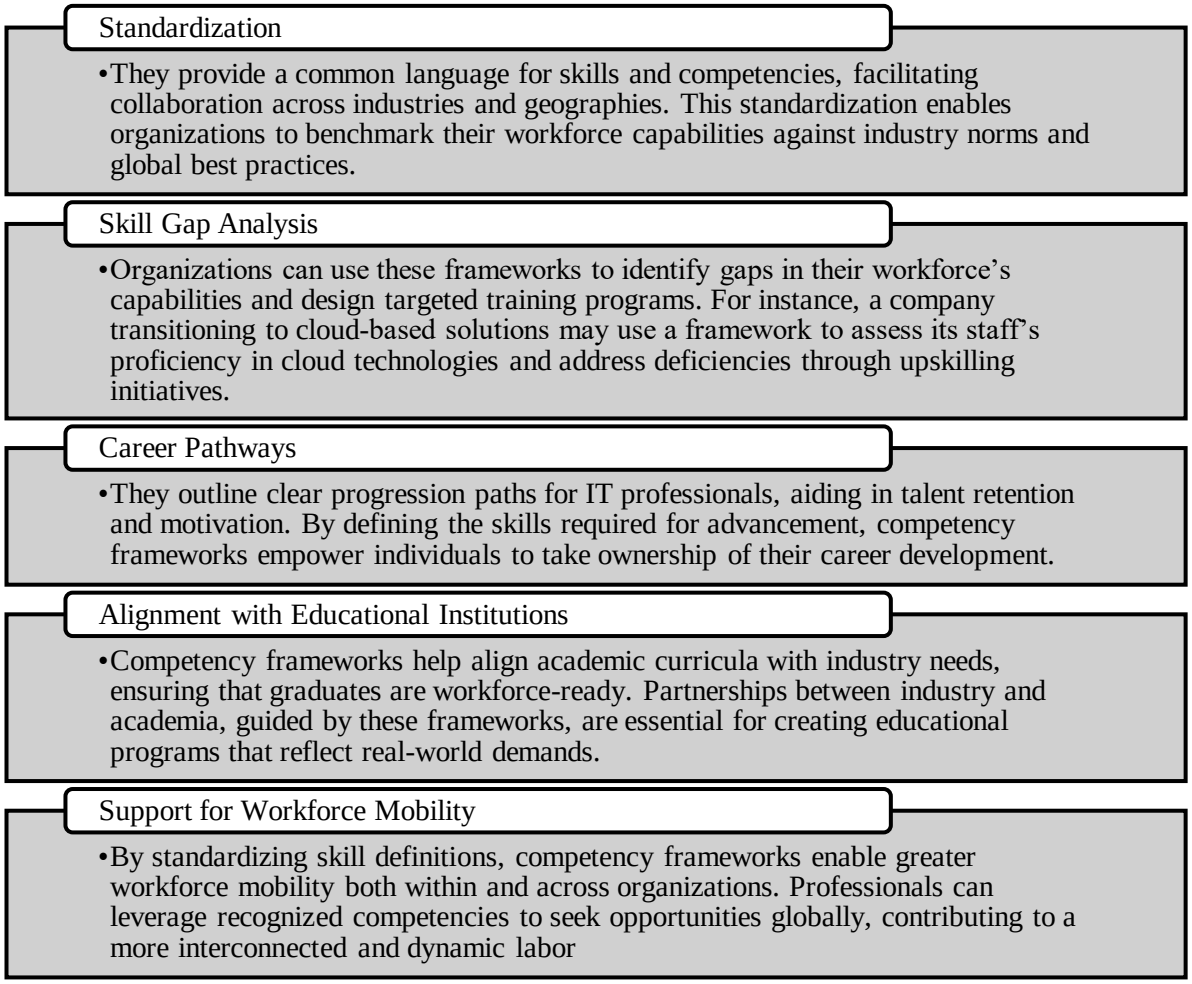


**Figure 1.1. The multiple purposes of competency frameworks in digital economies**

*Source: developed by the authors*

The evolution of competency frameworks for IT skills reflects the broader transformation of work in digital economies. By defining and standardizing the skills required for success, these frameworks have become essential tools for workforce development. As digital economies continue to grow, the ongoing refinement and adaptation of these frameworks will be critical to bridging skill gaps, fostering innovation, and ensuring inclusive growth. In a world where technological change is the only constant, competency frameworks stand as a vital bridge between today's workforce and the demands of tomorrow's digital economy.

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**2. The essence of IT skills and competencies and their role for company personnel.** In the digital era, IT skills and competencies are no longer optional but essential for the efficient functioning and competitiveness of companies across industries. These skills encompass a broad range of technical, analytical, and interpersonal abilities that enable employees to effectively leverage technology in their daily tasks and strategic initiatives.

IT skills and competencies have become indispensable assets for organizational personnel, playing a critical role in enhancing productivity, innovation, and adaptability. Literature on the subject emphasizes that IT skills go beyond technical proficiency, encompassing a blend of domain-specific expertise, problem-solving capabilities, and interpersonal skills that collectively drive organizational success.

Davenport and Harris (2007) argue that IT competencies are at the core of data-driven decision-making processes within organizations. Their research highlights the value of skills such as data analytics, database management, and programming in enabling employees to derive actionable insights from complex datasets. Similarly, Byrd and Turner (2001) emphasize the strategic role of IT competencies in fostering organizational agility, particularly in rapidly changing markets.

Moreover, IT competencies are seen as enablers of innovation. Research by Bharadwaj (2000) highlights the transformative impact of IT skills on product development, customer engagement, and process optimization. Organizations with a workforce proficient in emerging technologies such as cloud computing and artificial intelligence are better positioned to innovate and gain competitive advantages in their respective industries.

Interpersonal and collaborative skills also form an essential component of IT competencies. Studies by Reich and Benbasat (2000) underscore the importance of aligning IT personnel with business objectives through effective communication and teamwork. These competencies enable IT professionals to work seamlessly with cross-functional teams, ensuring that technical solutions align with broader organizational goals.

The role of IT skills in addressing cybersecurity challenges is another critical focus in the literature. Research by Von Solms and Van Niekerk (2013) highlights the growing need for competencies in cybersecurity risk assessment, threat mitigation, and compliance with regulatory frameworks. Organizations equipped

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with skilled personnel in these areas are better prepared to safeguard their operations from cyber threats.

Furthermore, IT competencies are integral to workforce development and employee retention. Studies by Agarwal and Ferratt (2001) indicate that organizations investing in upskilling and reskilling programs for their IT personnel experience higher levels of job satisfaction and employee engagement. These programs not only address skill gaps but also empower employees to adapt to emerging technologies, fostering a culture of continuous learning.

**Table 1.3. Essence of IT Skills and Competencies**

| Category | Skill/Competency | Description |
|---|---|---|
| Core IT Skills | Technical Proficiency | Mastery of software applications, programming languages, and IT tools like data management systems, cloud platforms, and cybersecurity solutions. |
| | Digital Literacy | The ability to use and understand digital technologies, ensuring seamless adaptation to workplace tools and processes. |
| Advanced IT Competencies | Data Analytics | Skills to interpret and utilize data for informed decision-making and problem-solving. |
| | Cybersecurity Knowledge | Expertise in protecting digital assets, ensuring data integrity, and mitigating security threats. |
| | AI and Automation Understanding | Familiarity with artificial intelligence, machine learning, and robotic process automation to drive innovation. |
| Soft Skills in IT Context | Critical Thinking | Analyzing technological trends and their implications for the business. |
| | Adaptability | Quickly learning and integrating new tools or systems in a dynamic digital environment. |
| | Collaboration | Effective teamwork in cross-functional and often remote settings enabled by IT solutions. |

*Source: developed by the authors*

***Role of IT skills and competencies for personnel.*** The role of IT skills and competencies for personnel is essential in today's digital landscape, as they enable individuals to effectively contribute to the success of organizations while adapting to technological advancements. Here are the key aspects of their importance:

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– *driving productivity and efficiency* - mastery of IT tools and systems allows personnel to automate repetitive tasks, manage workflows, and streamline processes, enhancing productivity and operational efficiency.

– *enabling informed decision-making* - advanced competencies such as data analytics empower individuals to interpret complex datasets and derive actionable insights, enabling evidence-based decision-making and problem-solving.

– *ensuring security and risk management* - cybersecurity skills are critical for safeguarding sensitive data and protecting organizational assets from potential threats, ensuring business continuity and regulatory compliance.

– *facilitating innovation and competitiveness* - understanding emerging technologies like artificial intelligence and automation helps personnel drive innovation, adopt cutting-edge solutions, and maintain a competitive edge in the market.

– *adapting to dynamic environments* - digital literacy and adaptability equip employees to quickly learn and implement new technologies, ensuring resilience in rapidly changing digital environments.

– *promoting collaboration and connectivity* - IT skills enable seamless communication and collaboration, especially in remote or cross-functional teams, fostering a culture of teamwork and collective problem-solving.

– *enhancing customer experience* - proficiency in IT tools helps personnel deliver better customer experiences through efficient service delivery, personalized solutions, and robust support systems.

By developing and leveraging these skills, personnel become valuable assets to their organizations, capable of meeting the demands of modern workplaces and contributing to sustained growth and success.

**3. Investment in improving IT skills and competencies.** Investing in IT skills and competencies is a strategic priority for organizations aiming to thrive in an increasingly digital economy. The benefits of such investments are multifaceted, enabling businesses to enhance productivity, foster innovation, and maintain competitiveness. This approach is especially critical for industries experiencing rapid technological advancements, where a skilled workforce serves as the foundation for success.

In today's rapidly evolving digital landscape, the importance of investing in the development of IT skills and competencies has been widely acknowledged in academic and industry literature. The integration of advanced technologies into

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workplace processes has created a demand for a workforce equipped with technical expertise and adaptability. This literature review examines studies and frameworks that explore the rationale, benefits, and best practices for investing in IT skills enhancement.

Studies highlight that the accelerating pace of technological innovation requires continuous upskilling and reskilling of the workforce. According to the World Economic Forum (2020), over 50% of employees will need significant skill upgrades by 2025 to meet emerging industry demands. Similarly, Brynjolfsson and McAfee (2014) emphasize that digital transformation has introduced new job roles that require specialized skills, including data analytics, artificial intelligence, and cybersecurity.

The literature also underscores the growing skills gap as a critical challenge. For instance, the International Data Corporation (IDC) reports that nearly 60% of organizations face challenges in recruiting IT professionals with the required competencies (IDC, 2022). This skills gap not only hampers organizational efficiency but also slows down innovation and economic growth.

Investing in IT skills delivers multifaceted benefits for both individuals and organizations. Studies by Acemoglu and Restrepo (2018) indicate that firms with highly skilled IT professionals experience higher productivity and innovation levels. Additionally, digital proficiency contributes to organizational resilience by enabling businesses to adapt to dynamic market conditions (Anderson, 2021).

On an individual level, employees with advanced IT skills enjoy enhanced employability, career growth opportunities, and competitive salaries. Research by McKinsey & Company (2021) highlights that IT upskilling programs result in a 20-30% increase in employee satisfaction and retention rates.

Organizations increasingly implement tailored training initiatives to address specific skill gaps. For example, Amazon’s Upskilling 2025 initiative aims to train 100,000 employees in fields like cloud computing and machine learning (Amazon, 2020).

Collaboration between academia, industry, and governments has proven effective in bridging the skills gap. The European Union’s Digital Skills and Jobs Coalition exemplifies such partnerships, promoting large-scale IT skills development programs.

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Studies by Skillsoft (2021) reveal that online learning platforms and modular certifications allow employees to learn at their own pace, making training more accessible and scalable.

Research emphasizes the need to complement technical training with soft skills, such as critical thinking and collaboration. According to Harvard Business Review (2019), blending these competencies enhances the overall effectiveness of IT professionals.

Despite the recognized benefits, challenges persist in implementing IT skills programs. Funding constraints, especially in small and medium-sized enterprises (SMEs), remain a significant barrier. Additionally, resistance to change and lack of engagement among employees can hinder program success (Deloitte, 2020).

Another challenge lies in keeping training programs aligned with rapidly evolving technologies. Studies by Gartner (2021) stress the importance of continuous curriculum updates to ensure relevance.

***Opportunities of Investment in IT Skills.*** Investment in IT skills and competencies opens numerous opportunities for organizations, employees, and economies (Figure 2.2).

***Plan for improving IT skills.*** Developing IT skills effectively requires a structured and phased approach. This ensures that the process is systematic, measurable, and aligned with the needs of individuals or organizations. A general plan for improving IT skills can be outlined in the following phases:

*Phase 1: Assessment and planning.* This phase involves evaluating current skill levels and identifying gaps to align training objectives with organizational or individual needs. Conducting a skills gap analysis helps determine areas for improvement, whether in technical competencies, such as data analytics or cybersecurity, or in soft skills, like collaboration. Clear objectives and measurable goals should be established to ensure the training initiatives address specific requirements. Resource allocation, including budget, time, and access to training platforms or expertise, is also critical in this phase.

*Phase 2: Design and development.* The design phase focuses on creating tailored training programs to address identified gaps. The curriculum should cover both core IT skills (e.g., programming, cloud computing) and advanced competencies (e.g., AI, machine learning), complemented by soft skills like critical thinking and adaptability. Organizations must select appropriate training modalities, such as online courses, in-person workshops, or hybrid methods.

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Partnerships with educational institutions or e-learning providers can enhance the quality and relevance of the training content. This phase ensures the programs are both scalable and adaptable to technological trends (Figure 1.2).

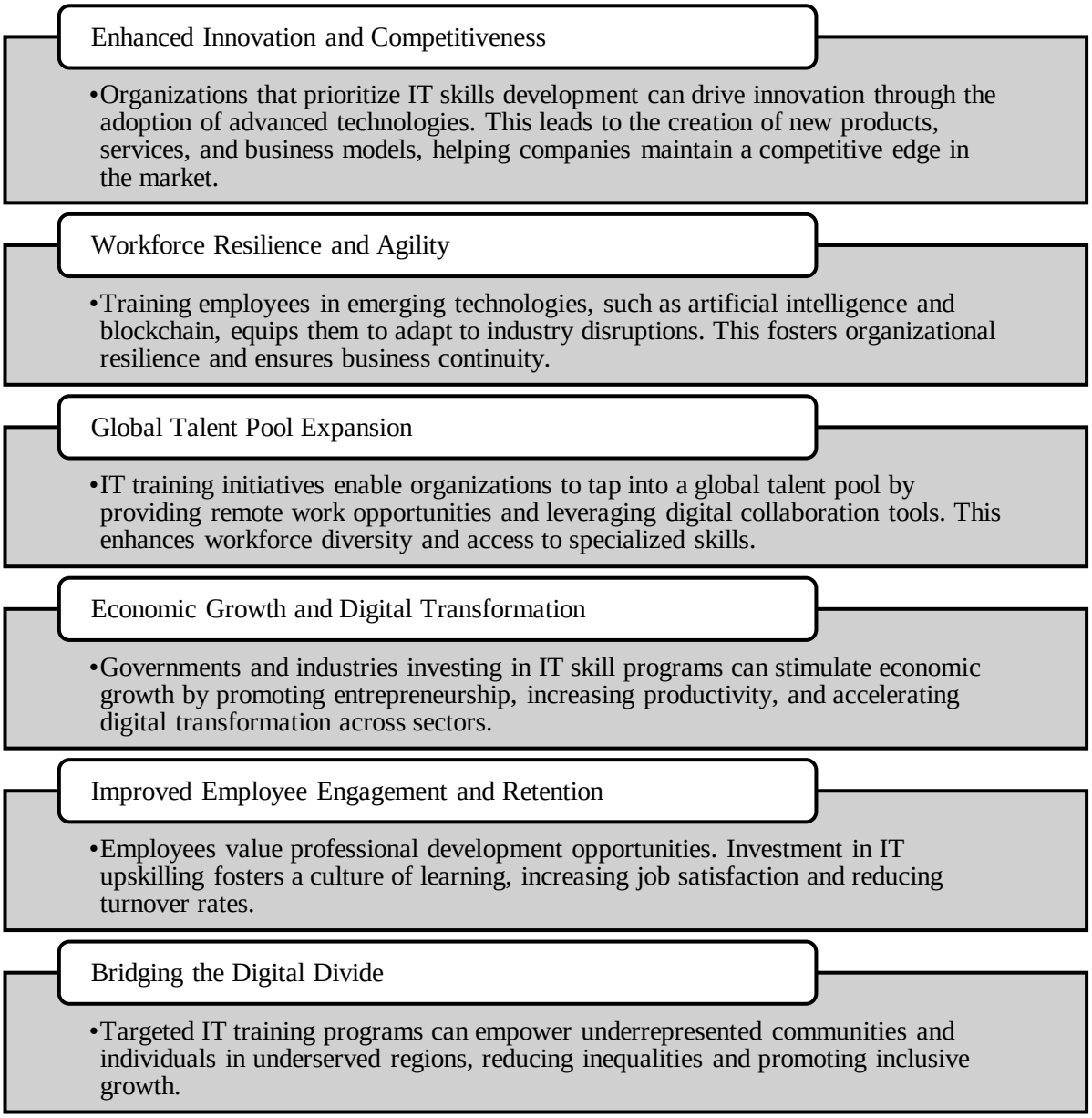


**Figure 1.2. Tne key opportunities of investment in IT skills**

*Source: developed by the authors*

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*Phase 3: Implementation and execution.* This phase involves rolling out the training programs in a structured manner. It is often advisable to start with pilot programs for a smaller group to test effectiveness and make necessary adjustments. Following successful pilots, the programs can be scaled across departments or teams. Employee engagement is crucial for successful execution. Strategies like gamification, leadership support, or providing incentives can motivate employees to actively participate in training. Additionally, organizations must ensure that logistical challenges, such as time zones for remote training or access to resources, are addressed.

*Phase 4: Evaluation and continuous improvement.* The final phase focuses on measuring the outcomes of the training initiatives and refining them for better effectiveness. Key performance indicators (KPIs), such as improved skill proficiency, enhanced productivity, and ROI, should be used to evaluate success. Collecting feedback from participants ensures that the training remains relevant and valuable. Continuous updates to the curriculum, informed by technological advancements and evolving industry needs, help sustain the effectiveness of the programs over time. This phase ensures that the investment in IT skills yields long-term benefits for both individuals and organizations.

This phased approach creates a structured framework for systematically improving IT skills. Each phase builds on the previous one, ensuring measurable progress, scalability, and adaptability to the changing demands of the digital landscape.

Investing in IT skill development is a transformative strategy for companies aiming to stay competitive and agile in a rapidly evolving digital landscape. By following a structured plan, businesses can empower their workforce, achieve strategic objectives, and secure long-term success.

**Table 1.4. The Plan for Improving IT Skills**

| Steps | Details | Skills Focus |
|---|---|---|
| *Phase 1: Assessment and Planning* | | |
| Skill Gap Analysis | Conduct surveys, interviews, and assessments to identify current skills and gaps. Use competency frameworks and benchmarking for evaluation. | IT fundamentals, digital literacy, technical and soft skills benchmarking |
| Define Objectives | Set measurable goals aligned with organizational needs, e.g., improving proficiency in specific tools or certifications. | Alignment with organizational tools (e.g., CRM, ERP systems), business communication |

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| Steps | Details | Skills Focus |
|---|---|---|
| Resource Allocation | Allocate budget, time, and resources for the program. Identify platforms and experts for delivery. | Budgeting, project management, resource planning |
| Stakeholder Engagement | Gain leadership buy-in and align program goals with business priorities. | Strategic alignment, communication skills |
| *Phase 2: Design and Development* | | |
| Develop Training Modules | Create content targeting core IT skills (e.g., programming), advanced skills (e.g., AI), and soft skills (e.g., collaboration). | Core: Programming, cybersecurity, data management. Advanced: AI, ML, cloud computing. Soft: Adaptability, collaboration |
| Choose Training Methods | Use e-learning, workshops, on-the-job training, and micro-learning. Offer certifications and micro-credentials. | Blended learning, certification in specialized IT skills (e.g., AWS, Azure, Python) |
| Create Learning Pathways | Design tiered training paths (beginner, intermediate, advanced) based on employee expertise levels. | Beginner: Basic IT skills (MS Office, Google Workspace). Intermediate: Cybersecurity, analytics. Advanced: AI, blockchain |
| Leverage Partnerships | Partner with universities, tech firms, and e-learning providers for high-quality content and delivery. | Networking, collaboration with institutions and industry leaders |
| *Phase 3: Implementation and Execution* | | |
| Pilot Program | Test the program with a small group to gather feedback and make adjustments. | Agile feedback collection, testing implementation tools |
| Rollout Training | Launch the full program and provide access to training modules and tools for all employees. | Hands-on training in real-world tools (e.g., cybersecurity incident response, cloud deployment) |
| Monitor Participation | Use dashboards and tracking systems to track employee progress and completion rates. | Tracking tools (e.g., LMS usage, employee analytics) |
| Encourage Engagement | Motivate employees with incentives, career advancement opportunities, and gamification (e.g., leaderboards, badges). | Gamification skills, team collaboration |
| *Phase 4: Evaluation and Continuous Improvement* | | |
| Measure Outcomes | Assess success with metrics like skill improvement, productivity gains, employee satisfaction, and ROI. | ROI analysis, performance tracking |
| Collect Feedback | Conduct post-training surveys and focus groups to gather insights for improvements. | Survey analysis, communication and feedback collection |
| Refine and Update | Update content based on feedback and emerging technology trends. | Curriculum redesign, updating skills to match trends (e.g., IoT, edge computing) |
| Create a Culture of Continuous Learning | Encourage ongoing development via learning subscriptions, annual certifications, and mentoring programs. | Lifelong learning skills, mentorship programs |

*Source: developed by the authors*

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**4. The role of IT skills in addressing key infrastructure deficiencies.** IT skills play a pivotal role in overcoming infrastructure deficiencies, which are often a significant barrier to economic development and technological progress. These deficiencies, such as limited access to high-speed internet, outdated technological frameworks, and insufficient digital tools, hinder businesses and public institutions from achieving optimal efficiency and innovation. Here's how IT skills contribute to resolving these challenges:

1. *Designing and Implementing Digital Infrastructure.* Skilled IT professionals are essential for planning, deploying, and maintaining robust digital infrastructure. This includes: High-Speed Internet Expansion - technicians and engineers with expertise in networking can develop and implement broadband solutions, particularly in underserved and rural areas. Cloud-Based Solutions - IT personnel facilitate the migration to cloud computing, reducing reliance on physical infrastructure and ensuring scalability.

2. *Enhancing System Efficiency*. IT skills enable the optimization of existing infrastructure by: Upgrading Legacy Systems - professionals can modernize outdated IT frameworks, improving their compatibility and efficiency. Automation - automating routine processes reduces the strain on physical infrastructure and enhances resource utilization.

3. *Developing Innovative Solutions*. Smart Infrastructure - IT experts can design intelligent systems, such as smart grids and IoT-enabled devices, that optimize infrastructure use and maintenance. Cybersecurity Infrastructure - IT skills are critical for building secure networks to protect sensitive data and ensure infrastructure resilience against cyber threats.

4. *Supporting Public and Private Initiatives*. Skilled IT personnel are instrumental in: Public Sector Projects - supporting government initiatives like e-governance and digital public services, which require well-trained professionals to execute and maintain. Private Sector Innovations - *c*ompanies rely on IT talent to develop solutions that address specific infrastructure gaps, such as digital payment systems or supply chain platforms.

*5. Fostering Collaboration.* IT professionals bridge the gap between technical requirements and business objectives by: Cross-Sector Integration - enabling seamless collaboration between industries, governments, and service providers to tackle infrastructure challenges. Training and Upskilling - creating training programs to equip others with the necessary IT skills, ensuring

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widespread capability across sectors.

The role of IT skills in addressing infrastructure deficiencies cannot be overstated. By equipping individuals with the expertise to design, optimize, and secure digital systems, nations and organizations can overcome technological gaps, improve service delivery, and foster sustainable economic growth. We offer table with Proposed Actions for Addressing Infrastructure Deficiencies (Table 1.5).

**Table 1.5. Comparative analysis of infrastructure in Ukraine and the EU and directions for its improvement**

| Aspect | Ukraine | Europe |
|---|---|---|
| Telecommunications Infrastructure | | |
| Coverage in Rural Areas | Limited or no access in rural areas. | Comprehensive rural and urban coverage driven by EU initiatives. |
| Infrastructure Age | Outdated fixed-line and mobile networks requiring modernization. | Advanced infrastructure, continuously updated with cutting-edge technology. |
| Future Goals | Extend rural coverage and replace outdated systems. | Maintain leadership in 5G and IoT network expansion. |
| Broadband Access | | |
| Penetration Rates | Lagging behind, especially in rural areas. | Near-universal coverage with high-speed internet access. |
| Quality and Speed | Inconsistent and often insufficient for modern business needs. | High-speed, reliable broadband services supporting advanced applications. |
| Future Goals | Subsidize rural broadband installation and promote adoption. | Achieve 100% high-speed internet coverage by 2025. |
| Data Centers and Cloud Infrastructure | | |
| Data Center Capacity | Insufficient local capacity, reliance on foreign data centers. | Numerous advanced hubs (e.g., Frankfurt, Amsterdam) ensure data sovereignty and low latency. |
| Cloud Adoption | Limited due to concerns about security and compliance. | Widely adopted with robust regulatory frameworks like GDPR ensuring trust and security. |
| Future Goals | Incentivize local data center growth and promote cloud usage. | Expand regional hubs and maintain global competitiveness. |
| Digital Infrastructure for Government Services | | |
| E-Government Services | Uneven digitization, with limited accessibility and user issues. | Highly integrated systems offering seamless public service access (e.g., Estonia). |
| Integration and Interoperability | Lacks interoperability, leading to inefficiencies. | Promoted through EU initiatives like the eGovernment Action Plan for cross-border efficiency. |
| Future Goals | Digitize key services and improve integration. | Continue leadership in e-governance, fostering innovation and reducing administrative burdens. |

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| Aspect | Ukraine | Europe |
|---|---|---|
| Proposed Actions for Addressing Infrastructure Deficiencies | | |
| Telecommunications Infrastructure | Extend rural coverage through PPPs; initiate 5G pilots. | Replace outdated systems and adopt IoT-enabled networks. |
| Broadband Access | Subsidize broadband installations; promote adoption. | Achieve universal, affordable high-speed internet. |
| Data Centers | Incentivize local development; train cloud experts. | Build a national cloud strategy; create a regional hub. |
| Digital Government Services | Expand online service access; improve user interfaces. | Develop fully digitized, interoperable systems. |

*Source: developed by the authors*

Figure 1.3 presents the IT Infrastructure Development Stages.

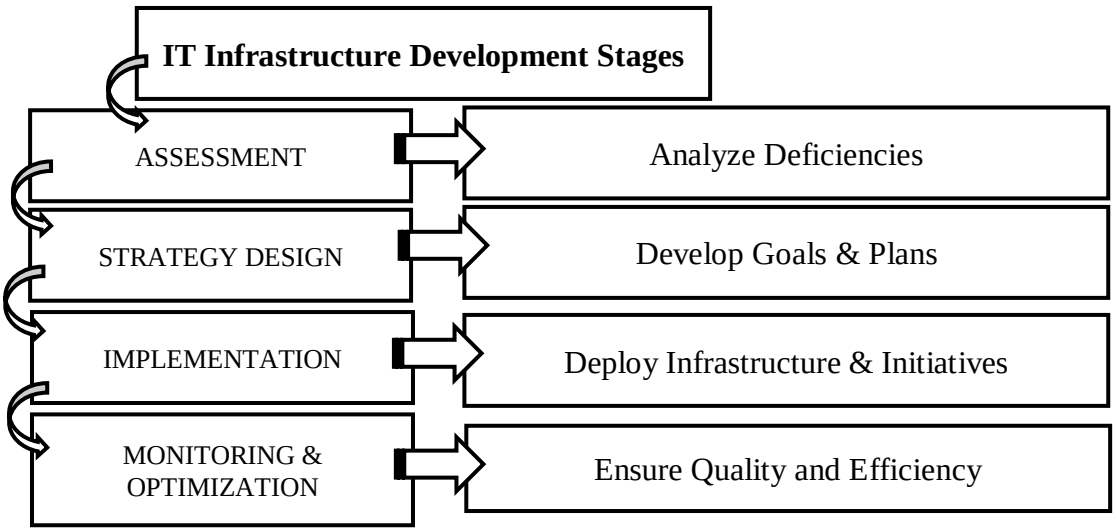


**Figure 1.3.** IT infrastructure development stages

*Source: developed by the authors*

This structured approach in tables and schemes ensures clear communication of the current state, comparative insights, and actionable plans to address IT infrastructure deficiencies effectively.

*Analysis and expansion of the skills gap in IT technologies*. Current state of the skills gap in Ukraine. The skills gap in IT technologies is a significant challenge for Ukraine's economic growth and competitiveness. Despite having a strong educational tradition and a robust IT sector, the mismatch between the skills provided by the education system and the needs of the labor market remains

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a pressing issue.

University education - strong technical universities; curriculum gaps. Strong technical universities - Ukraine is home to several renowned technical universities, such as the National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute» and Lviv Polytechnic National University. These institutions produce a large number of IT graduates annually. Curriculum gaps - despite their strengths, many university curricula are outdated and not aligned with current industry needs. The rapid pace of technological advancement outstrips the ability of educational institutions to keep their programs updated.

Limited availability - vocational training programs in IT are less developed compared to university programs. There is a lack of short-term, industry-specific training that can quickly adapt to new technologies. Continuing education - opportunities for continuous learning and professional development are limited. Many IT professionals find it challenging to stay current with the latest technologies and best practices due to the scarcity of high-quality training programs.

Demand for specialized skills - the IT industry in Ukraine, like elsewhere, is rapidly evolving and requires specialized skills in areas such as artificial intelligence, cybersecurity, cloud computing, and data analytics. There is a shortage of professionals with these advanced skills.

General VS specialized education - while many graduates have strong general IT skills, there is a gap in specialized knowledge and hands-on experience. This mismatch results in a labor market where graduates are not fully prepared to meet industry demands.

Lack of soft skills - beyond technical skills, employers often find that graduates lack essential soft skills such as problem-solving, teamwork, communication, and project management. These skills are critical for successful integration into the workplace and for career advancement.

Business understanding - there is a need for IT professionals to understand the business context of their work. Bridging the gap between technical expertise and business acumen is essential for driving innovation and value creation in organizations.

A comparative analysis of Ukraine and Europe was carried out in the context of education and training systems:

1) *European educational excellence*: European countries like Germany,

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Finland, and the Netherlands have robust education systems that closely align with industry needs. These systems emphasize practical training, industry partnerships, and continuous curriculum updates to keep pace with technological advancements; vocational training and apprenticeships are well-integrated into the educational landscape, providing students with hands-on experience and direct pathways to employment.

2) *Continuous learning and professional development*: Europe has a strong culture of lifelong learning, supported by government initiatives, industry associations, and educational institutions. Programs such as the European Social Fund (ESF) provide funding for training and upskilling; many European countries offer extensive professional development opportunities, including certifications, online courses, and industry-specific training programs that help professionals stay current with technological trends.

A comparative analysis of Ukraine and Europe was carried out in the context of workforce and industry alignment:

1) *Close industry-education collaboration:* European countries often have close collaboration between industry and educational institutions. This collaboration ensures that curricula are aligned with industry needs and that students gain practical experience through internships and projects; industry advisory boards and regular feedback loops help educational institutions stay updated on emerging skills and technologies.

2) *Emphasis on soft skills*: European education systems emphasize the development of soft skills alongside technical skills. Programs are designed to foster critical thinking, problem-solving, and teamwork, ensuring that graduates are well-rounded and adaptable; business schools and technical universities often offer joint programs that combine technical education with business training, preparing graduates for leadership roles in the tech industry.

SWOT analysis of the skills gap in Ukraine (Figure 1.4).

*Based on the results of a comparative analysis of Ukraine and Europe, recommendations were proposed for reforming educational programs:*

1. *Curriculum updates*: Regularly update university curricula to reflect current industry needs and technological advancements. Involve industry experts in curriculum development and review processes. Introduce specialized courses in emerging technologies such as artificial intelligence, cybersecurity, and cloud computing.

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2. *Emphasis on practical training*: Increase the emphasis on practical training through internships, coop programs, and industry projects. Partner with tech companies to provide students with hands-on experience and exposure to real-world challenges. Develop vocational training programs that offer short-term, flexible courses focused on specific skills in demand by the industry.

| **Strengths:** | **Weaknesses:** |
|---|---|
| - Strong technical education institutions<br>- High number of IT graduates<br>- Growing IT sector with increasing job opportunities | - Outdated university curricula<br>- Limited vocational training and continuing education programs<br>- Mismatch between education and industry needs<br>- Lack of soft skills and business acumen among graduates |
| **Opportunities:** | **Threats:** |
| - Potential for reforming and updating educational programs<br>- Increased investment in vocational and continuing education<br>- Partnerships with industry to align curricula with market demands<br>- Development of programs to enhance soft skills and business understanding | - Rapid technological advancements outpacing education reforms<br>- Brain drain of skilled professionals seeking opportunities abroad<br>- Economic instability affecting investment in education and training<br>- Competition from better-developed education and training systems in Europe |

**Figure 1.4. SWOT analysis of the skills gap in Ukraine**

*Source: developed by the authors*

**5. Enhancing continuous learning and professional development.** In today's fast-paced, technology-driven world, continuous learning and professional development are essential for maintaining relevance and competitiveness in the workforce. Enhancing these processes requires strategic investments in education, training, and a culture that values lifelong learning.

Continuous learning ensures that individuals and organizations remain adaptable in a rapidly evolving environment. It helps employees stay updated with the latest technologies, methodologies, and industry trends, while also fostering innovation and creativity. For organizations, it enhances productivity, employee engagement, and long-term competitiveness.

Key aspects of improving continuous learning and professional development are proposed:

1. *Accessible training programs* - expand the availability of continuing education and professional development programs. Offer online courses,

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certifications, and workshops that are affordable and accessible to a wide range of professionals. Provide financial incentives, such as grants and scholarships, to encourage professionals to pursue further training and upskilling.

2. *Public-private partnerships* - foster partnerships between educational institutions, government, and the private sector to develop and fund training programs. Leverage the expertise and resources of industry partners to create high-quality, relevant training opportunities. Establish industry advisory boards to provide ongoing feedback and guidance on training programs and curricula.

We were offered activities to develop communication skills and business acumen:

- Design educational programs that integrate technical training with soft skills development. Include courses on communication, teamwork, problem-solving, and project management as part of the core curriculum.

- Collaborate with business schools to offer joint programs that combine technical education with business training, preparing graduates for leadership roles in the tech industry.

- Encourage companies to provide on-the-job training and mentorship programs that focus on both technical and soft skills. Create opportunities for employees to develop business acumen through cross-functional projects and leadership training.

- Promote a culture of lifelong learning within organizations, encouraging employees to continuously develop their skills and knowledge.

Addressing the skills gap in IT technologies is essential for Ukraine's economic development and competitiveness. By reforming educational programs, enhancing continuous learning opportunities, and developing soft skills and business acumen, Ukraine can better align its workforce with industry needs and drive innovation and growth in the IT sector. These efforts will not only improve the employability of Ukrainian IT professionals but also attract more investment and create a more dynamic and resilient economy.

**Conclusion.** Together, these strategic initiatives - regulatory reform, enhanced education and training, and investment incentives - form a comprehensive approach to building a robust IT ecosystem. They address the critical barriers to IT sector growth while leveraging opportunities for innovation, competitiveness, and economic development.

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The integration of IT skills and competencies is pivotal for fostering innovation, enhancing productivity, and driving economic growth in the digital era. These skills serve as the backbone of a modern workforce, enabling companies to adapt to technological advancements and maintain competitiveness. IT competencies empower personnel to leverage digital tools for optimizing processes, enhancing decision-making, and delivering superior value to customers. Their role extends beyond individual performance, contributing to the overall agility and resilience of organizations.

Investment in the improvement of IT skills and competencies is essential to meet the demands of an increasingly technology-driven economy. By allocating resources toward education, training, and skill development, companies can bridge the gap between current capabilities and industry requirements. This approach not only addresses the immediate needs of businesses but also ensures long-term sustainability by creating a culture of continuous learning and innovation.

IT skills play a critical role in addressing key infrastructure deficiencies, particularly in areas such as telecommunications, broadband access, and data management. Skilled professionals are required to design, implement, and maintain advanced IT systems that support high-speed internet, cloud computing, and integrated e-government services. These improvements enhance the efficiency and accessibility of digital infrastructure, providing a solid foundation for economic and social development.

The promotion of continuous learning and professional development is crucial in keeping pace with the rapid evolution of IT technologies. Encouraging employees to engage in lifelong learning and upskilling not only boosts individual career prospects but also strengthens the organization's capacity to innovate and remain competitive. This requires a collaborative effort between businesses, educational institutions, and policymakers to create accessible and relevant learning opportunities.

**References:**

1. Acemoglu, D. & Autor, D. (2011). Skills, Tasks, and Technologies: Implications for Employment and Earnings. *Handbook of Labor Economics*, Vol. 4B, Elsevier, pp. 1043-1171. Retrieved from: https://doi.org/10.1016/S0169-7218(11)02410-5.
2. Acemoglu, D., & Autor, D. (2011). Skills, tasks, and technologies: Implications for employment and earnings. *Handbook of Labor Economics*, 4B, 1043–1171. Retrieved from: https://doi.org/10.1016/B978-0-444-53008-3.00004-7
3. Acemoglu, D., & Restrepo, P. (2018). Artificial intelligence, automation, and work. *National Bureau of Economic Research*. Retrieved from: https://doi.org/10.3386/w24196

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

4. Amazon. (2020). Upskilling 2025: Preparing Our Workforce for the Future. *Amazon Press Release*. Retrieved from: https://www.aboutamazon.com/news/workplace/upskilling-2025
5. Bharadwaj, A.S. (2000) A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation. MIS Quarterly, 24, 169-196. http://dx.doi.org/10.2307/3250983
6. Boyatzis, R. E. (1982). *The competent manager: A model for effective performance*. Wiley. Retrieved from: https://www.scirp.org/reference/referencespapers?referenceid=2119706.
7. Brynjolfsson, E. & McAfee, A. (2014). The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies. W.W. Norton & Company, New York, 2014, pp. 67-101. Retrieved from: https://edisciplinas.usp.br/pluginfile.php/4312922/mod_resource/content/2/Erik%20-%20The%20Second%20Machine%20Age.pdf.
8. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W W Norton & Co. Retrieved from: https://psycnet.apa.org/record/2014-07087-000.
9. Carnevale, A. P., Smith, N., & Melton, M. (2011). *STEM: Science, technology, engineering, and mathematics*. Georgetown University Center on Education and the Workforce. Retrieved from: http://hdl.handle.net/10822/559306
10. CEN. (2008). *European e-Competence Framework*. European Committee for Standardization. Retrieved from: https://www.na-bibb.de
11. CEN. (2010). *European e-Competence Framework*. European Committee for Standardization. Retrieved from: https://www.na-bibb.de
12. CEN. (2016). *European e-Competence Framework version 3.0*. European Committee for Standardization. Retrieved from: https://www.na-bibb.de
13. Davenport, T. H., & Harris, J. G. (2007). *Competing on analytics: The new science of winning*. Harvard Business Review Press.
14. Frey, C. B., & Osborne, M. A. (2013). The future of employment: How susceptible are jobs to computerisation? *Oxford Martin School, University of Oxford*. Retrieved from: https://doi.org/10.1016/j.techfore.2016.08.019.
15. Frey, C., & Osborne, M. (2013). The Future of Employment. How Susceptible Are Jobs to Computerization? Working Paper, Oxford: Oxford Martin. https://doi.org/10.1016/j.techfore.2016.08.019.
16. Grynko, T., Hviniashvili, T., & Kaliberda, M. (2023). STRATEGIC MANAGEMENT OF THE ENTERPRISE IN THE CONDITIONS OF THE DIGITAL ECONOMY. *Economy and Society*, (50). https://doi.org/10.32782/2524-0072/2023-50-71.
17. He, Z., Huang, H., Choi, H., & Bilgihan, A. (2023). Building organizational resilience with digital transformation. *Journal of Service Management*, *34*(1), 147-171.
18. Katerna, O. & Molchanova, K. (2020). Digital transformation of aviation industry in Ukraine. *Collection of scientific papers of DUIT. Series "Economics and Management". Iss. 47*, , pp. 53-63. DOI: 10.32703/2664-2964-2020-47-53-63.
19. Kharazishvili, Y., Kwilinski, A., Bugayko, D., Hryhorak, M., Butorina, V., & Yashchyshyna, I. (2022). Strategic Scenarios of the Post-War Recovery of the Aviation Transport Sustainable Development: The Case of Ukraine. *Virtual Economics*, *5*(3), 7–30. Retrieved from: https://doi.org/10.34021/ve.2022.05.03(1).
20. Le Deist, F. D., & Winterton, J. (2005). What Is Competence? *Human Resource Development International*, 8(1), 27–46. https://doi.org/10.1080/1367886042000338227.
21. Liskovich N. Yu. Assessment of the effectiveness of strategic management of aviation enterprises in Ukraine // International scientific journal "Internauka". Series: "Economic Sciences". - 2018. - No. 3. DOI: 10.25313/2520-2294-2018-3-3508.
22. Majchrzak, A., Markus, M., & Wareham, J. (2016). Designing for Digital Transformation: Lessons for Information Systems Research from the Study of ICT and Societal Challenges. *MIS Q.*, *40*, 267-277. Retrieved from: https://shorturl.at/Xam4S.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

23. Mazzucato, M. (2018). The Value of Everything: Making and Taking in the Global Economy. *Allen Lane*, London, 2018, pp. 202-236. Retrieved from: https://shorturl.at/Kwd1i.
24. McClelland, D. C. (1973). Testing for Competence Rather than for "Intelligence". American Psychologist, 28, 1-14. http://dx.doi.org/10.1037/h0034092.
25. Michael E. Porter (1985). Competitive Advantage: Creating and Sustaining Superior Performance. *Free Press*, New York, 1985, pp. 45-78. Retrieved from: https://www.hbs.edu/faculty/Pages/item.aspx?num=193.
26. Mok, L. (2021). Future-Proof the IT Workforce *Gartner*. Retrieved from: https://shorturl.at/K5RtS.
27. Nam, E. (2023). The Power of Soft Skills: Our Favorite Reads. *Harvard Business Review*. Retrieved from: https://hbr.org/2023/05/the-power-of-soft-skills-our-favorite-reads.
28. O'Leary, J., Bussey, C., Agarwal, S. (2020). Job-centric upskilling: The new workforce development imperative. *Deloitte Insights*. Retrieved from: https://www2.deloitte.com/us/en/insights/industry/public-sector/on-the-job-upskilling.html.
29. OECD (2024), *Understanding Skill Gaps in Firms: Results of the PIAAC Employer Module*, OECD Skills Studies, OECD Publishing, Paris, https://doi.org/10.1787/b388d1da-en.
30. Pablo Illanes, P., Susan Lund, S., Mourshed, M., Rutherford, S. & Tyreman, M. (2018). Retraining and reskilling workers in the age of automation. *McKinsey Global Institute*. Retrieved from: https://shorturl.at/jElvR.
31. Porter, M.E. (1985) Competitive Advantage. Creating and Sustaining Superior Performance. Free Press, New York, 557 p. DOI: https://doi.org/10.1590/S0034-75901985000200009.
32. Reich, B. H., & Benbasat, I. (2000). Factors that influence the social dimension of alignment between business and information technology objectives. *MIS Quarterly*, 24(1), 81–113. Retrieved from: https://doi.org/10.2307/3250980
33. Spencer, L.M. and Spencer, S.M. (1993) Competence at Work: Models for Superior Performance. John Wiley & Sons, New York.
34. State of Digital Learning: A Report. (2024). Retrieved from: https://www.elucidat.com/guides/state-of-digital-learning-report-2024/.
35. Tufts, S. (2003). Florida, Richard 2002. The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life. New York: Basic Books, 404p. *Just Labour*, *2*. https://doi.org/10.25071/1705-1436.180
36. Tufts, S. (2003). Florida, Richard 2002. The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life. New York: Basic Books, 404p. *Just Labour*, *2*. https://doi.org/10.25071/1705-1436.180.
37. Von Solms, R., & Van Niekerk, J. (2013). From information security to cybersecurity. *Computers & Security*, 38, 97–102. Retrieved from: https://doi.org/10.1016/j.cose.2013.04.004
38. Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation.* Harvard Business Review Press. 304 p. Retrieved from: https://hbsp.harvard.edu/product/17039-HBK-ENG.
39. World Economic Forum (2020): The Future of Jobs Report 2020.*World Economic Forum, Geneva*, 2020, pp. 33-59. Retrieved from: https://www.weforum.org/publications/the-future-of-jobs-report-2020/
40. Yanovska, V. Levchenko,O., Tvoronovych,V. & Bozhok, A. (2019). Digital Transformation of the Ukrainian Economy: Digitization and Transformation of Business Models. NTI-UkrSURT 2019. SHS Web of Conferences 67, 05003. Retrieved from: https://doi.org/10.1051/shsconf/20196705003.
41. Zachosova, N., Zhyvko, Z., Kyryliuk, Y., Blikhar, V. Strategic priorities of security - oriented management in financial markets. *Global Trends of Data Analytics in Business Management, Social Sciences, Medical Sciences and Decision making.* [24-th FAI-ICDBSMD 2021. 25, 26 & 27 June 2021]. Editors Prof. M. Lellis Thivagar, Prof. K.K.S. Mer, Prof. Tetiana Zhyber, Prof. Nina Poyda-Nosyk, Mr. Vishwanath Bijalwan, Dr. Ramakant Bhardwaj, Dr. A. Amutha, Dr. Pichyada Pheunpha,Prof. Arceloni Neusa Volpato, Prof. Pankaj Srivastava. Abstract Proceedings of 24th FAI-ICDBSMD 2021 Vol. 6(i), 2021. P.107-109. Available online at https://www.faipublications.com

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# Chapter 1.3. Innovating Education for Financial Specialists: The Digitalization Imperative

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***Abstract.*** *The financial industry has consistently been at the forefront of technological innovation, driven by the need for efficiency, accuracy, and adaptability in an increasingly dynamic environment. Over decades, digital skills have evolved from basic computer literacy to core competencies required to navigate complex ecosystems powered by artificial intelligence (AI), blockchain, and advanced data analytics. This transformation underscores the growing need for financial professionals to acquire and refine digital skills to adapt to a rapidly digitizing global financial landscape. The evolution of digital skills training provides valuable insights into the challenges and opportunities that accompany this shift, shaping the future of education for financial specialists. This study explores the evolution, key challenges, and emerging opportunities in digital skills training for financial professionals. It aims to analyze how advancements in technology have reshaped training paradigms and identify future directions to enhance learning experiences and prepare professionals for the demands of a digital-first industry. This research is based on an extensive literature review and synthesis of industry reports, academic studies, and case examples. The study also assessed contemporary challenges in upskilling financial professionals and explored future opportunities for effective digital skills development through emerging technologies like virtual reality (VR), augmented reality (AR), and artificial intelligence. Contemporary training emphasizes hybrid skills, combining domain expertise with advanced technical proficiency in tools like Python, blockchain, and data analytics platforms. Rapid technological advances have been found to be outpacing the ability of professionals and organizations to keep skills up to date. Skills gaps remain, particularly in cutting-edge areas such as cybersecurity, AI, and blockchain. Access to high-quality training is hampered by financial constraints, geographic limitations, and cultural resistance to change. Future research should focus on integration of immersive technologies like VR/AR into financial training to create interactive, real-world scenarios for learners.*

***Keywords:*** *digital skills; financial professionals; fintech training; artificial intelligence; blockchain; cybersecurity; data analytics; lifelong learning; VR training; AR training; regulatory technology; sustainability in finance.*

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**1. The evolution of digital skills training for financial specialists.** The financial industry has always been at the forefront of technological innovation, driven by the need for efficiency, accuracy, and adaptability in a dynamic and competitive environment. Over the decades, digital skills have transformed from a secondary competency into a core requirement for financial specialists. From the advent of personal computers and basic spreadsheet training to the current era of artificial intelligence, blockchain, and advanced data analytics, the evolution of digital skills training reflects the increasing complexity and digitization of the financial landscape.

In today's financial sector, professionals are expected not only to possess deep domain expertise but also to navigate an ecosystem powered by cutting-edge technologies. This evolution of training programs has been shaped by the rapid pace of digital transformation, the emergence of fintech innovations, and the growing demand for data-driven decision-making. Understanding this journey provides valuable insights into how financial specialists have adapted to the changing demands of their roles and how future training will prepare them to thrive in a technology-driven world.

The evolution of digital skills training for financial specialists has been a widely researched topic, reflecting the transformative impact of technology on the financial industry. Over the years, researchers and industry experts have explored how the development of digital skills aligns with technological advancements, shifting industry needs, and the increasing complexity of global financial systems. This literature review examines key studies and perspectives on the progression of digital skills training in the financial sector, identifying themes, trends, and challenges that have shaped this journey.

In the early stages of digital transformation, research largely focused on the adoption of basic computing skills and financial software. Studies from the 1980s and 1990s, such as those by Brynjolfsson and Hitt (1998), highlighted the productivity gains associated with the use of personal computers in financial operations. Financial training programs during this period emphasized the use of spreadsheet tools (e.g., Excel) and database management systems for accounting, budgeting, and reporting purposes.

Other studies, like Davis's (1989) work on technology acceptance, provided frameworks to understand how financial professionals adopted and adapted to

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emerging digital tools. The emphasis was on fostering digital literacy and overcoming resistance to change in traditional financial institutions.

The late 1990s and early 2000s marked a significant shift with the proliferation of internet-based technologies. Research by Tapscott (1996) and others explored how the internet transformed financial operations, enabling online banking, electronic trading, and real-time financial monitoring. Training programs began incorporating skills related to using digital platforms and enterprise resource planning (ERP) systems such as SAP and Oracle Financials.

A notable theme during this era was the integration of digital tools for globalized financial operations. Researchers like Friedman (2005) underscored how digital skills became essential for navigating the interconnected nature of global financial markets, requiring specialists to adapt to cross-border transactions, regulatory compliance, and real-time data management.

The 2010s ushered in the era of big data, analytics, and cloud computing, significantly reshaping the training landscape for financial specialists. Studies by McAfee and Brynjolfsson (2012) emphasized the importance of data-driven decision-making in the financial sector. Training programs expanded to include tools such as SQL, Tableau, and Power BI, enabling professionals to analyze large datasets, forecast market trends, and optimize resource allocation.

Research also highlighted the challenges of integrating these advanced tools into traditional workflows. For example, Davenport and Harris (2017) explored how financial specialists required not just technical training but also strategic thinking to interpret and apply insights from data analytics tools effectively.

The rise of financial technology (fintech) in the 2020s introduced new dimensions to digital skills training. Studies, such as those by Arner, Barberis, and Buckley (2015), examined how innovations like blockchain, artificial intelligence (AI), and machine learning (ML) disrupted traditional financial practices. Researchers noted that training programs now needed to include blockchain fundamentals, cryptocurrency management, and AI-powered tools for fraud detection and risk analysis.

Additionally, regulatory compliance in the fintech era became a focal point for digital skills training. Research by Zetzsche, Buckley, and Arner (2018) explored how financial specialists were trained to navigate evolving legal frameworks while leveraging digital tools for compliance and reporting.

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As financial systems became increasingly digital, the need for cybersecurity training grew significantly. Studies by Anderson and Moore (2016) emphasized the rising threat of cyberattacks on financial institutions, driving the need for financial specialists to develop skills in cybersecurity risk management. Training programs evolved to include modules on data protection, digital identity management, and responding to sophisticated cyber threats.

Research also pointed to the growing collaboration between financial specialists and IT teams, necessitating cross-disciplinary training that bridged technical and financial expertise.

Emerging literature highlights several future trends in digital skills training for financial specialists. For instance, Zuboff (2019) discusses the increasing role of automation and AI in shaping financial roles, requiring ongoing training in machine learning models and robotic process automation (RPA). Other researchers, such as Schwab (2017), predict a growing emphasis on sustainability and environmental, social, and governance (ESG) reporting, pushing financial training to incorporate tools for managing ESG data and metrics.

Virtual reality (VR) and augmented reality (AR) are also highlighted as potential tools for immersive financial training, simulating real-world scenarios like market fluctuations or crisis management.

The evolution of digital skills training for financial specialists reflects the rapid advancements in technology and the increasing complexity of the financial industry. Over the years, this transformation has been driven by a combination of technological breakthroughs, shifting market dynamics, and the growing need for professionals to adapt to a digital-first environment (Table 1.6).

The evolution of digital skills training for financial specialists has mirrored the rapid advancements in technology and the increasing complexity of financial operations. From early research on basic computing skills to recent studies on fintech and cybersecurity, the literature reveals a consistent focus on adapting training to meet the demands of a digital-first financial ecosystem. As technology continues to advance, future research and training initiatives will need to address emerging challenges, such as the ethical implications of AI, the integration of sustainability metrics, and the use of immersive technologies for experiential learning.

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**Table 1.6. The key stages of evolution of digital skills training for financial specialists**

| Years | Stage | Key Features |
|---|---|---|
| 1980s-1990s | Early Digital Literacy | - Introduction of personal computers for workplace tasks.<br>- Training in basic computer literacy (e.g., spreadsheets like Microsoft Excel).<br>- Early financial software training (e.g., QuickBooks, SAP).<br>- Emphasis on data entry efficiency and basic analysis. |
| Late 1990s-2000s | Internet and Globalization | - Introduction of online banking, electronic trading platforms, and real-time financial monitoring.<br>- Training in Enterprise Resource Planning (ERP) systems like Oracle Financials.<br>- Basic cybersecurity training to protect digital transactions. |
| 2010s | Big Data and Advanced Analytics | - Introduction to data-driven decision-making with tools like SQL, Tableau, and Power BI.<br>- Adoption of cloud computing platforms for financial operations (e.g., NetSuite, Xero).<br>- Emphasis on regulatory compliance training (e.g., GDPR). |
| 2020s | AI, Machine Learning, and Fintech Disruption | - AI-powered tools for financial modeling, fraud detection, and portfolio optimization.<br>- Training on fintech platforms (e.g., blockchain, mobile payments, DeFi, APIs).<br>- Advanced cybersecurity training for data privacy and attack prevention.<br>- Emphasis on hybrid skills for communication and insight presentation. |
| After 2020s | Future of Digital Skills Training | - Focus on automation and RPA (e.g., automating reconciliations and reporting).<br>- Understanding AI augmentation for decision-making.<br>- Skills for sustainability and ESG reporting.<br>- Use of VR and AR for immersive, scenario-based learning. |

*Source: developed by the author*

**2. Key digital competencies for financial professionals.** The digital transformation of the financial industry has significantly reshaped the competencies required by professionals to navigate and thrive in a technology-driven landscape. Financial professionals are increasingly expected to possess not only domain expertise in areas such as investment, banking, and risk management but also a deep understanding of digital tools, technologies, and strategies. As financial systems become more complex and interconnected, the ability to leverage digital tools for data analysis, compliance, security, and innovation has become paramount.

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In the rapidly evolving financial landscape, digital competencies are essential for professionals to stay competitive and efficient. These competencies encompass a range of technical, analytical, and strategic skills required to navigate and leverage modern financial technologies.

Data analytics has become one of the core competencies for financial professionals, enabling them to make informed decisions based on large volumes of structured and unstructured data. As the financial industry increasingly relies on big data, machine learning, and predictive analytics, professionals must be adept at using tools such as SQL, Python, R, and Tableau for data analysis and visualization.

According to McAfee and Brynjolfsson (2012), the rise of big data in financial decision-making has transformed the role of financial professionals from purely transactional to analytical. Professionals must not only collect and process data but also interpret complex datasets to forecast trends, optimize portfolios, assess risk, and make strategic decisions. The ability to work with big data technologies, such as Hadoop or Spark, is becoming increasingly relevant for analyzing unstructured data from sources like social media, market news, and consumer behavior (Davenport & Harris, 2017). Moreover, professionals need to use data visualization tools like Power BI to communicate insights clearly to stakeholders and decision-makers, making data interpretation a critical skill in financial management.

Proficiency in financial software and tools is a key competency for financial professionals. As financial services have become more digitized, tools like Enterprise Resource Planning (ERP) systems, cloud-based platforms, and specialized fintech applications have become critical for managing day-to-day operations. ERP systems such as SAP, Oracle Financials, and Microsoft Dynamics are widely used in large organizations for accounting, payroll, resource planning, and budgeting.

With the rapid shift to cloud computing, financial professionals are increasingly required to understand cloud-based financial platforms such as NetSuite, Xero, and QuickBooks Online. As noted by Arner, Barberis, and Buckley (2015), cloud technology enables real-time access to financial data, improving operational efficiency and collaboration across departments. Furthermore, financial professionals must be familiar with fintech platforms for mobile payments, blockchain technologies, and robo-advisors, which are

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revolutionizing payments, investment management, and lending (Zetzsche, Buckley, & Arner, 2018).

The need for financial professionals to adapt to the fintech landscape highlights the importance of financial software proficiency in today's industry. As financial services become more embedded in digital platforms, professionals must understand how to use these tools to improve service delivery, enhance customer experience, and meet regulatory requirements.

Cybersecurity has become an essential area of expertise for financial professionals as the industry digitizes financial transactions and services. Financial institutions are prime targets for cyberattacks, and as a result, professionals must be equipped to manage risks related to data protection, fraud, and digital threats. Anderson and Moore (2016) emphasize that the rise in cyber threats, including phishing, ransomware, and identity theft, requires financial professionals to adopt robust cybersecurity practices.

Financial professionals must understand encryption techniques, secure data storage, and compliance with privacy regulations such as the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA). Additionally, they need to be proficient in tools and strategies for detecting and mitigating cyberattacks. According to a report by PwC (2020), financial institutions are investing heavily in cybersecurity training to protect sensitive financial data and preserve customer trust.

Moreover, the integration of artificial intelligence (AI) in financial services has brought both opportunities and challenges for cybersecurity. AI-powered systems can identify patterns and detect fraudulent transactions in real-time, but they also require professionals to be knowledgeable about ethical concerns and AI-driven decision-making (Zuboff, 2019). Thus, cybersecurity awareness is not only about protecting systems but also about managing ethical risks associated with new technologies.

Automation, particularly Robotic Process Automation (RPA), is rapidly transforming the financial services industry by automating repetitive tasks and streamlining workflows. Professionals must understand how to identify processes that can be automated and use tools such as UiPath, Blue Prism, and Automation Anywhere to improve operational efficiency (Davenport, 2018).

The potential for automation in finance is vast, from automating routine accounting tasks like invoicing and account reconciliation to complex financial

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reporting and regulatory compliance procedures. RPA allows professionals to focus on higher-value tasks such as strategic analysis and decision-making. According to Brynjolfsson and McAfee (2014), financial professionals who embrace RPA tools can improve both productivity and accuracy, reducing human error and enabling real-time financial monitoring.

Moreover, the integration of AI in automation workflows adds another layer of complexity. Financial professionals need to leverage AI to detect anomalies, optimize trading strategies, and enhance customer service. The ability to integrate automation and AI into financial operations is a growing competency that will be essential for professionals to stay competitive in the future.

Blockchain technology and cryptocurrencies are disrupting traditional financial systems, requiring professionals to understand how these technologies work and how they can be applied in financial services. Blockchain's decentralized, secure nature makes it an attractive solution for recording transactions, verifying identity, and executing smart contracts without intermediaries (Tapscott, 2016).

Financial professionals must be proficient in blockchain fundamentals, including its applications in cryptocurrency trading, supply chain management, and digital payments. According to a report by Arner et al. (2015), financial institutions are increasingly adopting blockchain for cross-border payments, reducing transaction costs, and enhancing transparency. Additionally, professionals must understand how to manage digital currencies like Bitcoin, Ethereum, and stablecoins, which are rapidly gaining popularity as alternative investment options and means of payment.

Smart contracts, which automatically execute financial agreements based on predefined conditions, are another important area of blockchain technology. Financial professionals must be able to navigate smart contract platforms, such as Ethereum, to ensure compliance and mitigate risks associated with blockchain transactions.

AI and machine learning are revolutionizing the financial industry by providing tools for predictive analytics, fraud detection, and portfolio optimization. Financial professionals must be adept at using AI-powered tools to predict market trends, assess risk, and optimize investment strategies (McAfee & Brynjolfsson, 2012). Machine learning algorithms can analyze vast amounts of

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data to identify patterns and make real-time decisions, providing a competitive edge in financial markets.

Moreover, machine learning is being increasingly applied in credit scoring, fraud detection, and customer segmentation. Financial professionals must understand how these models work and how to interpret their outputs to make informed decisions. As financial institutions adopt AI-driven solutions, professionals will need to keep up with the latest advancements in AI and machine learning to remain relevant.

The ethical implications of AI in financial decision-making, particularly in areas like credit scoring and investment management, are also a critical concern. Financial professionals must be aware of biases in AI models and ensure that AI systems are transparent, fair, and comply with regulatory standards (Zuboff, 2019).

As digital tools and technologies become more integrated into financial services, the ability to communicate financial insights effectively is crucial. Financial professionals must be proficient in using data visualization tools such as Tableau, Power BI, and Excel to present complex financial data clearly and concisely to stakeholders (Davenport, 2018). Visual storytelling has become an essential skill for professionals to translate data into actionable insights and inform decision-making.

Furthermore, digital collaboration tools like Microsoft Teams, Slack, and Zoom have become integral to modern financial operations, especially in remote and hybrid work environments. Financial professionals must be able to work collaboratively with teams across different functions, including IT, data science, and compliance, to deliver integrated solutions.

*Data analytics and interpretation***.** Financial professionals must be proficient in tools such as SQL, Python, R, Tableau, Power BI, and Excel for data analysis. These tools enable the collection, organization, and visualization of large datasets for insights. The ability to analyze and interpret data trends, generate forecasts, and make informed decisions is critical. This includes predictive modeling, financial simulations, and scenario analysis. Understanding how to work with big data technologies, such as Hadoop or Spark, is becoming increasingly relevant for analyzing unstructured data like social media sentiment or market trends.

*Financial software proficiency***.** Familiarity with Enterprise Resource Planning systems such as SAP, Oracle Financials, and Microsoft Dynamics is

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essential for managing accounting, payroll, and resource planning in complex organizations. The transition to cloud-based tools (e.g., NetSuite, Xero) requires skills in navigating and managing financial operations securely in a cloud environment. Professionals need to adapt to fintech platforms, including payment gateways, blockchain technologies, and robo-advisors, to stay aligned with industry innovations.

*Cybersecurity awareness***.** With financial data being highly sensitive, understanding principles of encryption, secure data storage, and compliance with regulations such as GDPR and CCPA is critical. Professionals must identify vulnerabilities and assess risks related to financial systems and digital platforms. Familiarity with strategies to detect and respond to phishing, ransomware, and other cyber threats is an essential skill in protecting financial assets and systems.

*Automation and robotic process automation (RPA).* Familiarity with tools like UiPath, Blue Prism, and Automation Anywhere is essential for automating repetitive tasks, such as invoice processing, account reconciliations, and data entry. Professionals must identify processes that can be automated to save time, reduce human error, and improve overall efficiency. Leveraging artificial intelligence in automation workflows for tasks like fraud detection or automated financial advising is becoming increasingly important.

*Blockchain and cryptocurrency.* A deep understanding of blockchain technology, its potential applications in financial transactions, and its role in enhancing transparency and security is critical. Professionals must understand digital currencies, including Bitcoin, Ethereum, and stablecoins, as well as the platforms for trading and managing crypto assets. The ability to work with smart contracts, which automate and enforce financial agreements, is an emerging competency in the decentralized finance (DeFi) space.

*Artificial intelligence and machine learning.* Financial professionals need to work with AI-driven tools for market predictions, risk assessment, and portfolio optimization. Familiarity with machine learning models for tasks like credit scoring, fraud detection, and customer segmentation is increasingly in demand. Understanding the ethical implications and limitations of AI in financial decision-making is a growing area of focus.

*Regulatory technology (RegTech).* Knowledge of digital tools that monitor and ensure compliance with financial regulations, such as AML (Anti-Money Laundering) and KYC (Know Your Customer), is essential. Skills in using

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RegTech platforms for real-time compliance reporting and data submission to regulators are increasingly important. Leveraging digital tools to automate audit trails and financial reporting helps ensure transparency and accuracy in compliance.

*Communication and presentation in a digital context.* Financial professionals must be adept at creating compelling visualizations to present complex financial data effectively to stakeholders. Tools like Tableau and Power BI are crucial. The ability to use collaboration platforms such as Slack, Microsoft Teams, and Zoom is essential for working in remote and hybrid environments. Beyond presenting numbers, professionals must craft narratives that help decision-makers understand financial insights and strategic recommendations.

*Innovation and adaptability.* Keeping up with trends like quantum computing, ESG reporting tools, and augmented/virtual reality (AR/VR) in financial training is essential. In a rapidly changing environment, professionals need the ability to learn and adapt quickly to new digital tools and processes. Combining digital skills with critical thinking to solve complex financial challenges in innovative ways is a key competency.

*Ethics and digital responsibility.* Financial professionals must navigate ethical challenges around data usage, privacy, and AI-driven decisions. Skills in using digital tools to track and report on environmental, social, and governance (ESG) metrics are becoming critical as sustainability gains prominence in financial decision-making. Promoting inclusivity by ensuring that financial tools and services are accessible to diverse populations.

Table 1.7 presents a deep description of the key digital competencies for financial professionals.

The financial industry's digital transformation demands a robust set of competencies that extend beyond traditional financial expertise. Financial professionals must combine technical proficiency with strategic, analytical, and ethical skills to thrive in this evolving landscape. Mastery of these digital competencies not only ensures their relevance in a competitive field but also enables them to drive innovation and efficiency within their organizations.

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**Table 1.7. The key digital competencies for financial professionals**

| Key Digital Competency | Description |
|---|---|
| Data Analytics and Interpretation | - Proficiency in tools like SQL, Python, R, Tableau, Power BI, and Excel for data analysis.<br>- Skills in predictive modeling, financial simulations, and data-driven decision-making.<br>- Knowledge of big data technologies like Hadoop or Spark. |
| Financial Software Proficiency | - Familiarity with ERP systems (SAP, Oracle Financials, Microsoft Dynamics).<br>- Skills in using cloud-based platforms (e.g., NetSuite, Xero).<br>- Adapting to fintech platforms such as blockchain technologies, payment gateways, and robo-advisors. |
| Cybersecurity Awareness | - Understanding data protection principles, encryption, and compliance with regulations like GDPR.<br>- Skills in identifying vulnerabilities and managing cyber risks.<br>- Competence in mitigating cyber threats such as phishing and ransomware. |
| Automation and RPA | - Proficiency in RPA tools (e.g., UiPath, Blue Prism, Automation Anywhere).<br>- Identifying and optimizing workflows for automation.<br>- Leveraging AI-driven automation for fraud detection and financial advising. |
| Blockchain and Cryptocurrency | - Knowledge of blockchain fundamentals and its applications in finance.<br>- Skills in managing cryptocurrencies like Bitcoin, Ethereum, and stablecoins.<br>- Understanding smart contracts and their role in decentralized finance (DeFi). |
| AI and Machine Learning | - Skills in AI-powered analytics for market predictions, risk assessment, and portfolio optimization.<br>- Familiarity with machine learning models for credit scoring, fraud detection, and customer segmentation.<br>- Awareness of AI ethics. |
| Regulatory Technology (RegTech) | - Proficiency in digital tools for monitoring AML and KYC compliance.<br>- Skills in real-time compliance reporting and automated audits.<br>- Using RegTech platforms to ensure regulatory transparency and accuracy. |
| Communication and Presentation | - Expertise in data visualization tools (e.g., Tableau, Power BI) for presenting financial data.<br>- Proficiency in digital collaboration platforms (e.g., Slack, Teams, Zoom).<br>- Crafting narratives to explain financial insights effectively. |
| Innovation and Adaptability | - Staying updated on trends like quantum computing, ESG reporting tools, and AR/VR in finance.<br>- Agile learning to adapt to new digital tools and technologies.<br>- Problem-solving with a mix of digital and strategic skills. |
| Ethics and Digital Responsibility | - Navigating ethical challenges around data usage, privacy, and AI-driven decisions.<br>- Tracking and reporting ESG metrics using digital tools.<br>- Ensuring accessibility and inclusivity in financial tools and services. |

*Source: developed by the author*

Digital competencies in the financial sector vary by role but generally include some combination of data analytics, risk management, fintech tools, and regulatory knowledge. As technology becomes more embedded in every aspect of finance – from day-to-day transaction processing to strategic decision-making

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– financial professionals who invest in continuous digital upskilling will be better positioned to innovate, drive organizational growth, and deliver higher value to their clients or stakeholders (Table 1.8).

**Table 1.8. The key digital competencies for financial professionals by they roles**

| Role | Core Responsibilities | Key Digital Competencies |
|---|---|---|
| Financial Planners/ Wealth Managers | - Personalized financial advice for individuals and families - Retirement, estate, and investment planning - Relationship and portfolio management | 1. Financial Planning Software (eMoney, MoneyGuidePro) |
| | | 2. Robo-Advisor Integration (AI-driven recommendations) |
| | | 3. CRM Systems and Client Portals (Salesforce, Redtail) |
| | | 4. Virtual Communication Skills (Zoom, Microsoft Teams) |
| FinTech Product Managers/ Business Analysts | - Overseeing the design and deployment of technology-driven financial products - Market research, user testing, and feature prioritization - Collaborating with cross-functional teams (developers, designers, compliance) | 1. Agile and Lean Methodologies (Jira, Trello) |
| | | 2. Wireframing and Prototyping Tools (Figma, Sketch) |
| | | 3. API Integration and Data Flows (RESTful APIs) |
| | | 4. User Behavior and Analytics (Google Analytics, A/B testing) |
| Chief Financial Officers (CFOs)/ Finance Directors | - Strategic financial leadership - Financial reporting and budgeting - Overseeing risk management and operational efficiency | 1. ERP Systems (SAP, Oracle Financials) |
| | | 2. Advanced Analytics & Business Intelligence (Power BI, Tableau) |
| | | 3. Digital Transformation Leadership (process digitization) |
| | | 4. Risk Oversight and Governance (cybersecurity policies) |

*Source: developed by the author*

Below is a detailed exploration of how the required digital competencies for financial professionals can vary depending on the economic sector in which they operate. While fundamental financial skills (e.g., accounting, budgeting, risk assessment) remain essential across all sectors, the specifics of technology usage, data analytics, and regulatory focus differ significantly based on industry characteristics and operational requirements (Table 1.9).

Each economic sector presents unique digital requirements for financial professionals, shaped by the specific operational models, regulatory landscapes, and technological advancements within that industry. Mastering relevant digital

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tools—ranging from blockchain for banking to IoT analytics for agriculture—enables financial specialists to:

- provide high-value insights and strategic guidance;
- streamline processes and reduce costs;
- ensure regulatory compliance and data security;
- make more informed, data-driven decisions that drive organizational success.

**Table 1.9. The key digital competencies by for financial professionals sector**

| Sector | Key Digital Competencies |
|---|---|
| Energy and Utilities | 1. CTRM Systems: Tools like Openlink for energy commodity trading and risk management.<br>2. IoT Data: Using smart grid analytics for forecasting and cost optimization.<br>3. Project Finance: Digital platforms for tracking milestones and capital costs.<br>4. Sustainability Tools: Carbon accounting software and ESG reporting frameworks. |
| Agriculture and Agribusiness | 1. Agritech: IoT and drone data for yield forecasting and financial projections.<br>2. Commodity Analysis: Hedging tools for futures and options markets.<br>3. Logistics Platforms: Farm-to-table traceability using ERP systems.<br>4. Rural Finance: Blockchain-based platforms for micro-lending and crop insurance. |
| Government and Public Sector | 1. E-Government Platforms: Online portals for tax collection and grant management.<br>2. Budget Tools: Financial software for multi-year public sector planning.<br>3. Public Audit Systems: Automated compliance and procurement checks.<br>4. Open Data: Data visualization platforms for public spending transparency. |

*Source: developed by the author*

By aligning their digital competencies with the needs of their sector, financial professionals remain agile and well-prepared to manage evolving challenges in today's technology-driven marketplace.

**3. Challenges in digital skills development for financial professionals.** The digital transformation of the financial industry has significantly reshaped the competencies required by professionals to navigate and thrive in a technology-driven landscape. Financial professionals are increasingly expected to possess not only domain expertise in areas such as investment, banking, and risk management but also a deep understanding of digital tools, technologies, and strategies. As financial systems become more complex and interconnected, the ability to leverage digital tools for data analysis, compliance, security, and innovation has become paramount.

The rapid digital transformation of the financial sector has created immense opportunities, but it also brings significant challenges in developing digital skills

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among financial professionals. As technology reshapes financial operations and demands new competencies, professionals face barriers that range from technical to organizational and cultural.

Data analytics has become one of the core competencies for financial professionals, enabling them to make informed decisions based on large volumes of structured and unstructured data. As the financial industry increasingly relies on big data, machine learning, and predictive analytics, professionals must be adept at using tools such as SQL, Python, R, and Tableau for data analysis and visualization.

According to McAfee and Brynjolfsson (2012), the rise of big data in financial decision-making has transformed the role of financial professionals from purely transactional to analytical. Professionals must not only collect and process data but also interpret complex datasets to forecast trends, optimize portfolios, assess risk, and make strategic decisions. The ability to work with big data technologies, such as Hadoop or Spark, is becoming increasingly relevant for analyzing unstructured data from sources like social media, market news, and consumer behavior (Davenport & Harris, 2017). Moreover, professionals need to use data visualization tools like Power BI to communicate insights clearly to stakeholders and decision-makers, making data interpretation a critical skill in financial management.

Proficiency in financial software and tools is a key competency for financial professionals. As financial services have become more digitized, tools like Enterprise Resource Planning (ERP) systems, cloud-based platforms, and specialized fintech applications have become critical for managing day-to-day operations. ERP systems such as SAP, Oracle Financials, and Microsoft Dynamics are widely used in large organizations for accounting, payroll, resource planning, and budgeting.

With the rapid shift to cloud computing, financial professionals are increasingly required to understand cloud-based financial platforms such as NetSuite, Xero, and QuickBooks Online. As noted by Arner, Barberis, and Buckley (2015), cloud technology enables real-time access to financial data, improving operational efficiency and collaboration across departments. Furthermore, financial professionals must be familiar with fintech platforms for mobile payments, blockchain technologies, and robo-advisors, which are

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revolutionizing payments, investment management, and lending (Zetzsche, Buckley, & Arner, 2018).

The need for financial professionals to adapt to the fintech landscape highlights the importance of financial software proficiency in today's industry. As financial services become more embedded in digital platforms, professionals must understand how to use these tools to improve service delivery, enhance customer experience, and meet regulatory requirements.

Cybersecurity has become an essential area of expertise for financial professionals as the industry digitizes financial transactions and services. Financial institutions are prime targets for cyberattacks, and as a result, professionals must be equipped to manage risks related to data protection, fraud, and digital threats. Anderson and Moore (2016) emphasize that the rise in cyber threats, including phishing, ransomware, and identity theft, requires financial professionals to adopt robust cybersecurity practices.

Financial professionals must understand encryption techniques, secure data storage, and compliance with privacy regulations such as the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA). Additionally, they need to be proficient in tools and strategies for detecting and mitigating cyberattacks. According to a report by PwC (2020), financial institutions are investing heavily in cybersecurity training to protect sensitive financial data and preserve customer trust.

Moreover, the integration of artificial intelligence (AI) in financial services has brought both opportunities and challenges for cybersecurity. AI-powered systems can identify patterns and detect fraudulent transactions in real-time, but they also require professionals to be knowledgeable about ethical concerns and AI-driven decision-making (Zuboff, 2019). Thus, cybersecurity awareness is not only about protecting systems but also about managing ethical risks associated with new technologies.

Automation, particularly Robotic Process Automation (RPA), is rapidly transforming the financial services industry by automating repetitive tasks and streamlining workflows. Professionals must understand how to identify processes that can be automated and use tools such as UiPath, Blue Prism, and Automation Anywhere to improve operational efficiency (Davenport, 2018).

The potential for automation in finance is vast, from automating routine accounting tasks like invoicing and account reconciliation to complex financial

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reporting and regulatory compliance procedures. RPA allows professionals to focus on higher-value tasks such as strategic analysis and decision-making. According to Brynjolfsson and McAfee (2014), financial professionals who embrace RPA tools can improve both productivity and accuracy, reducing human error and enabling real-time financial monitoring.

Moreover, the integration of AI in automation workflows adds another layer of complexity. Financial professionals need to leverage AI to detect anomalies, optimize trading strategies, and enhance customer service. The ability to integrate automation and AI into financial operations is a growing competency that will be essential for professionals to stay competitive in the future.

Blockchain technology and cryptocurrencies are disrupting traditional financial systems, requiring professionals to understand how these technologies work and how they can be applied in financial services. Blockchain's decentralized, secure nature makes it an attractive solution for recording transactions, verifying identity, and executing smart contracts without intermediaries (Tapscott, 2016).

Financial professionals must be proficient in blockchain fundamentals, including its applications in cryptocurrency trading, supply chain management, and digital payments. According to a report by Arner et al. (2015), financial institutions are increasingly adopting blockchain for cross-border payments, reducing transaction costs, and enhancing transparency. Additionally, professionals must understand how to manage digital currencies like Bitcoin, Ethereum, and stablecoins, which are rapidly gaining popularity as alternative investment options and means of payment.

Smart contracts, which automatically execute financial agreements based on predefined conditions, are another important area of blockchain technology. Financial professionals must be able to navigate smart contract platforms, such as Ethereum, to ensure compliance and mitigate risks associated with blockchain transactions.

AI and machine learning are revolutionizing the financial industry by providing tools for predictive analytics, fraud detection, and portfolio optimization. Financial professionals must be adept at using AI-powered tools to predict market trends, assess risk, and optimize investment strategies (McAfee & Brynjolfsson, 2012). Machine learning algorithms can analyze vast amounts of

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data to identify patterns and make real-time decisions, providing a competitive edge in financial markets.

Moreover, machine learning is being increasingly applied in credit scoring, fraud detection, and customer segmentation. Financial professionals must understand how these models work and how to interpret their outputs to make informed decisions. As financial institutions adopt AI-driven solutions, professionals will need to keep up with the latest advancements in AI and machine learning to remain relevant.

The ethical implications of AI in financial decision-making, particularly in areas like credit scoring and investment management, are also a critical concern. Financial professionals must be aware of biases in AI models and ensure that AI systems are transparent, fair, and comply with regulatory standards (Zuboff, 2019).

As digital tools and technologies become more integrated into financial services, the ability to communicate financial insights effectively is crucial. Financial professionals must be proficient in using data visualization tools such as Tableau, Power BI, and Excel to present complex financial data clearly and concisely to stakeholders (Davenport, 2018). Visual storytelling has become an essential skill for professionals to translate data into actionable insights and inform decision-making.

Furthermore, digital collaboration tools like Microsoft Teams, Slack, and Zoom have become integral to modern financial operations, especially in remote and hybrid work environments. Financial professionals must be able to work collaboratively with teams across different functions, including IT, data science, and compliance, to deliver integrated solutions.

Table 1.10 presents the results of the study of the main challenges in the development of digital skills of financial professionals and their key implications.

*Rapid technological evolution.* Financial services are constantly adopting new technologies, from AI-driven risk assessment tools to blockchain-based payment systems. The speed at which these innovations emerge can outpace the ability of professionals and organizations to keep up. As soon as one skillset becomes comfortable or standardized, new demands arise, requiring ongoing commitment to education and skills acquisition.

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**Table 1.10. The main challenges in the development of digital skills of financial professionals and their key implications**

| Challenges | Key Implications |
|---|---|
| Rapid Technological Evolution | - Continuous Learning Requirement: Professionals must actively upskill or reskill to stay relevant.<br>- Obsolescence of Current Skills: Existing skills risk becoming outdated.<br>- Strategic Resource Allocation: Organizations must allocate time, budget, and personnel for upskilling. |
| Skill Gaps and Specialized Knowledge | - Technical vs. Financial Expertise: Bridging gaps requires specialized training or partnerships.<br>- Steep Learning Curve: Advanced tools like Python can intimidate non-technical professionals.<br>- Need for Industry-Specific Training: Generic courses often fail to address financial applications. |
| Access to Quality Training and Resources | - Financial Constraints: High-quality certifications and programs can be costly.<br>- Geographical Limitations: Not all regions have reliable internet or networking opportunities.<br>- Time Constraints: Balancing careers, family, and learning is challenging for professionals. |
| Organizational Culture and Resistance to Change | - Internal Pushback: Employees may see digital transformation as a threat to job security.<br>- Slow Decision-Making: Regulated institutions face lengthy approval processes.<br>- Leadership Buy-In: Lack of leadership support hinders training initiatives. |
| Regulatory and Compliance Constraints | - Compliance-Driven Training Needs: Professionals must integrate ethics and legal requirements into digital skills.<br>- Additional Certifying Bodies: Specialized certifications add complexity to training.<br>- Risk Aversion: Regulatory ambiguity limits experimentation with new technologies. |
| Cybersecurity Concerns | - Heightened Security Standards: Training must include robust cybersecurity measures.<br>- Liability and Reputation Risks: Breaches can harm reputations, emphasizing the need for thorough training.<br>- Constantly Evolving Threat Landscape: Regular updates to training programs are necessary. |
| Motivation and Self-Discipline in Lifelong Learning | - Burnout Risk: Intense upskilling combined with work responsibilities can lead to fatigue.<br>- Need for Targeted Incentives: Recognition programs or financial support can motivate learners.<br>- Peer and Community Support: Networks and mentorship can boost motivation and accountability. |
| Balancing Technical Skills with Soft Skills | - Holistic Skillsets: Training must combine technical knowledge with critical thinking and communication.<br>- Cross-Functional Collaboration: Financial professionals need to collaborate with IT and data science teams.<br>- Future-Proofing Careers: Soft skills help professionals adapt to rapid changes. |

*Source: developed by the author*

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*Skill gaps and specialized knowledge.* While basic computer literacy is widespread, advanced digital competencies—such as data analytics, algorithmic trading, blockchain integration, and cybersecurity—are in shorter supply. Many financial professionals come from backgrounds heavily focused on traditional finance or accounting principles, making the leap to more technical realms challenging.

*Access to quality training and resources.* Even when professionals are motivated to learn, finding and accessing high-quality, cost-effective training resources can be a hurdle. Some organizations may offer in-house programs, but smaller firms might not have the means to do so. Meanwhile, online learning platforms vary in rigor, and self-directed programs can be difficult to complete without guidance or accountability.

*Organizational culture and resistance to change.* In many financial institutions, particularly those with long-standing traditions, there may be cultural resistance to adopting new technologies or processes. Established professionals might rely on familiar methods that have proven successful over decades, making them hesitant to invest in extensive digital upskilling.

*Regulatory and compliance constraints.* The financial sector is highly regulated, with strict guidelines around data privacy, security, and customer protection. Developing digital skills must go hand-in-hand with understanding compliance requirements related to emerging technologies. This regulatory environment can slow the pace of digital skill adoption or require specialized training beyond purely technical competencies.

*Cybersecurity concerns.* As financial transactions move into digital domains, financial professionals face increased threats from cyberattacks and fraud. Acquiring digital skills also involves learning to identify vulnerabilities, mitigate risks, and follow best practices for data protection.

*Motivation and self-discipline in lifelong learning.* The drive to continually learn and adapt is crucial in the digital era. Even the best resources and well-structured programs can fail if learners are not motivated or if organizations do not foster a culture of continuous development. Adult learners often juggle multiple responsibilities, making it challenging to prioritize ongoing education.

*Balancing technical skills with soft skills.* Financial professionals must blend digital competencies with strong analytical, communication, and strategic thinking skills to apply technology effectively in real-world scenarios. While

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mastering the tools is vital, the ability to interpret data insights, collaborate with interdisciplinary teams, and make informed decisions remains equally important.

Developing digital skills in financial specialties involves navigating a variety of challenges—ranging from rapid technological change and regulatory constraints to cultural resistance and the need for balanced technical and soft skills. Addressing these challenges requires a multifaceted approach that includes targeted training programs, supportive organizational cultures, continuous professional development, and close collaboration between the financial industry, educational institutions, and technology providers. By proactively engaging with these challenges, financial professionals and their employers can ensure they remain competitive and innovative in a digital-first world.

**4. Opportunities in digital skills training for financial professionals.** The rapid digital transformation of the financial sector has created unprecedented opportunities for financial professionals to enhance their skills, advance their careers, and drive innovation in their organizations. Digital skills training has emerged as a critical focus area, offering new ways to prepare financial specialists to meet the demands of a technology-driven industry. This literature review examines the opportunities in digital skills training for financial professionals, drawing from academic research, industry reports, and case studies.

The growing reliance on technology in finance has created high demand for professionals with digital competencies. According to McAfee and Brynjolfsson (2012), proficiency in tools like Python, SQL, and Power BI, along with expertise in areas such as blockchain, artificial intelligence (AI), and data analytics, is increasingly viewed as essential for career advancement.

Davenport (2018) highlights that professionals who acquire digital skills are more likely to access leadership roles or transition into emerging positions, such as fintech product managers, data analysts, and digital transformation leaders. Certifications in advanced technologies, such as machine learning or blockchain, are particularly valuable, as they enable professionals to stand out in a competitive job market. Moreover, digital competencies open global career opportunities, as remote work and international collaboration become more prominent in the financial sector.

Digital platforms have revolutionized the way financial professionals learn, offering flexible and tailored training opportunities. Online learning platforms such as Coursera, LinkedIn Learning, and edX provide on-demand courses that

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allow professionals to upskill at their own pace. According to Tapscott (2016), these platforms reduce barriers to entry, making high-quality training accessible to a wider audience.

Emerging technologies like virtual reality (VR) and augmented reality (AR) further enhance learning experiences by providing immersive, hands-on training in complex scenarios such as market simulations or fraud detection (Zuboff, 2019). Additionally, gamified training methods, which incorporate leaderboards, badges, and competitions, have been shown to improve engagement and motivation among learners.

As financial operations increasingly integrate technology, cross-disciplinary collaboration between financial professionals, IT teams, and data scientists has become essential. Davenport and Harris (2017) emphasize the importance of training programs that combine technical, financial, and strategic skills to foster effective teamwork in digital transformation projects.

Training initiatives that encourage collaboration through group projects, case studies, and real-world problem-solving prepare professionals to navigate interdisciplinary environments. Exposing financial specialists to agile methodologies and collaboration platforms like Slack, Microsoft Teams, and GitHub equips them to work effectively in dynamic, technology-driven organizations.

Digital skills training empowers financial professionals to adopt emerging technologies and drive innovation in financial services. According to Arner, Barberis, and Buckley (2015), training in blockchain, AI, and machine learning enables professionals to develop cutting-edge solutions such as automated advisory systems, decentralized finance (DeFi), and predictive analytics.

Innovation is further supported by tailored training programs that focus on industry-specific applications, such as risk modeling, algorithmic trading, and ESG (Environmental, Social, and Governance) reporting. By acquiring these skills, financial professionals can contribute to product development, improve operational efficiency, and enhance the customer experience.

The pace of technological change in finance necessitates a culture of lifelong learning. According to Brynjolfsson and McAfee (2014), organizations that invest in continuous upskilling for their workforce are better positioned to adapt to market changes and maintain competitiveness. Lifelong learning initiatives, such as modular training programs, micro-credentialing, and frequent refresher

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courses, enable professionals to build competencies incrementally and stay updated on emerging trends.

Organizations can also incentivize lifelong learning by offering financial support, promotions, or recognition programs for employees who pursue upskilling opportunities. Additionally, participation in professional networks and mentorship programs can reinforce motivation and accountability for continued education.

Digital skills training provides opportunities to address skill gaps and promote inclusivity in the financial workforce. Online platforms reduce geographical barriers, enabling professionals in remote or underserved areas to access high-quality education (Friedman, 2005). Additionally, initiatives targeting underrepresented groups, such as women and minorities, can help bridge gaps in digital skill acquisition and increase diversity in technology-focused roles.

Gamification and mobile-optimized learning tools also enhance accessibility by accommodating diverse learning preferences and schedules. These tools allow professionals to learn on the go, making training more accessible to individuals with demanding responsibilities.

The financial sector's regulatory environment presents both challenges and opportunities for digital skills training. As noted by Zetzsche et al. (2018), compliance with evolving regulations such as GDPR, AML (Anti-Money Laundering), and KYC (Know Your Customer) is critical. Training programs that incorporate compliance-related modules help professionals stay ahead of regulatory requirements while developing technical skills.

Moreover, advancements in regulatory technology (RegTech) have created opportunities for professionals to specialize in areas such as automated compliance monitoring and real-time reporting. Training in RegTech tools equips financial specialists to streamline compliance processes and reduce operational risks.

The integration of emerging technologies into training programs is transforming the way financial professionals acquire digital skills. AI-powered learning platforms offer personalized training experiences by analyzing individual performance and recommending targeted content. Secure, blockchain-based credentialing systems simplify the verification of certifications, increasing trust among employers and learners (Tapscott, 2016).

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Additionally, simulation-based training environments allow professionals to practice real-world financial scenarios in a risk-free setting. For example, portfolio management simulations or fraud detection exercises provide hands-on experience with advanced tools and strategies.

The key opportunities in digital skills training for financial professionals are (Figure 1.5).

*Tailored, industry-specific curriculum.* Institutions can collaborate with industry experts to design courses that directly address the practical needs of financial professionals, such as algorithmic trading, risk analytics, and digital payments. Professional bodies (e.g., CFA Institute, ACCA, ACFE) increasingly offer specialized certifications covering financial technology (FinTech), data analytics, and blockchain. These credentials validate digital competencies and help professionals stand out in the job market. Short, targeted modules focused on specific tools or processes (e.g., using Python for risk modeling) allow for immediate application in daily tasks, making training highly relevant and efficient.

*Corporate partnerships and sponsored training.* Many financial institutions recognize the strategic importance of digital upskilling and invest in internal training academies or learning platforms. These programs can be tailored to the organization's unique technology stack and workflows. Collaborations between financial firms and educational technology companies can yield cutting-edge training solutions. For example, a bank might partner with an online learning platform to develop customized courses on cryptocurrency regulations. Government entities or professional associations sometimes offer financial assistance for digital education, reducing the cost barrier for mid-career professionals looking to upskill.

*Flexible learning formats.* Digital platforms allow professionals to learn at their own pace and on their own schedule. This flexibility is especially valuable for those balancing demanding work commitments with continuous upskilling. Virtual labs and trading simulations enable hands-on practice in a risk-free environment, allowing learners to experiment with real-world tools and scenarios. Smartphone apps and mobile-optimized platforms deliver bite-sized lessons that professionals can consume anytime, anywhere—particularly beneficial for those who travel frequently or work remotely.

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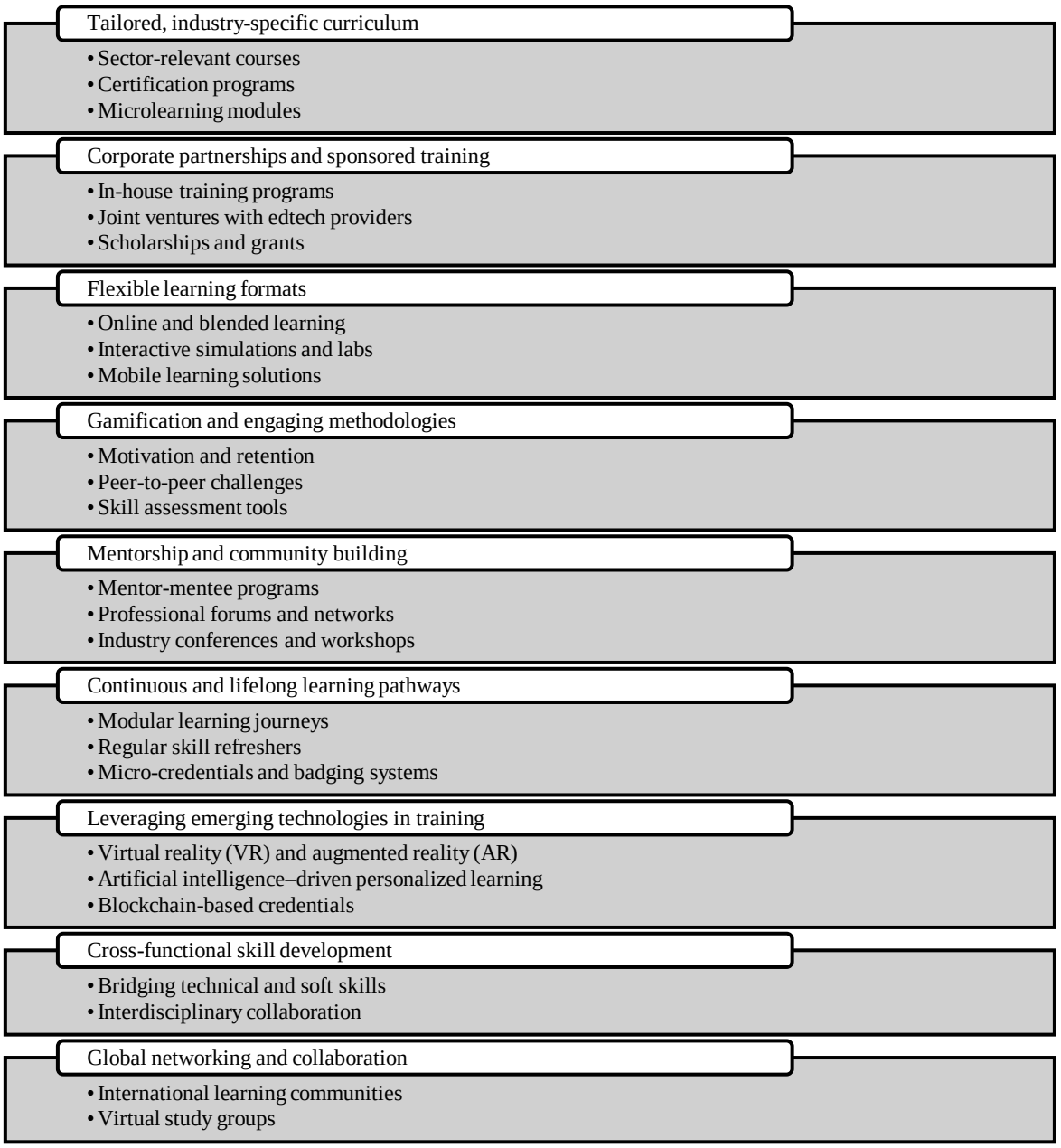


**Figure 1.5. The key opportunities in digital skills training for financial professionals**

*Source: developed by the author*

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*Gamification and engaging methodologies.* Incorporating game-like elements, such as leaderboards, badges, and quizzes, can increase learner engagement and motivation. Small-group competitions or team-based projects foster collaboration while reinforcing digital skills in real-world contexts. Many gamified platforms include built-in diagnostics that track progress, identify knowledge gaps, and recommend targeted content to address weak areas.

*Mentorship and community building.* Pairing tech-savvy mentors with financial professionals seeking digital upskilling can accelerate learning by offering guidance and real-time feedback. Online communities and forums (e.g., LinkedIn groups, specialized Slack channels) provide ongoing peer support and opportunities to discuss the latest tech developments, share resources, and seek problem-solving advice. Live events and webinars offer professionals a chance to engage with thought leaders, learn best practices, and stay informed about emerging trends in financial technology.

*Continuous and lifelong learning pathways.* Segmenting training into progressive modules—from foundational digital literacy to advanced data science—allows professionals to build competencies step by step. Technology changes rapidly; frequent refresher courses or update sessions help professionals stay current and maintain proficiency in the latest tools and methodologies. Offering micro-credentials or digital badges for each learning milestone helps track progress, maintain motivation, and provide a tangible record of continued education efforts.

*Leveraging emerging technologies in training.* Simulations in VR/AR can help financial professionals practice complex tasks, like portfolio management or fraud detection, in an immersive environment. AI-powered platforms can adapt training content based on individual performance, ensuring each learner follows an optimal path. This technology can also predict skill gaps and recommend relevant modules. Secure, decentralized record-keeping of certifications and achievements can simplify credential verification, building trust among employers and professionals.

*Cross-functional skill development.* Modern financial roles increasingly require both digital competence and business acumen. Training programs that integrate communication, leadership, and problem-solving alongside technical modules empower professionals to apply digital tools effectively. Exposing financial professionals to agile work methods and collaborative platforms (like

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GitHub or Microsoft Teams) encourages efficient teamwork with IT departments, data scientists, and other business units.

*Global networking and collaboration.* As finance becomes more global and interconnected, professionals can join international cohorts, gaining exposure to best practices from different regions. Remote collaboration tools make it feasible for professionals worldwide to form study groups, enabling cross-cultural knowledge exchange and networking opportunities.

The shift toward digital technologies in finance presents a wealth of opportunities for professionals to enhance their skill sets, stay competitive, and drive innovation. From specialized certification programs and corporate partnerships to emerging training technologies and flexible learning models, there are myriad ways to acquire and refine digital competencies in financial specialties. By leveraging these opportunities, financial professionals can position themselves at the forefront of industry transformation—capable of harnessing digital tools to inform smarter decisions, deliver more efficient services, and ultimately shape the future of finance.

The opportunities in digital skills training for financial professionals are vast and transformative. By investing in the right training programs, professionals can enhance their careers, contribute to organizational growth, and foster innovation in the financial sector. As the industry continues to evolve, digital skills will become an indispensable asset for navigating the complexities of a dynamic and technology-driven world.

**Conclusion.** The digital transformation of the financial industry has fundamentally reshaped the skills and competencies required of financial professionals. From the early days of basic computing skills to the current demand for expertise in artificial intelligence, blockchain, big data analytics, and regulatory compliance, the evolution of digital skills training reflects the sector's dynamic and complex nature. As technology continues to advance, financial professionals must adopt a lifelong learning approach to stay relevant and competitive.

Key challenges such as rapid technological changes, skill gaps, organizational resistance, and cybersecurity threats have highlighted the need for targeted and strategic digital training initiatives. These challenges, however, are accompanied by opportunities to enhance productivity, drive innovation, and promote inclusivity through tailored learning platforms, gamified approaches,

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and collaborative cross-disciplinary training programs. Furthermore, the integration of emerging technologies like virtual and augmented reality (VR/AR) and artificial intelligence (AI) into training solutions offers a pathway to immersive and practical learning experiences.

As the financial sector embraces a more digital future, professionals will need to blend technical expertise with strategic thinking, communication, and ethical awareness to navigate a rapidly evolving landscape. Regulatory frameworks, sustainability imperatives, and global interconnectivity will also play a significant role in shaping the future of digital skills training. By addressing these challenges and capitalizing on emerging opportunities, financial professionals and institutions alike can position themselves to thrive in a technology-driven world.

Ultimately, the ability to adapt, innovate, and collaborate will define the success of financial professionals in this transformative era, underscoring the importance of comprehensive and forward-thinking digital skills training programs.

**References:**

1. Arner, D. W., Barberis, J., & Buckley, R. P. (2015). The evolution of Fintech: A new post-crisis paradigm. Geo. J. Int'l L., 47, 1271. Retrieved from: https://heinonline.org/HOL/LandingPage?handle=hein.journals/geojintl47&div=41&id=&page=.
2. Brinton Anderson, B., Vance, A., Kirwan, C. B., Eargle, D., & Jenkins, J. L. (2016). How users perceive and respond to security messages: a NeuroIS research agenda and empirical study. European Journal of Information Systems, 25(4), 364–390. https://doi.org/10.1057/ejis.2015.21
3. Brynjolfsson, E., & Hitt, L. M. (1998). Beyond the productivity paradox. Communications of the ACM, 41(8), 49–55. https://dl.acm.org/doi/abs/10.1145/280324.280332.
4. Brynjolfsson, E., & McAfee, A. (2014). The second machine age: Work, progress, and prosperity in a time of brilliant technologies. W. W. Norton & Company.
5. California Consumer Privacy Act (CCPA). (2018). Assembly Bill No. 375. Retrieved from: https://oag.ca.gov/privacy/ccpa.
6. Davenport, T. H., & Harris, J. G. (2007). Competing on analytics: the new science of Winning. Harvard business review press, Language, 15(217), 24.
7. Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13(3), 319–340. https://doi.org/10.2307/249008.
8. European Union. (2016). General Data Protection Regulation (GDPR): Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016.
9. Friedman, T. L. (2005). The world is flat: A brief history of the twenty-first century. Macmillan. Retrieved from: https://media-1.carnegiecouncil.org/import/studio/The_World_Is_Flat.pdf.
10. Kolbjørnsrud, V., Amico, R., & Thomas, R. J. (2016). How artificial intelligence will redefine management. Harvard business review, 2(1), 3-10. Retrieved from: https://enterprisersproject.com/sites/default/files/how_artificial_intelligence_will_redefine_management.pdf.
11. McAfee, A., Brynjolfsson, E., Davenport, T. H., Patil, D. J., & Barton, D. (2012). Big data: the management revolution. Harvard business review, 90(10), 60-68. Retrieved from: https://tarjomefa.com/wp-content/uploads/2017/04/6539-English-TarjomeFa-1.pdf

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

12. OECD (2013), The Survey of Adult Skills: Reader's Companion, OECD Publishing, Paris, https://doi.org/10.1787/9789264204027-en.
13. OECD (2023), OECD Employment Outlook 2023: Artificial Intelligence and the Labour Market, OECD Publishing, Paris, https://doi.org/10.1787/08785bba-en.
14. OECD (2023), OECD Skills Outlook 2023: Skills for a Resilient Green and Digital Transition, OECD Publishing, Paris, https://doi.org/10.1787/27452f29-en.
15. PwC. (2020). Financial Services Technology 2020 and Beyond: Embracing disruption. Retrieved from: Retrieved from: https://www.pwc.com/gx/en/financial-services/assets/pdf/technology2020-and-beyond.pdf.
16. Schwab, K. (2017). The fourth industrial revolution. Crown Currency.
17. Spivak, I., Mihus, I., & Greben, S. (2024). A COMPARATIVE ANALYSIS OF THE DIGITAL COMPETENCIES DEVELOPMENT IN ADULT EDUCATION. *Pedagogy and Education Management Review*, (2(16), 18–27. https://doi.org/10.36690/2733-2039-2024-2-18-27
18. Spivak, I., Mihus, I., & Greben, S. (2024). FINANCIAL LITERACY AND GOVERNMENT POLICIES: AN INTERNATIONAL STUDY. *Public Administration and Law Review*, (2(18), 21–33. https://doi.org/10.36690/2674-5216-2024-2-21-33.
19. Tapscott, D. (1996). Six themes for new learning from: the digital economy: promise and peril in the age of networked intelligence. Educom Review, 31, 52-54.
20. World Economic Forum (2024). The Future of Global Fintech: Towards Resilient and Inclusive Growth. Retrieved from: https://www3.weforum.org/docs/WEF_The_Future_of_Global_Fintech_2024.pdf
21. Zetzsche, D. A., Buckley, R. P., & Arner, D. W. (2018). The distributed liability of distributed ledgers: Legal risks of blockchain. University of Illinois Law Review, 2018(4), 1361–1406. Retrieved from: https://heinonline.org/HOL/LandingPage?handle=hein.journals/unilllr2018&div=41&id=&page=
22. Zuboff, S. (2023). The age of surveillance capitalism. In Social theory re-wired (pp. 203-213). Routledge. Retrieved from: https://www.taylorfrancis.com/chapters/edit/10.4324/9781003320609-27/age-surveillance-capitalism-shoshana-zuboff.

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# SECTION 2:
# DIGITALIZATION IN BUSINESS AND FINANCIAL PROCESSES

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# Chapter 2.1. Digitalization to Overcome the Challenges of Customs Brokerage

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***Abstract.*** *Customs brokers play a crucial role in international trade, acting as intermediaries between importers, exporters and government customs authorities. They provide basic services that facilitate the smooth movement of goods across borders. One of the main functions of customs brokers is the preparation and submission of the necessary documentation for customs clearance. However, customs brokers encounter difficulties in their work. Uncertainty around trade agreements and border policies, regulatory complexity, corruption and bureaucracy, lack of transparency of procedures, technical limitations, infrastructure problems, technology gaps and inadequate staff skills. Directions for improving the situation are being considered. Comprehensive reforms, optimization of customs procedures, increased transparency of customs operations, ensuring adaptability to a changing environment, improving the efficiency of infrastructure and implementing effective electronic systems are necessary. The main purpose of this study is to determine directions for creating a more favorable environment for the activities of customs brokers based on digitalization to overcome the challenges of the customs fraternity, which in turn will contribute to the expansion of foreign trade and the economy. Digital transformation is a key factor in bridging the technological divide. The lack of integrated digital platforms is a significant obstacle for customs brokers. By investing in digital tools training, brokers can transition from legacy systems to more efficient modern technologies. Customs brokers must adopt a holistic approach to digital transformation, including automating processes, improving customer interactions and ensuring regulatory compliance. The results indicate that digital tools can improve the efficiency of customs processes, allowing brokers to respond quickly to changing conditions and achieve a high level of competitiveness. The digital transformation of the customs fraternity is critical to adapting to uncertainty. Automated systems can reduce human error, speed up processes and improve data accuracy, which is important in a rapidly changing environment. Brokers investing in technology will be better positioned to navigate the complexities created by geopolitical factors.*

***Keywords:*** *customs brokers; digitalization; infrastructure; transformation; customs digitalization; trade facilitation; e-customs; supply chain efficiency; regulatory compliance.*

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**1. Challenges Faced by Customs Brokers in Ukraine**. The geopolitical status of Ukraine has long been a subject of scholarly discourse, particularly in the context of its relations with other countries. As a country situated at the crossroads of Europe and Asia, Ukraine's European identity is shaped by a complex interplay of economic, political, and socio-cultural factors. These characteristics not only define Ukraine's position within the broader European space but also influence its integration into European institutions and its role in regional and global geopolitics.

Economically, Ukraine's European status is largely determined by its efforts to align with European standards of development, particularly through market reforms, integration into the European Union economy, and participation in regional trade agreements. Ukraine's strategic location as a key transit hub for energy resources, its agricultural potential, and its industrial base all contribute to its economic ties with European countries. The implementation of economic reforms, such as the adoption of EU-compatible legal frameworks, anti-corruption measures, and efforts to modernize infrastructure, have been crucial in shaping Ukraine's European aspirations.

Despite challenges such as political instability, economic crises, and ongoing conflicts, Ukraine has made significant strides in aligning its economy with European norms. The EU-Ukraine Association Agreement, which includes provisions for deeper economic integration, is a critical step in Ukraine's pursuit of greater economic ties with Europe. The development of a free trade area with the EU and participation in the Eastern Partnership program further enhance Ukraine’s economic integration into the European space.

Furthermore, Ukraine’s foreign policy priorities emphasize cooperation with European institutions, including the EU and NATO. Ukraine's desire for greater security and political stability within the European context is driven by the aspiration to enhance its sovereignty and territorial integrity, particularly in the face of Russian aggression and the annexation of Crimea in 2014. The pursuit of NATO membership and continued dialogue with the EU represent key political dimensions of Ukraine’s European status.

Ukraine’s European status in the geopolitical space is the result of a multifaceted process, shaped by the interplay of economic, political, and socio-cultural factors. As Ukraine continues to strengthen its ties with European institutions and reform its internal systems, its European identity will increasingly

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be defined by its active participation in the European project and its commitment to the values of democracy, human rights, and the rule of law.

"Recognition of the European status of the geopolitical space of Ukraine is a unique methodological principle for identifying the economic, political, and sociocultural characteristics that define it, both of the entire space and its constituent parts… The challenge associated with an adequate way of representing our postmodern era is to formulate an understanding of world politics that corresponds to the need to move beyond the problematic of sovereignty, focused on geopolitical segmentation, stable actors, and economic power; it should be a vision that takes into account the significance of the flows, networks, and identities found within them but does not resort to simply introducing new levels of analysis" (Nekhai, 2024). In this regard, attention should be paid to improving the principles of operation of those organizations that directly carry out procedures related to the initial stage of presenting our products on the international market.

Customs brokers play a crucial role in the international trade landscape, acting as intermediaries between importers, exporters, and government customs authorities. Their expertise in navigating the complexities of customs regulations ensures that goods are imported and exported smoothly and efficiently. This article explores the essential functions and principles of customs brokers.

Customs brokers are licensed professionals who facilitate the clearance of goods through customs. They are knowledgeable about trade laws, tariffs, and regulations, making them invaluable assets for businesses engaged in international trade. By ensuring compliance with customs regulations, brokers help prevent delays, fines, and other complications that can arise during the import/export process.

One of the primary functions of customs brokers is to prepare and submit the necessary documentation for customs clearance. This includes invoices, shipping manifests, and customs declarations, which must be accurate and complete to avoid delays.

Customs brokers help classify goods according to the Harmonized System codes, which determine the applicable duties and taxes. Accurate classification is essential for ensuring that the correct tariffs are applied. Brokers facilitate the payment of customs duties and taxes on behalf of their clients, ensuring compliance with all financial obligations required for the import/export of goods.

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Customs brokers represent their clients before customs authorities, managing the clearance process to ensure that shipments are released in a timely manner.

Brokers provide valuable advice on compliance with trade regulations, helping businesses understand import/export restrictions, duty drawbacks, and other pertinent issues. Many customs brokers also offer logistics services, assisting with the transportation and storage of goods, ensuring that shipments reach their destination efficiently.

The activities of customs brokers are carried out on the basis of sound principles (Table 2.1).

**Table 2.2. Principles Guiding Customs Brokers**

| Principles | The essence of the principles |
|---|---|
| Compliance | A fundamental principle guiding customs brokers is adherence to legal and regulatory requirements. They must ensure that all activities comply with international trade and customs laws |
| Accuracy and Transparency | Customs brokers must maintain high standards of accuracy in documentation and declarations. Transparency in their operations fosters trust with clients and customs authorities alike |
| Ethical Conduct | Ethical behavior is crucial for customs brokers. They must act in the best interests of their clients while adhering to legal obligations, avoiding any actions that could be considered fraudulent or deceptive |
| Continuous Learning | The field of customs brokerage is dynamic, with laws and regulations frequently changing. Brokers must engage in continuous professional development to stay informed about updates in trade policies, tariffs, and customs procedures |

*Source: systematized by the author according to (Akinsola, 2023)*

Customs brokers are essential partners in the world of international trade, providing critical services that facilitate the smooth movement of goods across borders. Their expertise in navigating the complexities of customs regulations, combined with their commitment to compliance and ethical conduct, makes them invaluable to businesses engaged in global commerce. As trade continues to evolve, the role of customs brokers will remain vital in ensuring that international trade operates efficiently and effectively.

Customs brokers in Ukraine play a vital role in facilitating international trade, ensuring that goods move smoothly across borders while complying with

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complex regulations. However, they face numerous challenges that can hinder their operations and impact the efficiency of trade. This article explores some of the key issues confronting customs brokers in Ukraine today.

*Regulatory Complexity.* One of the most significant challenges for customs brokers in Ukraine is the complexity of customs regulations. The legal framework governing customs procedures is often intricate and subject to frequent changes. This variability makes it difficult for brokers to stay updated and compliant, leading to potential delays and increased costs for businesses. Correct use of these rules requires special knowledge and constant vigilance, which can be overwhelming for many brokers.

Customs brokers are essential partners in international trade, providing critical services that facilitate the smooth movement of goods across borders. Their expertise in navigating the complexities of customs regulations and commitment to compliance and ethical conduct makes them invaluable to businesses engaged in global commerce. As trade evolves, customs brokers will remain vital in ensuring that international trade operates efficiently and effectively.

Customs brokers in Ukraine are vital in facilitating international trade, ensuring that goods move smoothly across borders while complying with complex regulations. However, they face numerous challenges that can hinder their operations and impact trade efficiency. This article explores some critical issues confronting customs brokers in Ukraine today.

*Regulatory Complexity*. One of the most significant challenges for customs brokers in Ukraine is the complexity of customs regulations. The legal framework governing customs procedures is often intricate and subject to frequent changes. This variability makes it difficult for brokers to stay updated and compliant, leading to potential delays and increased business costs. Correctly using these rules requires special knowledge and constant vigilance, which can be overwhelming for many brokers.

*Corruption and Bureaucracy*. Corruption remains a pervasive issue within the customs system in Ukraine. Customs brokers often encounter bureaucratic hurdles that can complicate the clearance process. Bribes and unofficial payments may be expected in certain situations, creating an ethical dilemma for brokers who strive to operate legally. This corruption undermines trust in the customs system and leads to increased costs and uncertainty for businesses.

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Customs brokers in Ukraine play a crucial role in facilitating import and export processes. However, their activities are often hampered by numerous bureaucratic obstacles that negatively impact the efficiency and competitiveness of their businesses. One of the main issues is the need for more precise and transparent customs procedures. Changes in legislation and customs rules occur frequently, complicating the work of brokers. Customs authorities often interpret regulations differently, leading to customs clearance delays and additional costs.

Moreover, customs brokers must provide many documents for each shipment. These requirements can be excessive or not aligned with actual needs, prolonging the process and creating an additional burden, especially for small and medium-sized enterprises. Corruption is another severe problem, as brokers frequently encounter informal demands and bribery to expedite customs clearance. This situation increases costs and poses significant risks for companies trying to operate within the law.

Technical limitations within customs authorities further complicate matters. Often, they need more resources to work efficiently, and automation systems for electronic document management frequently experience malfunctions or have limited functionality. This can delay processes and make interactions between brokers and customs more challenging. Additionally, the need for more qualified personnel in the customs service affects the overall efficiency of customs brokers. Many customs staff need help working with new technologies or fully understanding the specifics of international trade, resulting in errors and delays during the clearance process.

To improve this situation, comprehensive reforms are needed. Simplifying customs clearance procedures, increasing transparency in customs operations, and implementing effective electronic systems can help reduce bureaucratic obstacles. By addressing these issues, Ukraine can create a more favorable environment for customs brokers, ultimately contributing to foreign trade growth and the overall economy.

*Competition and Market Pressures.* The customs brokerage market in Ukraine is becoming increasingly competitive, with many players vying for business. This competition can drive down prices and lead to a race to the bottom regarding service quality. Brokers may feel pressured to cut costs, which can compromise the level of service provided and result in increased errors or compliance issues.

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The customs brokerage sector in Ukraine is undergoing dynamic changes driven by globalization, technological advancements, and evolving regulatory environments. Customs brokers play a vital role in ensuring the efficiency of international trade by handling customs clearance processes. However, increasing market competition and pressure require them to improve their services and strategies continuously.

The growth of international trade has led to an increase in the number of customs brokers in Ukraine. New market participants, including traditional firms and startups offering innovative solutions, create high competition. Additionally, the automation of customs clearance processes and the use of digital platforms are changing the rules of engagement, providing clients with the option to choose between traditional brokers and new technological solutions.

Market pressure forces brokers to lower service prices, often reducing profit margins. This is particularly relevant for small and medium-sized enterprises, which may need more resources to invest in new technologies. In response to this pressure, customs brokers need to find ways to enhance the efficiency of their processes and reduce costs.

In a highly competitive environment, companies must embrace innovation. Electronic document management, improved management systems, and enhanced customer service are critical for competitiveness. Brokers offering unique solutions or specialized services are more likely to succeed.

Competition and market pressure in the customs brokerage sector in Ukraine require companies to be flexible and capable of adapting to change. An innovative approach focused on improving service quality and optimizing processes may be crucial to survival and growth in a competitive market. The prospects of customs brokerage in Ukraine depend on market players' ability to adapt to a constantly evolving business environment.

Ongoing geopolitical tensions and conflicts in the region also impact the operations of customs brokers in Ukraine. Uncertainty surrounding trade agreements and border policies can lead to fluctuations in trade volumes and create additional complexities for brokers. Navigating these unstable conditions requires adaptability and resilience.

The activities of customs brokers are significantly influenced by geopolitical factors, which shape the regulatory landscape, trade relationships, and operational challenges they face. Let us explore how geopolitical dynamics, such as

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international relations, regional conflicts, trade agreements, and economic sanctions, impact the customs brokerage sector. By analyzing these influences, we aim to understand how customs brokers can navigate the complexities of an ever-changing geopolitical environment. By analyzing these influences, we aim to provide insights into how customs brokers can navigate the complexities of an ever-changing geopolitical environment.

Customs brokers serve as intermediaries between businesses and government authorities, facilitating the movement of goods across borders. Their role is increasingly important in a globalized economy, where many factors influence trade flows. Geopolitical events, such as shifts in political power, conflicts, and changes in international trade policies, directly affect customs brokerage operations.

Geopolitical factors can significantly alter trade patterns. For instance, political tensions between countries often lead to imposing tariffs and trade barriers. Customs brokers must stay informed about these developments to advise their clients on compliance and risk management effectively. Additionally, geopolitical instability in one region can lead to supply chain disruptions, prompting brokers to seek alternative routes or partners.

The relationships between countries play a crucial role in determining trade opportunities. Positive diplomatic ties facilitate smoother customs processes, whereas strained relations can increase scrutiny and delays. For example, the ongoing trade tensions between the United States and China have prompted many businesses to reconsider their supply chains, affecting customs brokers who handle goods between these nations.

Conflicts can severely disrupt trade routes and logistics. Customs brokers must be prepared to navigate these challenges, including rerouting shipments or dealing with increased security measures. The situation in Ukraine, for instance, has led to significant changes in trade dynamics across Eastern Europe, compelling brokers to adapt quickly to new realities.

Bilateral and multilateral trade agreements are essential in shaping customs operations. Agreements such as the United States-Mexico-Canada Agreement or the Comprehensive and Progressive Agreement for Trans-Pacific Partnership can create new opportunities for customs brokers by simplifying procedures and reducing tariffs. Brokers must remain abreast of such agreements to capitalize on the benefits they offer their clients (WCO Customs Brokers Guidelines, 2023).

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Economic sanctions imposed by governments can profoundly impact customs brokerage activities. Brokers must ensure compliance with these sanctions to avoid penalties and legal repercussions. A deep understanding of the geopolitical landscape and the ability to track changes in sanctions regimes are required. For instance, sanctions against countries like Iran or North Korea create complex scenarios for brokers, necessitating thorough due diligence on the part of customs professionals.

In light of the challenges posed by geopolitical factors, customs brokers must adopt new technologies to enhance their resilience. Digital tools can improve the efficiency of customs processes, enabling brokers to respond quickly to changing conditions. Blockchain and artificial intelligence can streamline documentation, enhance transparency, and facilitate compliance monitoring.

The digital transformation in customs brokerage is critical for adapting to geopolitical uncertainties. Automated systems can reduce human error, speed up processes, and improve data accuracy, all essential in a rapidly changing environment. Brokers should invest in technology to navigate the complexities caused by geopolitical factors.

Data analytics can give customs brokers valuable insights into market trends, compliance risks, and operational efficiencies. By analyzing data related to geopolitical events, brokers can make informed decisions and develop strategies that mitigate potential disruptions.

Geopolitical factors play a significant role in shaping the operations of customs brokers. Adapting to changes in international relations, regional conflicts, trade agreements, and sanctions is essential for success in this field. As the global trade landscape evolves, customs brokers must embrace technological advancements and data-driven strategies to remain competitive. Ultimately, understanding and responding to geopolitical influences will be crucial for customs brokers looking to thrive in an increasingly complex and interconnected world.

*Infrastructure Challenges.* Ukraine’s infrastructure poses additional challenges for customs brokers. This circumstance leads to delays in cargo clearance. Poor road conditions and limited access to transportation options further complicate logistics, making it difficult for brokers to ensure the timely delivery of goods. “To ensure risk minimization to increase profitability and financial strength, enterprises need to adapt to the new reengineering system a set

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of measures that allow identifying combined business processes into a holistic management system, in which control, monitoring, and assessment of negative environmental factors to stabilize the competitiveness of business entities play a key role" (Trusova & etc., 2023).

*Technological Gaps.* While technology has the potential to streamline customs processes, Ukraine faces significant technological challenges. Many customs brokers still need to rely on outdated systems for documentation and communication with customs authorities. The lack of integrated digital platforms can lead to inefficiencies, increased processing times, and a higher likelihood of errors in documentation.

*Training and Professional Development.* The evolving nature of international trade and customs regulations necessitates ongoing training for customs brokers. However, access to professional development opportunities in Ukraine is often limited. Many brokers need more resources to pursue advanced training or certification, which can hinder their ability to adapt to changes in the industry and improve their service offerings.

Customs brokers in Ukraine play a crucial role in facilitating international trade, but they face various challenges that can impact their effectiveness. Addressing regulatory complexity, corruption, infrastructure limitations, and technological gaps is essential for improving the customs brokerage environment. By investing in training and development, enhancing infrastructure, and promoting transparency within the customs system, Ukraine can better support its customs brokers and enhance its position in global trade.

**2. Overcoming Challenges Faced by Customs Brokers in Ukraine.** Customs brokers in Ukraine are essential players in the international trade landscape, facilitating the movement of goods across borders. However, they face numerous challenges, including regulatory complexity, Corruption, outdated infrastructure, and technological gaps. One effective way to address these issues is through acquiring digital skills. This work explores how increasing digital competencies can help customs brokers in Ukraine overcome current challenges.

*They are streamlining Regulatory Compliance*. One of the most significant hurdles for customs brokers is navigating the complex web of customs regulations. Digital skills can empower brokers to use online resources and software that provide real-time updates on regulatory changes. By utilizing tools such as automated compliance management systems, brokers can ensure they are

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up to date with the latest requirements, reducing the risk of errors and delays.

*They are enhancing Transparency and Reducing Corruption*. Corruption remains a persistent issue in the customs process. By adopting digital tools for documentation and communication, customs brokers can enhance transparency. Implementing electronic platforms for submissions and approvals creates a clear, traceable record of transactions, reducing opportunities for corrupt practices. Additionally, training in digital ethics and compliance can further promote a culture of integrity within the industry.

*Adaptability in a Changing Environment*. The geopolitical landscape can create uncertainty for customs brokers. By developing digital skills, brokers can quickly adapt to changes in trade agreements, tariffs, and customs procedures. For instance, data analytics tools allow brokers to assess market trends and make informed decisions, ensuring they remain agile in the face of shifting conditions.

*They are building a Collaborative Ecosystem*. Digital skills foster collaboration among customs brokers, clients, and customs authorities. By utilizing online platforms for communication and information sharing, brokers can work more effectively with stakeholders. This collaboration can improve problem-solving, faster customs clearance, and a more efficient overall process.

*They are improving Infrastructure Efficiency*. While Ukraine's physical infrastructure may pose challenges, digital solutions can significantly improve efficiency. Customs brokers can leverage logistics software to optimize routing and inventory management, helping mitigate the impact of poor infrastructure. By analyzing data and utilizing digital mapping tools, brokers can make informed decisions that enhance the speed and reliability of their services.

*They are enhancing Infrastructure Efficiency in Customs Brokerage*. In international trade, the efficiency of customs brokerage is crucial for ensuring that goods move smoothly across borders. In Ukraine, customs brokers face significant challenges related to infrastructure that can impede their operations and affect overall trade efficiency. This work explores strategies for enhancing infrastructure efficiency in customs brokerage and the benefits that can result from these improvements.

*Understanding the Current Infrastructure Challenges*. Customs brokers in Ukraine often encounter various infrastructure-related issues, including:

- inadequate facilities: many customs offices and border checkpoints lack the necessary equipment and space to handle high volumes of goods efficiently,

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leading to delays in processing;

- poor transportation networks: insufficient road and rail infrastructure can complicate logistics, making it difficult to transport goods to and from customs facilities promptly;
- limited technology integration: Many customs facilities still rely on outdated systems for documentation and communication, which can slow down processes and increase the risk of errors.

Improving the efficiency of customs brokerage facilitates the implementation of several strategies:

- investment in modern facilities: Upgrading customs offices and border checkpoints with state-of-the-art technology and adequate space can significantly improve processing times. For this, it is necessary to install automated customs clearance systems and expand storage capabilities;
- developing transportation networks: Improving the road and rail networks that connect customs facilities to crucial trade routes is essential. Investing in infrastructure development can facilitate smoother logistics and reduce transit times for goods;
- implementing digital solutions: Embracing digital technologies can streamline customs processes. For example, utilizing electronic data interchange (EDI) systems allows for the rapid exchange of information between customs brokers and authorities, minimizing paperwork and expediting clearance times
- training and development: Training customs personnel in the latest technologies and processes is critical. Regular workshops and training sessions can equip staff with the necessary skills to leverage new systems effectively.

Collaboration between the government and private sector is vital for enhancing customs infrastructure. Public-private partnerships (PPPs) can facilitate investments in infrastructure projects, bringing together resources and expertise from both sectors. Such collaborations can lead to innovative solutions tailored to the specific needs of customs operations.

Improving infrastructure efficiency in customs brokerage yields several benefits:

- reduced processing times: enhanced facilities and streamlined processes lead to faster customs clearance, minimizing delays in the supply chain;
- lower costs: Efficient operations reduce operational costs for customs brokers, which can translate into lower costs for businesses engaged in

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international trade;

- increased competitiveness: a more efficient customs brokerage system enhances Ukraine's competitiveness in the global market, attracting more foreign investment and trade opportunities;

- improved compliance: with better infrastructure and technology, customs brokers can more easily comply with regulations and requirements, reducing the risk of fines and penalties.

Enhancing infrastructure efficiency in customs brokerage is essential for facilitating international trade in Ukraine. By investing in modern facilities, improving transportation networks, implementing digital solutions, and fostering public-private partnerships, the customs brokerage system can become more effective and responsive to the needs of businesses. These improvements benefit customs brokers and contribute to Ukraine's overall economic growth and competitiveness in the global marketplace.

*Overcoming technological gaps is also essential.* The need for integrated digital platforms is a significant barrier for customs brokers. By investing in training for digital tools, brokers can transition from outdated systems to more efficient, modern technologies. Learning to use cloud-based platforms, electronic data interchange, and other digital solutions can streamline processes and reduce paperwork, ultimately saving time and resources.

*Bridging Technological Gaps in Customs Brokerage*. In the fast-paced world of international trade, customs brokers play a pivotal role in ensuring the smooth movement of goods across borders. However, many brokers need help with significant technological gaps that hinder their efficiency and effectiveness. Bridging these gaps is essential for modernizing customs operations and enhancing the overall trade experience. This article explores the challenges posed by technological gaps and presents strategies for overcoming them.

Understanding is essential in this process of technological gaps. Technological gaps in customs brokerage can manifest in various ways:

1) Outdated systems: Many customs brokers still rely on legacy systems for documentation and data management. These outdated technologies can lead to inefficiencies, increased processing times, and a higher likelihood of errors;

2) need for integration: Customs processes often involve multiple stakeholders, including customs authorities, logistics providers, and importers/exporters. A lack of integrated systems can create communication

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barriers and result in fragmented workflows;

3) limited data analytics: The ability to analyze data is crucial for making informed decisions. Many customs brokers need access to advanced analytics tools, limiting their ability to assess market trends and optimize operations.

To increase the efficiency and effectiveness of brokers' activities, they need to implement the following strategies:

- investing in modern technology: Customs brokers should prioritize upgrading their systems to incorporate modern technologies such as cloud-based platforms, electronic data interchange, and automated processing tools. These technologies can streamline workflows, reduce paperwork, and enhance communication;
- training and development: Continuous professional development is essential for customs brokers to stay current with technological advancements. Offering training programs on new systems and tools will equip brokers with the skills needed to leverage technology effectively;
- fostering collaboration: Establishing partnerships with technology providers and other stakeholders in the supply chain can facilitate the development of integrated solutions. Collaborative platforms can enhance communication and coordination among all parties involved in customs processes;
- utilizing data analytics: Investing in data analytics tools can give customs brokers insights into their operations, helping them identify inefficiencies and optimize processes. By leveraging data, brokers can make informed decisions that enhance service delivery.

**3. The role of digital transformation to improve the activities of the customs broker.** Digitalization is converting information into a digital format, enabling it to be processed, stored, and transmitted using electronic devices. This transformation affects data and encompasses changes in business operations, communication, and society as a whole. By leveraging technology, organizations can enhance efficiency, improve decision-making, and create new opportunities for innovation and collaboration. Digitalization reshapes how we interact with information, streamlining processes and facilitating real-time access to data, ultimately leading to a more connected and agile world.

The significance of digital transformation of processes lies in its ability to change how organizations operate and deliver value fundamentally. By

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integrating digital technologies into various aspects of business, companies can streamline operations, enhance efficiency, and respond more swiftly to market demands. This transformation optimizes existing workflows and enables the development of innovative products and services. Furthermore, digital transformation fosters a culture of agility and adaptability, allowing organizations to stay competitive in a rapidly evolving landscape. Ultimately, it empowers businesses to harness data insights, improve customer experiences, and create sustainable growth, making it a crucial element in today's digital age. "All anti-crisis measures have a common strategic goal to increase the number of resources that socioeconomic systems of different levels (from enterprises to national economies) receive from outside the market mechanism, i.e. side competitive relations, especially with economic entities of other countries" (Nekhai & etc., 2022).

Digital transformation is a critical driver in bridging technological gaps. Customs brokers should embrace a holistic approach to digital transformation (Table 2.2).

**Table 2.2. A holistic approach to digital transformation**

| Aspect | Description |
|---|---|
| Process Automation | Automating routine tasks frees up time for customs brokers to focus on more strategic activities, including data entry, document generation, and compliance checks. |
| Enhanced Customer Experience | Implementing CRM systems improves communication with clients, providing real-time updates on shipments and enhancing overall satisfaction. |
| Regulatory Compliance | Digital tools ensure compliance with changing regulations, allowing brokers to stay updated on requirements and streamline reporting processes. |

*Source: author's research*

Automation of routine tasks for customs brokers significantly simplifies processes and increases operational efficiency. Customs brokers deal with many documents daily, which must be processed, verified, and ensured for compliance with legal requirements. Many of these tasks required significant time and human resources from managers. With the introduction of modern technology, they can now be performed much faster and more accurately. Automation helps reduce errors arising from human factors and minimizes the risk of penalties for non-compliance with procedures.

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With automated systems, customs brokers can easily handle the processing of customs declarations, generate required reports, and verify data in real time. This notoronly saves time but also allows for quicker adjustments in response to changes in legislation or customs practices, ensuring that documents and processes are updated promptly. Instead of manually checking thousands of data fields or cross-referencing information across various systems, software can automatically perform these tasks, freeing up employees from routine work and enabling them to focus on more strategic matters.

Such systems also make it possible to plan and forecast customs expenses and other necessary procedures with greater accuracy, ensuring precision and transparency in operations. Furthermore, automation helps reduce management service costs and decreases employee workload. As a result, the customs broker gains a significant competitive advantage by saving time and resources on routine tasks, while clients benefit from faster and more accurate services.

In conclusion, automating routine tasks for customs brokers is a convenience and a necessity for optimizing workflow, improving the accuracy and quality of services, and ensuring competitiveness in a rapidly changing market.

Implementing Customer Relationship Management (CRM) systems for customs brokers is crucial in enhancing client interaction and overall service quality. Customs brokers manage a diverse client base with varying needs, ranging from individual importers and exporters to large corporations. Maintaining clear and consistent communication with clients is essential for ensuring smooth operations and client satisfaction in such a dynamic environment. A CRM system helps streamline these interactions by centralizing all client-related information in one place.

With a CRM system, customs brokers can track and manage client communications, document exchanges, and specific requirements throughout the process. The system stores critical data such as client contact details, shipment history, payment information, and preferences, allowing brokers to access relevant information and provide personalized service quickly. Additionally, CRM systems enable brokers to automate reminders for follow-ups, critical deadlines, and required actions, reducing the risk of missed tasks or delays.

The integration of CRM software also helps enhance collaboration within the brokerage team. All members can access the same up-to-date client information, ensuring no details are overlooked and that the service provided to

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clients is efficient and consistent. This seamless coordination is essential in a complex field like customs brokerage, where multiple processes must be managed simultaneously.

Moreover, CRM systems provide valuable insights and analytics, enabling customs brokers to identify trends, assess client needs, and predict future demand. This data-driven approach allows brokers to proactively offer tailored solutions, improve customer retention, and even discover new growth opportunities.

In summary, implementing a CRM system for customs brokers improves the efficiency of daily operations, strengthens client relationships, enhances service delivery, and provides a competitive edge in an increasingly complex and fast-paced industry. By leveraging CRM technology, brokers can foster long-term client loyalty and better meet the evolving needs of their clientele.

Brokers can leverage automated compliance management systems to stay informed about regulatory requirements and simplify the reporting process. In the fast-paced world of customs brokerage, staying up-to-date with constantly changing laws, rules, and regulations is critical. Compliance management systems streamline this process by automatically tracking regulatory updates, ensuring brokers are always aware of the latest legal changes that may affect their operations. By automating the monitoring of compliance obligations, brokers can minimize the risk of overlooking critical updates or making costly mistakes.

These automated systems also simplify the complex process of generating and submitting reports. Rather than manually compiling data from multiple sources or worrying about meeting various deadlines, brokers can rely on the system to generate accurate, real-time reports based on the most current data available. This reduces the workload and improves accuracy, ensuring that all submissions meet the regulatory standards and deadlines.

Furthermore, automating compliance processes allows brokers to devote more time to other important tasks, knowing that the system handles regulatory monitoring and reporting intricacies. This reduces the burden on staff and increases operational efficiency, as brokers can focus on delivering value to their clients while maintaining high compliance with the relevant laws and regulations.

Automated compliance management systems provide brokers with the tools to navigate complex regulatory landscapes more efficiently and effectively. By staying ahead of compliance requirements and simplifying reporting, these

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systems help brokers maintain smooth operations and avoid non-compliance risks.

Bridging the technological gaps in customs brokerage offers numerous advantages (Table 2.3).

**Table 2.3. Advantages of overcoming technological gaps in customs brokerage**

| Advantages | Description |
|---|---|
| Increased Efficiency | Overcoming technological gaps leads to faster customs clearance, reducing delays and improving overall operational efficiency. |
| Cost Reduction | Streamlined workflows and automated processes lower operational costs, enabling customs brokers to offer more competitive pricing. |
| Enhanced Accuracy | Advanced technologies minimize the risk of human error in documentation and data management, leading to improved accuracy in customs declarations |
| Better Decision-Making | ccess to data analytics enables customs brokers to make informed decisions, enhancing service delivery and operational effectiveness |

*Source: author's research*

The customs brokerage sector is undergoing a significant transformation driven by technological advancements. However, many customs brokers still need to work on technological gaps that hinder their efficiency and effectiveness. By identifying critical areas for improvement and discussing innovative solutions, we aim to provide insights into how customs brokers can achieve greater efficiency and adaptability in a rapidly changing environment.

Customs brokers play a crucial role in facilitating international trade by managing the complexities of customs clearance and compliance. In an increasingly digital world, the efficiency of customs brokers is paramount to the success of businesses reliant on global supply chains. However, many brokers still need to operate using outdated systems and manual processes that create inefficiencies and increase the risk of errors. This paper will examine the impact of technological gaps on customs brokerage operations and propose strategies for bridging these gaps to improve overall efficiency.

Despite the rapid advancement of technology in various industries, customs brokerage has needed to be faster to adopt innovative solutions. Many customs brokers rely on traditional documentation, communication, and data management

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methods, which can lead to delays and inaccuracies. Common technological gaps include:

- *inefficient documentation processes* - many brokers still use paper-based systems for managing customs documents, which can lead to misplacement, delays, and compliance issues;
- *limited integration of digital tools* - a lack of integration between various software systems used in customs brokerage can hinder the seamless flow of information, complicating the process of customs clearance;
- *inadequate data analytics* - many customs brokers need to leverage data analytics to monitor and optimize their operations, missing opportunities for improvement and risk management.

To enhance efficiency, customs brokers must focus on overcoming these technological challenges. Several strategies can be implemented:

1) *Adopting Electronic Document Management Systems (EDMS):* Transitioning from paper-based processes to electronic document management can significantly reduce processing times and minimize the risk of errors. An EDMS allows for more accessible storage, retrieval, and sharing of documents, facilitating smoother communication with customs authorities and clients.

2) *Implementing Integrated Software Solutions:* Investing in integrated customs brokerage software can streamline operations by consolidating various functions—documentation, compliance checks, and communication—into a single platform. This integration improves efficiency and enhances data accuracy and reporting capabilities.

3) *Utilizing Data Analytics for Decision-Making*: By adopting data analytics tools, customs brokers can gain insights into their operations, identify bottlenecks, and make informed decisions. Predictive analytics can also help brokers anticipate regulatory changes and adjust their strategies accordingly.

4) *Training and Development*: Ensuring staff are trained in the latest technologies is essential for maximizing their potential. Providing ongoing training and support can help employees adapt to new systems and improve their overall productivity.

Examining successful customs brokerage firms that have effectively bridged technological gaps can provide valuable insights. For instance, a leading European customs brokerage implemented an integrated software solution that automated key processes, resulting in a 30% reduction in clearance times and

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improved compliance rates. Another company adopted a cloud-based EDMS that enabled real-time team collaboration, significantly enhancing operational efficiency (2024).

Bridging technological gaps is essential for customs brokers aiming to enhance their efficiency and adaptability in a rapidly evolving industry. Customs brokers can significantly improve their operations by embracing electronic document management, integrated software solutions, and data analytics (Pasichnyi& etc., 2024; Nekhai& etc., 2023; Nekhai& etc., 2021). Furthermore, investing in staff training ensures that the workforce can effectively leverage these technologies. Addressing technological shortcomings will ultimately enable customs brokers to provide better services to their clients and thrive in a competitive landscape.

Bridging technological gaps in customs brokerage is essential for modernizing operations and enhancing the efficiency of international trade. By investing in modern technology, fostering collaboration, and embracing digital transformation, customs brokers can overcome these challenges and better serve their clients. As the global trade landscape evolves, adapting to technological advancements will be vital to ensuring competitiveness and success in the customs brokerage industry.

**4. Continuous Professional Development of Customs Brokers in the Era of Digitalization.** Digital skills training is essential for ongoing professional development. By participating in online courses, webinars, and workshops focused on digital competencies, customs brokers can stay abreast of industry advancements. This knowledge enhances their skill set and equips them to provide better client service in an increasingly competitive market.

In today's fast-paced global trade environment, customs brokers play a crucial role in facilitating the movement of goods across borders. As digitalization transforms various industries, customs brokerage is no exception. The need for continuous professional development ) in this field has never been more critical.

In this section, we will explore the importance of continuous professional development for customs brokers, focusing on digitalization.

*The Importance of Continuous Professional Development.* For customs brokers to stay relevant and competitive in a rapidly changing environment, continuous professional development is essential. It involves ongoing education

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and training that helps brokers enhance their skills, knowledge, and expertise. This is particularly important in digitalization, where new technologies and processes can significantly impact customs operations.

*Embracing Digital Skills*. As customs processes are increasingly digitized, brokers must acquire new digital skills to thrive. Key areas of focus include:

1) *Understanding Digital Platforms*: Customs brokers should be familiar with digital platforms and tools that facilitate customs clearance, such as electronic data interchange systems and cloud-based management software. Training programs that cover these technologies can empower brokers to utilize them effectively.

In recent years, the landscape of customs brokerage has evolved significantly due to the rise of digital platforms. These platforms play a crucial role in streamlining operations, enhancing efficiency, and improving compliance in international trade. As customs brokers navigate increasingly complex regulations and market demands, understanding the functionalities and benefits of digital platforms becomes essential.

Digital platforms for customs brokers offer a range of tools designed to facilitate communication, documentation, and data management. By automating routine tasks such as customs declarations and tariff classification, these platforms reduce the potential for human error and increase processing speed. Furthermore, the integration of real-time data analytics allows brokers to make informed decisions quickly, responding to changing regulations and market conditions effectively.

Another significant advantage of digital platforms is their ability to foster collaboration between various stakeholders in the supply chain. Brokers can connect seamlessly with importers, exporters, freight forwarders, and customs authorities, ensuring that information flows smoothly and efficiently. This interconnectedness enhances transparency and helps maintain compliance with customs regulations, reducing the risk of delays and penalties.

Moreover, using digital platforms enables customs brokers to provide better client service. By offering a user-friendly interface and access to valuable insights, brokers can help their clients navigate the complexities of international trade more effectively. This client-centric approach builds trust and positions brokers as strategic partners in their client's success.

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However, the transition to digital platforms also presents challenges. Brokers must adapt to new technologies and invest in training to ensure that their teams use these tools proficiently. Additionally, data security and privacy concerns must be addressed, as the sharing of sensitive information becomes more prevalent.

In conclusion, understanding digital platforms is vital for customs brokers who aim to thrive in a rapidly changing industry. By leveraging these technologies, brokers can enhance operational efficiency, improve compliance, and provide superior service to their clients. As the global trade environment evolves, those embracing digital solutions will be better positioned to navigate customs brokerage's complexities successfully.

2) *Data Analytics Competency*: With the growing importance of data in decision-making, customs brokers need to develop skills in data analytics. Understanding how to analyze and interpret data can lead to more informed decisions regarding customs processes, tariffs, and trade compliance;

3) *Cybersecurity Awareness*: As operations become more digital, the risk of cyber threats increases. Customs brokers must be educated about cybersecurity best practices to protect sensitive information and ensure the integrity of their operations.

4) *Leveraging Online Learning Resources*. The rise of online learning platforms offers customs brokers unprecedented access to training and resources. Webinars, e-courses, and virtual workshops can provide valuable insights into the latest developments in customs regulations, digital tools, and best practices. By leveraging these resources, brokers can tailor their learning to meet their needs and schedules.

5) *Building a Culture of Lifelong Learning*. To foster a culture of continuous professional development, organizations must encourage their employees to prioritize learning. This can include:

- Providing Access to Training Programs: Employers should invest in training programs focusing on digital skills and customs regulations. Supporting employees in their professional growth can enhance overall organizational performance;
- Encouraging Knowledge Sharing: Creating platforms for knowledge sharing among customs brokers can facilitate learning from one another. Regular

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meetings or forums can provide opportunities to discuss challenges, share experiences, and explore innovative solutions;

- Setting Development Goals: Encouraging brokers to set personal and professional development goals can motivate them to pursue continuous learning. By tracking progress and celebrating achievements, organizations can reinforce the importance of ongoing education.

Investing in continuous professional development in the direction of digitalization yields numerous benefits (Table 2.4).

**Table 2.4. Expected benefits of investing in Continuous Professional Development in the area of digitalization**

| Benefits | Essence |
|---|---|
| Enhanced Efficiency | Brokers equipped with the latest digital skills can streamline customs processes, leading to faster clearance times and improved service delivery. |
| Increased Competitiveness | Staying updated on digital tools and technologies allows customs brokers to remain competitive in a crowded market, attracting more clients and business opportunities |
| Improved Compliance | Continuous training helps brokers stay informed about changes in customs regulations and digital compliance requirements, reducing the risk of errors and penalties |
| Adaptability to Change | A focus on continuous learning fosters adaptability, enabling customs brokers to embrace new technologies and practices as they emerge |

*Source: author's research*

In an era of rapid change, digitalization and professional development are essential for customs brokers to thrive in their business. By prioritizing acquiring digital skills, leveraging online learning resources, and fostering a culture of lifelong learning, customs brokers can enhance their expertise and adaptability. Ultimately, this commitment to professional growth will benefit individual brokers and contribute to the overall efficiency and effectiveness of the customs brokerage industry in the global marketplace.

**Conclusion.** Customs brokers are essential partners in international trade, providing essential services that facilitate the smooth movement of goods across borders. As trade evolves, customs brokers will remain vital in ensuring efficient and effective international commerce.

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Customs brokers are intermediaries between importers, exporters, and government customs authorities. Their expertise in navigating complex customs regulations ensures the seamless and efficient import and export of goods. One of the customs brokers' primary functions is preparing and submitting required documentation for customs clearance. These firms operate on specific principles, including compliance with customs regulations and activities, accuracy and timeliness of information, ethical behavior, and ongoing professional development.

However, customs brokers need help with their work. The uncertainty surrounding trade agreements and border policies can lead to fluctuations in trade volumes and create additional difficulties for brokers. Economic sanctions imposed by governments can also have a profound impact on the operations of customs brokers. Brokers must ensure compliance with these sanctions to avoid fines and legal consequences. This requires a deep understanding of geopolitical situations and the ability to track changes in sanction regimes. Adapting to shifts in international relations, regional conflicts, trade agreements, and sanctions is crucial for success in this field. As global trade develops, customs brokers must embrace technological advancements and data-driven strategies to remain competitive.

Some issues hinder the complete execution of customs brokers' functions: regulatory complexity, corruption and bureaucracy, lack of procedural transparency, technical limitations, infrastructure challenges, technological gaps, and insufficient staff qualifications. To improve the situation, comprehensive reforms are needed, including streamlining customs procedures, increasing the transparency of customs operations, ensuring adaptability in a changing environment, improving infrastructure efficiency, and implementing effective electronic systems. By reducing bureaucratic barriers, a more favorable environment can be created for customs brokers, contributing to the growth of foreign trade and the economy.

The absence of integrated digital platforms is a significant obstacle for customs brokers. By investing in training for digital tools, brokers can transition from outdated systems to more efficient, modern technologies. Digital transformation is a key factor in overcoming the technological gap. Customs brokers must adopt a holistic approach to digital transformation, including process automation, improved customer experience, and ensuring regulatory

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compliance. With automated systems, customs brokers can better handle customs declarations, generate necessary reports, and conduct real-time data verification. This not only saves time but also enables quicker responses to changes in legislation and customs practices, allowing for timely adjustments in documents and processes. More accurate planning and forecasting of customs expenses also become possible.

Enhancing Customer Relationship Management systems to bridge technological gaps for customs brokers is critical in improving client interaction and overall service quality and forecasting future demand. By automating compliance monitoring, brokers can minimize the risk of overlooking critical updates or errors and simplify the complex process of generating and submitting reports.

Customs brokers can significantly improve their operations by implementing electronic document flow, integrated software solutions, and data analytics. Furthermore, investing in staff training ensures that the workforce is equipped to use these technologies effectively.

Digital platforms for customs brokers offer a range of tools designed to facilitate communication, documentation, and data management. There is also a need to encourage brokers to set personal and professional development goals, motivating them to engage in continuous learning.

Digital tools can improve the efficiency of customs processes, allowing brokers to respond to changing conditions and achieve high competitiveness quickly. Digital transformation in customs brokerage is crucial for adapting to uncertainty. Automated systems can reduce human errors, accelerate processes, and enhance data accuracy, essential in a rapidly changing environment. Brokers investing in technology will have better opportunities to navigate the complexities of geopolitical factors.

The challenges customs brokers face in Ukraine are significant, but acquiring digital skills offers a viable path toward overcoming these obstacles. By embracing technology and enhancing their digital competencies, customs brokers can improve regulatory compliance, increase transparency, optimize operations, and adapt to changing market conditions. Investing in digital skills benefits individual brokers and strengthens the overall efficiency and integrity of Ukraine's customs brokerage system, positioning it more favorably in the global trade arena.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

## References:

1. Akinsola, K. (2023). International Trade Agreements and Treaties: Case Studies of Bilateral, Regional, and Multilateral Trade Agreements and Their Impact on International Commerce and Investment..
2. How to Improve Process Efficiency? Strategies, Tools, and Best Practices (2024). Retrieved from: https://www.6sigma.us/process-improvement/process-efficiency-strategies-tools/
3. Nekhai V. (2011). Strengthening the role and value of marketing at a machine-building enterprise. Actual Problems of Economics, 116(2), p. 96–99 (2011).
4. Nekhai, V., Kolokolchykova, I., Rozumenko, S., Nikitina, T. (2022). Anti-crisis Management of Socio-economic Systems Development in the Global Competitive Environment. Review of Economics and Finance, 20, 363-377. DOI: https://doi.org/10.55365/1923.x2022.20.43
5. Nekhai, V., Melnyk, Y., Vyshnivska, B., Bilyk, O., Akimova, L. & Akimov, O. (2024) Economic Consequences of Geopolitical Conflicts for the Development of Territorial Communities in the Context of Economic and National Security of Ukraine. Economic Affairs, Vol. 69(01), pp. 551-563. DOI:10.46852/0424-2513.2.2024.17
6. Nekhai, V., Nesterenko, S., Marchenko, O., Suprunenko, S., & Khrystova, T. (2021). Restorative and productive methods of environmental management in the implementation of environmental policy. *Cuestiones Políticas*. 39 (71), 871-883 (2021). DOI:10.46398/cuestpol.3971.53
7. Nekhai, V., Voloshchuk, Y., Satyr, L., Voloshchuk, K., & Kravets , O. (2023). Production of engineering products as an element of social growth in the global world: legal factor of development: Productos de ingeniería como elemento de crecimiento social en el mundo global: factor jurídico de su desarrollo. *Cuestiones Políticas*, *41*(76), 259-273. DOI: https://doi.org/10.46398/cuestpol.4176.14
8. Pasichnyi, R., Bykova, A., Nekhai, V., Vychivskyi, P., Mosora, L., Akimova, L. (2024). International migration of human resources in the conditions of geo-economic transformations as the main influence on the components of sustainable development of Ukraine in the context of national security. Edelweiss Applied Science and Technology. Vol. 8, No. 6, p. 1354-1365.
9. Trusova, N., Nekhai, V., Litvinov, V. & and Ahieieva, I. (2023). Management of Reengineering of Business Processes of the Transport System Enterprises at Freight Transportation. Revista Iberoamericana de Viticultura Agroindustria y Ruralidad. Vol. 10. №30. 129-151. Retrieved from:: https://www.scielo.cl/pdf/rivar/v10n30/0719-4994-rivar-10-30-129.pdf
10. WCO Customs Brokers Guidelines. (2023). Retrieved from: https://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/instruments-and-tools/tools/customs-brokers/customs-brokers-guidelines.pdf?db=web

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*Monograph dedicated to the 5th anniversary*
*of Scientific Center of Innovative Research's activities*

# Chapter 2.2. Digitization of Accounting Processes in the Formation of Reporting Indicators under IFRS

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***Abstract.*** *The modern global economy demands the modernization of accounting and financial reporting systems from enterprises. The digitization of accounting processes has emerged as a key strategy, offering enhanced data utilization, increased transparency, and strengthened financial security. The digitization of accounting processes has become a crucial factor in the modernization of financial reporting systems. This paper examines the role of digitization in the formation of financial reporting indicators under IFRS, highlighting the benefits, challenges, and potential advancements in the field. This study aims to analyze the impact of digitization on accounting processes, particularly in the formation of financial reporting indicators under IFRS. The research focuses on identifying key digital tools such as cloud computing, blockchain, artificial intelligence (AI), and Enterprise Resource Planning (ERP) systems that optimize financial reporting. Additionally, it evaluates the regulatory landscape, the role of technology in compliance, and the broader economic implications of digital transformation in accounting. The study employs a mixed-methods approach, combining qualitative and quantitative analysis. Empirical data is collected through structured surveys and expert interviews with financial professionals, accountants, and regulatory bodies. Statistical analysis is used to assess the effectiveness of various digital tools in ensuring compliance with IFRS and improving financial reporting accuracy. The comparative analysis of traditional and digital accounting practices further highlights the advantages and limitations of digitization. The findings indicate that the digitization of accounting processes significantly enhances financial reporting accuracy, efficiency, and compliance with IFRS. Cloud-based accounting platforms provide secure and accessible financial data management, while AI-driven analytics streamline decision-making. privacy concerns, and the need for regulatory adaptation remain significant. The study underscores the necessity of a structured regulatory framework to facilitate a seamless transition to digital accounting practices. Further research should focus on developing standardized frameworks for digital accounting integration, addressing cybersecurity concerns, and assessing the long-term economic impact of digitization in financial reporting.*

***Keywords:*** *accounting; information; accounting process; accounting digitization; IFRS compliance; financial reporting; digitization; cloud accounting; data accuracy; regulatory standards.*

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**1. Digitization of accounting processes: conceptual foundations and key technologies.** The current global economic conditions impose new requirements on Ukrainian enterprises regarding the modernization of accounting systems and the preparation of financial statements. These requirements for digitization stem from the necessity to implement modern digital tools that not only ensure more effective utilization of accounting information but also contribute to enhancing the security of enterprise information systems.

Considering the complex challenges of recent years, driven by economic, social, and political factors, the issues of ensuring financial security for economic entities have gained particular significance. In this context, the transformational processes occurring in enterprises are increasingly analyzed for their potential impact on the level of financial security. This necessitates the integration of digital solutions capable of optimizing financial resource management, minimizing risks, and improving the transparency of financial reporting.

Research on digitization in accounting is gaining momentum both in Ukraine and globally. Ukrainian studies primarily focus on the integration of digital tools to address local economic challenges and regulatory requirements. Key topics include the implementation of automated systems for financial reporting and IFRS compliance.

For instance, researchers such as V. Panasiuk, T. Burdeniuk, and N. Muzhevych (Panasiuk, Burdeniuk & Muzhevych, 2021) highlight the introduction of modern digital tools into accounting systems, emphasizing the specific features of each tool. They identify key aspects of automating accounting processes and analyze the advantages and disadvantages of tools such as cloud technologies, ERP systems, and analytical platforms.

The works of A. Poltorak and V. Palamarchuk (Poltorak & Palamarchuk, 2019) are noteworthy as they focus on the transformation of accounting under the influence of digitization. Their studies examine the integration of artificial intelligence into accounting systems, the automation of routine operations, and the use of blockchain technology to ensure the transparency of financial data.

Similarly, I. Spilnyk and M. Paliukh (Spilnyk & Paliukh, 2019) emphasize the strategic advantages of digitization for enhancing enterprise competitiveness. Their research demonstrates how the use of big data and analytical models can optimize decision-making processes.

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Special attention is also drawn to the work of Y. Popivniak (Popivniak, 2020), which examines the evolution of accounting in the era of digital technologies. The author provides a detailed analysis of the impact of digitization on key accounting functions, including the automation of financial analysis, preparation of IFRS-compliant reports, and the integration of digital solutions in an international context.

At the international level, researchers focus on the role of artificial intelligence, blockchain, and big data in transforming accounting practices. For instance, D. Tapscott, in his book *Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World* (2016), examines the application of blockchain in accounting processes. He describes how companies like IBM use blockchain to register transactions, significantly reducing audit time and enhancing transparency.

R. Kaplan and S. Johnson, in their works *Relevance Lost: The Rise and Fall of Management Accounting* (Johnson & Kaplan, 1987), emphasize the need to modernize accounting systems through automation, highlighting the role of digital platforms such as QuickBooks and Xero in ensuring real-time accounting. While their studies underline the benefits of real-time financial analysis and simplification of auditing processes, challenges such as cybersecurity, data integrity, and a shortage of qualified professionals remain relevant.

Globally, digitization in accounting is a transformative process involving the use of information technology to automate accounting processes, process financial data, and integrate modern innovations into daily accounting practices. Digital tools help minimize errors, improve the quality of financial reporting, and ensure transparency for investors and regulatory authorities.

In today’s globalized and volatile market conditions, along with increased transparency requirements for financial information and the necessity of rapid adaptation to change, digitization has become a key strategic direction for enterprise development.

The processes of digitalization represent a contemporary trajectory for the development and modernization of accounting systems, emphasizing the transformation of traditional accounting methods through the application of digital technologies.

Researchers such as Huseva O. Yu. and Legominova S. V. (Huseva & Legominova, 2018) describe digitalization as a "deep transformation and

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penetration of digital technologies aimed at optimizing and automating business processes, improving productivity, and enhancing communication with consumers."

*Key Features of Modern Digitalization in Accounting:*

- shifting entirely from manual, paper-based processes to digital systems;
- ensuring the legal validity of documents in a digital environment through the use of electronic signatures;
- integrating accounting processes directly into production cycles without disruptions;
- adhering to laws such as "On Electronic Documents and Electronic Document Flow" and "On Accounting and Financial Reporting in Ukraine," including the creation of legally significant electronic documents with electronic signatures;
- employing comprehensive software systems that facilitate the closed-loop integration of digital technologies into business processes, enabling rapid and effective decision-making;
- replacing traditional paper archives with digital archiving solutions;
- creating tools that simplify tasks and enhance the efficiency of accounting work (Benko & Sopko, 2010).

According to Bagatska K. and Heidor A. (Bagatska & Heidor, 2019), the digitalization of accounting in Ukraine proceeds through several key stages:

- involves the automated generation of accounting documents using specialized accounting software;
- ensures the fast and accurate processing of information;
- achieved through the use of digital platforms and automated financial tools.

Numerous researchers define digitalization as an effective tool for optimizing and modernizing contemporary business processes. Huseva O. and Legominova S. (Huseva et al., 2018) emphasize digitalization as the deep transformation and penetration of digital technologies into business operations, focusing on automation, productivity enhancement, and improved communication with consumers.

Loboda N. and Chabaniuk O. (Loboda & Chabaniuk, 2021) broaden this perspective, asserting that digitalization encompasses not only the automation of accounting operations but also strategic enterprise management processes as a whole.

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An analysis of scholarly sources reveals that the concept of "digitalization of accounting" lacks a clear and unequivocal definition. The primary reason for this ambiguity lies in the fact that digitalization is closely linked to adjacent categories, complicating its study and precise delineation.

For example, Artemieva O. and Tomsh A. (Artemieva & Tomsh, 2020) provide an interpretation tied to the automation of enterprise management, where accounting is viewed as a functional component of management. They define this process as the foundation for creating a highly organized environment that integrates information systems, telecommunications, software, information technologies, networks, knowledge databases,other informational resources.

This interpretation emphasizes digitalization as more than a technical advancement—it is a holistic approach to streamlining and automating the various layers of an enterprise's operations, with accounting playing a pivotal role within this integrated framework.

Thus, digitalization is not merely a technical process but a strategic approach to optimizing business processes. It integrates the use of digital technologies, automation of accounting and management tasks, reduction of expenses on informational resources, enhancement of decision-making efficiency, and improved transparency in enterprise operations.

Based on an analysis of the conducted studies, the authors propose the following definition of "digitalization of accounting":

**Digitalization of accounting** is a comprehensive process of integrating digital technologies and information systems into traditional accounting processes. Its purpose is to optimize and automate these processes, enhance the accuracy and timeliness of accounting information, prepare financial reports in compliance with international standards (IFRS), and ensure the transparency, security, and real-time integration of financial data.

This concept implies that accounting processes within business entities are automated and optimized for transition to digital platforms. These platforms facilitate accounting practices by reducing paper-based operations, improving the accuracy of accounting data, and accelerating the processing of information.

**2. Digital Tools in Accounting Processes.** In the era of digitization, financial reporting has transitioned to automated, fast, and accurate formation processes utilizing modern digital tools. These tools ensure compliance with

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International Financial Reporting Standards (IFRS) and enhance the transparency of financial indicators.

International standards enable the integration of digital technologies with IFRS, effectively adapting financial reporting to global requirements. This reduces errors and ensures compliance while making financial information accessible to stakeholders.

Thus, the digitization of accounting is an innovative approach that combines accounting processes, automation, financial reporting, and international standards. It aims to modernize accounting methods, improve transparency, enhance financial management efficiency, and optimize communications between businesses and their stakeholders.

Accounting processes are undergoing intensive digitalization, driven by the need to increase the speed, accuracy, and efficiency of accounting information. Modern digital tools automate routine tasks, reduce accounting errors, ensure compliance with IFRS, and enhance financial transparency.

To implement accounting digitization, enterprises need to select programs that meet their specific needs. The most common specialized software tools for enterprise accounting include Debit-Plus, SAP, BAS, iBuh Online, SMARTfin.ua, Zarplata 24, TORGSoft, FIT Budget, KBS, BookKeeper, MASTER: Accounting, IT-Enterprise, and others. For online form completion and automatic submission of reports, businesses use tools such as MEDoc, Sota, BAS Accounting, iFin, Liga: Report, iBuh Online, Privat24 Electronic Accounting, Sonata, among others.

The following table consolidates the primary modern digital tools employed for automating processes, analyzing data, processing financial information, and enhancing accounting practices in enterprises (Table 2.5).

*The main technologies used in digital accounting include the following:*

- BAS – Covers all business functions of an enterprise. The software is designed for both large corporations and small and medium-sized businesses. It aims to automate accounting, management, and tax reporting for entities engaged in any type of commercial activity. Accounting and tax records are maintained in accordance with the current legislation of Ukraine.
- SAP ERP and Oracle ERP Cloud – Integrated platforms for managing business processes, which include accounting, financial reporting, budgeting, supply chains, and more.

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**Table 2.5. Modern Digital Tools for Digitizing Accounting Processes in Ukrainian Enterprises**

| No. | Digital Tools | Description | Key Functions |
|---|---|---|---|
| 1 | Accounting Automation Systems | Software solutions for automating accounting functions and financial planning. | Automating accounting processes, preparing reports, and controlling expenses. |
| 1.1 | BAS | A popular Ukrainian platform for accounting automation. | Automatic report generation, expense tracking, and integration with local and international standards. |
| 1.2 | QuickBooks | An intuitive tool for small and medium-sized businesses. | Finance management, expense tracking, and payroll calculation. |
| 1.3 | Xero | A cloud-based accounting service. | Monitoring expenses, preparing financial reports, and integrating financial data. |
| 2 | Cloud Accounting Services | Technologies enabling access to accounting data in a cloud environment. | Network services for storing accounting data and collaborative document management. |
| 2.1 | Google Workspace, Microsoft Azure | Cloud infrastructures for accounting information storage. | Cloud storage, team information exchange. |
| 3 | Artificial Intelligence (AI) Tools | AI-based tools for analyzing accounting data, identifying risks, and forecasting. | Financial data analysis, anomaly detection, and indicator forecasting. |
| 3.1 | IBM Watson Analytics | An analytical tool with AI capabilities. | Financial indicator analytics and forecasting. |
| 3.2 | Microsoft Power BI | Data visualization and AI-based analytics. | Data analytics, financial report creation, and analytical forecasting. |
| 4 | Blockchain Technology | Decentralized technology for transparent and secure financial data storage. | Immutable record creation, audits, and data security. |
| 4.1 | Blockchain for Financial Accounting | Blockchain-based tools ensuring accounting data transparency. | Automated audits and enhanced trust in accounting data. |
| 5 | ERP Systems (Enterprise Resource Planning) | Integrated systems combining accounting with other business processes on a single platform. | Financial planning, accounting, analytics, and supply chain management. |
| 5.1 | SAP ERP | A comprehensive system for accounting and resource planning. | Integrated accounting, report preparation, analytics, and inventory management. |
| 5.2 | Microsoft Dynamics 365 | A platform for managing financial and accounting operations. | Financial reporting, analytics, and customer relationship management (CRM). |
| 6 | Electronic Document Management Tools | Services for effective document exchange between counterparties and within companies. | Supporting electronic document exchange and ensuring legal validity. |
| 7 | Analytical Platforms | Specialized tools for financial analysis and business performance monitoring. | Financial indicator reviews, trend analysis, and risk forecasting. |
| 7.1 | Tableau, QlikView | Business analytics platforms. | Financial data analysis, visualization building, and forecasting. |

*Source: systematized by the authors*

– SaaS – Tools for the automatic preparation of reports in compliance with international standards (IFRS).
– Electronic Document Management (e-docs) – Software solutions that ensure efficient exchange of accounting documentation between counterparties.

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– BigData – Enables the storage and processing of accounting data, management, and review of all accounting information related to a particular enterprise.
– Microsoft Office 365 – Allows multiple users to work with data simultaneously, providing the ability to process, verify, and edit information.
– BookKeeper Digital Accounting Service – Provides capabilities for maintaining accounting records, preparing and submitting financial reports to relevant authorities, recording fixed asset operations, acquisition and sale of fixed assets and other non-current assets, calculating depreciation, controlling balances at the end of the reporting period, and inventory management.

The listed tools promote productivity, accounting efficiency, compliance with standards, and also provide better interaction with real-time information.

Currently, the most "digitally advanced" economy in the world is that of the United States. The country demonstrates a high level of digitalization, as one-third (33%) of its Gross Domestic Product (GDP) is influenced by digital technologies. Furthermore, a significant portion of the financial sector—approximately 60%—has already transitioned to a digital foundation, making it one of the most digitally advanced in the world. The communications sector in the United States is actively developing in the direction of digitalization, emphasizing the importance of creating and maintaining modern, resilient digital platforms that will ensure long-term development and sustainability in the global market.

Another country with active digitalization of its economy is China. The China Research Institute identifies six key areas that define the development of the digital economy (Nazarenko, 2020):

1.*Infrastructure* – this refers to the construction, expansion, and continuous improvement of modern digital infrastructure. It includes the establishment of high-speed internet networks, data centers, and cloud computing resources, which serve as the backbone of digital transformation. The focus on digital infrastructure ensures that businesses and government agencies have the necessary tools to implement advanced technologies and improve service delivery.

2.*Integrated programs* – the development of comprehensive, integrated programs aims to facilitate the effective implementation of digital solutions across various sectors of the economy. These programs often involve cross-sector collaboration, unifying efforts from government agencies, private enterprises,

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and technology providers. The goal is to ensure that digital technologies are seamlessly adopted and integrated into existing business processes and governance structures, driving both efficiency and innovation.

3.*Business transformation* – the transition of companies to new technological platforms and the automation of business processes is a critical aspect of China's digital economy. This involves adopting cutting-edge technologies such as artificial intelligence (AI), big data analytics, and cloud-based solutions to enhance operational efficiency, reduce costs, and drive innovation. Companies are also rethinking traditional business models, adapting them to the digital age by creating new value propositions and improving customer experiences.

4.*Transformation of government agencies* – the introduction of digital innovations into the public sector is another vital area of focus. The Chinese government has been actively modernizing its public administration systems by implementing digital technologies for e-governance, data-driven policymaking, and enhanced service delivery. This transformation allows for better management of public resources, improved transparency, and faster decision-making, which ultimately results in more effective governance.

5.*Regional development* – the application of digital tools at the regional level is essential for achieving balanced economic development across China. By leveraging technologies such as digital platforms, smart cities, and data analytics, regions are able to improve their economic competitiveness, streamline local services, and foster innovation. Digital tools help address regional disparities in development, ensuring that smaller or less developed areas benefit from the country's overall digital growth.

6.*Digital governance* – the optimization of management functions through digital technologies involves the use of digital tools and platforms to enhance decision-making, resource allocation, and governance practices. Digital governance in China includes the automation of routine tasks, improved data management systems, and the use of digital tools for better policy formulation and implementation. This leads to more efficient and transparent governance, as well as the ability to quickly adapt to changing conditions.

These six key areas represent the cornerstone of China's approach to fostering a digital economy, which is not only revolutionizing its domestic

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landscape but also positioning the country as a global leader in digital transformation.

We will give examples of key countries that have taken significant steps in the direction of digitalization of IFRS-Reporting (Table 2.6).

**Table 2.6. International Experience in Implementing Digital Technologies in IFRS Reporting**

| Country | Digital Technologies / Tools | Examples of Application | Implementation Results |
|---|---|---|---|
| USA | XBRL (eXtensible Business Reporting Language) | Standardized reports via XBRL at the SEC (Securities and Exchange Commission) | Automated analysis, quick access to data, reduced reporting preparation time |
| United Kingdom | Cloud services, Artificial Intelligence (AI) | Use of cloud platforms for processing financial data | Faster report generation, increased transparency of financial information |
| Australia | XBRL, Blockchain, Cloud technologies | ATO (Australian Taxation Office) applies blockchain and electronic document management | Improved financial data exchange, increased audit efficiency |
| Germany | ERP systems, Artificial Intelligence | Use of SAP for automating accounting processes | Increased efficiency, reduced data processing costs |
| Canada | Cloud platforms (Microsoft Azure, Google Cloud) | Integration of cloud solutions for processing financial information | Reduced costs, fast access to data, technology integration into financial reports |

*Source: systematized by the authors*

Digitalization in accounting processes is a key area of modernization in the financial and managerial sectors in Ukraine. In Ukraine, digitalization in accounting is being achieved through the integration of modern information technologies, automation of business processes, electronic document management, and other innovations.

A significant portion of accounting tasks in Ukraine is automated using accounting programs such as BAS, QuickBooks, SAP, and ERP systems, which help reduce manual labor, increase the speed of information processing, and minimize the likelihood of errors.

The implementation of electronic document management allows for the automation of information exchange between counterparties, taxpayers, banks, government agencies, and others. The use of electronic signatures in Ukraine, in accordance with legal requirements, simplifies document verification and ensures their legal validity.

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Cloud services are actively used for the storage and processing of accounting data, allowing real-time access to information, remote access to accounting systems, and enhancing data security.

Electronic reporting systems enable businesses to submit reports to tax authorities in real-time, reducing processing time and minimizing the likelihood of errors. In Ukraine, platforms such as the Electronic Taxpayer Cabinet are actively used, providing the ability to submit reports, check account statuses, and perform other financial operations.

Innovations such as artificial intelligence, blockchain, analytical tools, and big data are applied to enhance the effectiveness of accounting, financial data analysis, and forecasting based on analytical information.

**3. Prospects for the digitalization of accounting in Ukraine**. The digitalization of accounting processes in Ukraine is a necessary step to improve accounting efficiency, ensure the transparency of financial reporting, and adapt to international standards. The implementation of modern information technologies, automation of accounting tasks, and electronic document management will enable Ukrainian enterprises to enhance their financial performance, reduce costs, and ensure access to global markets.

Enterprises in Ukraine that have public interest, as well as corporations, use various information technologies for managing accounting processes. Therefore, under current conditions, there is an increasing demand for information that reflects the status and results of corporate activities. In any system, there is information that must be processed according to specific rules. The description and tracking of data processing rules are performed by a specialized system – a business process management system (often referred to as a Workflow system), which supports methodological consistency.

Workflow, or Business Process Management System, is a specialized information tool used to automate, organize, and optimize business processes within enterprises, particularly those that have public interest or function as large corporations. From a scientific perspective, Workflow represents a set of interconnected tasks, operations, information flows, and rules that ensure the effective execution of business processes, including the processing of accounting information, financial reporting, and decision-making based on analytical data.

To manage, monitor, and optimize work related to the processing of accounting information and financial reports, a business process management

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system is employed. The system ensures methodological consistency, enabling enterprises to meet modern requirements for transparency, efficiency, and compliance with international accounting standards. Workflow systems integrate with various information platforms, facilitating seamless data transfer between different company departments and enabling the integration and consolidation of accounting, financial, and analytical information.

Through the implementation of Workflow, enterprises can ensure compliance with national and international standards and ensure the timely preparation and submission of reports in accordance with legal regulations. The system automates routine accounting operations, including the processing of financial data, report generation, cost analysis, risk assessment, and more.

In general, accounting can be considered as a comprehensive information system, with each of its sections functioning as a subsystem and a set of tasks. These tasks differ from the system in that they contain result-oriented information about qualitatively different assets: material, labor, and financial, which correspond to the sections of accounting.

All subsystems, modules, and tasks have varying degrees of generalization of information about the objects of accounting on both analytical and synthetic accounts. Each subsystem is characterized by the following features:

1.It has specific informational inputs and outputs;

2.The output information (intermediate, reporting) is suitable for direct use in management and has logical completeness;

3.The output information (reporting indicators) is generated based on a specific methodology grounded in current legislation;

4.The synthetic accounting of subsystems and computerized accounting information systems (CAIS) reflects the formation of indicators for the preparation of account reconciliations;

5.The analytical accounting of subsystems and CAIS details and specifies synthetic indicators;

6.The output information from both synthetic and analytical accounting is transferred to CAIS or other subsystems;

7.The reporting tasks, including the formation of reporting indicators, are solved within the subsystem or in CAIS according to the adopted corporate strategy.

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A comprehensive information and accounting system (CIAS) is an integrated system that ensures accounting, analysis, financial reporting, enterprise management, and other functional tasks. However, defining clear boundaries between CIAS, subsystems, modules, and tasks is often challenging due to their interdependence, complexity, and multifunctionality.

Key functions of CIAS:

- accounting for business transactions;
- formation of financial reporting;
- resource planning and decision-making;
- analysis of financial flow effectiveness;
- support for compliance with international accounting standards (IFRS).

Subsystems are individual functional components of CIAS that specialize in performing specific tasks or groups of tasks. Each subsystem covers a particular block of business processes.

In the accounting of material resources, for example, in a subsystem, their analytical accounting is conducted in the following directions:

Current accounting of the receipt and disposal of material values, including small household property, in both physical and monetary terms (at accounting prices) by types of materials;

1) accounting for the sale of material circulating assets;
2) preparation of statistical reporting;
3) issuance of output information on claims;
4) control of warehouse inventories and material consumption norms.

However, accounting with suppliers can be centralized within the CIAS and handled in the following ways:

a) Based on the supplier invoice information for materials entered autonomously;

b) Based on the supplier invoice information for materials automatically transmitted from the subsystem to the CIAS.

The separation of information flows helps organize the distribution of specific tasks (subtasks) between subsystems and the CIAS. Accounting information contains double-entry bookkeeping, forming a closed loop of information links in accounting.

A distinctive feature of CIAS is that it integrates all sections (subsystems) of economic information under a unified principle—double-entry bookkeeping in

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both synthetic and analytical accounts. This implies that when designing subsystems for accounting information, it is necessary to define the account reconciliations (entries) formed within these subsystems, through which the information will be transferred from the subsystems to the CIAS.

Our research on the target design of the organizational structure of accounting in CIAS provides grounds for highlighting the features of designing the following informational subsystems:

1.*Subsystem "Accounting of Material Resources",* intended for accounting all types of resources that have a physical form and are used in the production activity of the enterprise. It covers the accounting of resources such as raw materials, materials, finished products, spare parts, goods, and other resources that ensure the continuous production and management process. The use of modern digital tools ensures the accuracy, transparency, and timeliness of information, allowing effective cost management and minimizing financial risks associated with resource shortages or their improper use.

2.*Subsystem "Accounting of Labor Resources"*. This subsystem is responsible for the accounting of wages by types and employee numbers (hourly and piecework pay, payments based on average earnings, vacations, bonuses, insurance payments for temporary disability), deductions (taxes, court orders, damages from work errors, etc.), preparation of payroll and payment documents, personal accounts, and reports. A key feature of the "Accounting of Labor Resources" subsystem in corporations is that it is based not only on payroll programs, computerization of time tracking, and human resources department operations, but also on the corporation's strategic mission and the impact of labor resources on it.

3.*Subsystem "Accounting of Financial Resources"*. This subsystem ensures the accounting of all financial resources of the enterprise, allowing management to perform analysis, planning, and effective control over the financial activities of the organization.

4) *Subsystem "Accounting of Production and Sales of Finished Goods"*. This subsystem accounts for unfinished production, defects, auxiliary production, the cost of finished goods, and the movement of finished goods into stock and their delivery in both physical and accounting values. It includes the tracking of shipped goods, monitoring delivery performance, and compiling reports on production costs, as well as generating financial performance indicators.

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5) *Subsystem "Reporting".* In this subsystem, the General Ledger is maintained, consolidated balance sheets are prepared, and reports for business units and business processes are created. It also covers tax reporting and special-purpose reports, ensuring that the enterprise complies with regulatory and reporting standards.

**Table 2.7. Types of accounting in the "Financial Resources Accounting" subsystem**

| Type of Accounting | Description and Functions |
|---|---|
| Cash Accounting | Accounts for the movement of cash within the enterprise, controls balances on accounts, and monitors the movement of financial flows between different accounts. |
| Accounts Receivable Accounting | Includes tracking amounts that customers owe to the enterprise, monitoring debt repayment deadlines, and assessing risks of non-payment. |
| Accounts Payable Accounting | Records the enterprise's debts to suppliers, banks, and other counterparties, and controls payment deadlines. |
| Investment Accounting | Covers accounting for financial investments made by the enterprise, monitors investment effectiveness, and assesses profitability. |
| Financial Reserves Accounting | Includes accounting for reserves created to cover financial risks, unforeseen expenses, and potential losses. |
| Expense and Funding Source Accounting | Accounts for expenses incurred in business activities and analyzes the sources of financing for the enterprise. |
| Capital Movement Accounting | Tracks financial flows coming from shareholders, investors, and the allocation of these funds for the development of the enterprise. |

*Source: systematized by the authors*

These subsystems ensure that the enterprise's accounting processes are transparent, accurate, and aligned with business objectives, providing the necessary tools for effective decision-making and operational efficiency

**4. Inline XBRL as a key tool for IFRS reporting.** Financial (accounting) reporting is a crucial tool that reflects the actual financial condition of an enterprise, its financial results, and development prospects. Ensuring the accuracy, transparency, and completeness of information in financial statements is one of the state's priority tasks, particularly through regulatory bodies. The transparency of financial statements has a direct impact on the investment climate in a country and the possibility of effective cooperation with developed Western countries.

Modern trends in digitalization significantly influence all stages of financial reporting — from its preparation to submission, processing, and analysis of indicators. Digital transformations are changing the traditional reporting format, transforming it into an interactive, adaptive, and dynamic tool that is generated

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in real-time, which is an important factor for improving the effectiveness of management decisions and the transparency of financial flows.

An especially important component of the digitalization of financial reporting is the introduction of the XBRL (eXtensible Business Reporting Language) standard in Ukraine. XBRL reporting involves the use of the widely adopted XBRL standard, which is used in many countries worldwide, as it enables the processing of large volumes of information and represents a unified system for the interaction of management, financial, and tax accounting. The application of this system simplifies the exchange of information between different structural units of a single enterprise as well as between various enterprises. This technological solution allows the presentation of financial statements in a standardized electronic format, which is part of the International Financial Reporting Standards (IFRS). In Ukraine, a system is in operation based on the Inline XBRL format, in compliance with the national UA XBRL IFRS taxonomy, following the "single window" principle (Popivnyak, 2020). This approach ensures the unification, standardization, and simplification of the exchange of financial data between different market participants and also enhances the level of transparency in financial information.

The transition of Ukrainian enterprises to prepare financial statements in accordance with IFRS and the accompanying digital innovations can be considered a strategic step in the fight against the shadow economy. This process allows for more effective control of financial flows and minimizes risks associated with data falsification. The task of ensuring transparency and the speed of information processing necessitates the full automation of the reporting process and the implementation of cutting-edge digital technologies.

On the other hand, the introduction of international standards and the digitalization of reporting open up new opportunities for Ukrainian enterprises in the international market and also promote the attraction of foreign investments.

Digital, electronic, or IT-oriented financial reporting is a modern format that relies on structured, computer-oriented forms. It is the result of integrating information technology into accounting processes and is oriented towards handling larger volumes and greater complexity of accounting information. This approach ensures rapid processing, high accuracy, integration of large data sets, and efficient transmission of accounting information in a digital environment (Spilnyk & Palyukh, 2019).

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Online reporting refers to the process of generating and publishing financial statements in real-time on an enterprise's official website after registering each business transaction in accounting entries, which function as synthetic accounts. The online approach ensures transparency, timeliness, and accessibility of information for all stakeholders in real time.

Digital innovations such as online reporting and IT-oriented formats contribute to the implementation of advanced methods for processing accounting data, ensuring high-quality information for making strategically significant management decisions. Thus, the digitalization of financial reporting according to IFRS in Ukraine is not just a technical innovation, but also an important strategic tool that enhances transparency, accountability, and the integration of the Ukrainian economy into the global financial community.

**5. Cloud accounting systems, blockchain: economic benefits and implementation challenges.** Among the contemporary trends in digital technology development, particularly in accounting processes related to the preparation and submission of financial statements, are cloud technologies and blockchain.

A modern trend in accounting innovation is the adoption of cloud technologies, which provide businesses with increased flexibility, efficiency, and accessibility in managing accounting processes. Cloud technologies are a model for processing and storing digital information on remote server capacities. All businesses, regardless of ownership structure or industry, utilize cloud technologies for accounting purposes. Cloud accounting systems enable companies to store and process data online, ensuring flexibility and accessibility from any location.

This approach to accounting has distinct advantages compared to traditional on-premise systems. Accounting data is stored in the cloud, allowing it to be accessed from any location and on any device with internet access. Cloud accounting systems typically operate on a subscription basis, allowing businesses to pay only for the resources they use. This is especially cost-effective for small and medium-sized enterprises.

Most cloud accounting systems adhere to high security standards, including data encryption. Regular data backups ensure security and recovery in case of necessity. Storing and managing business operations in the cloud provides near-

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total protection against malware and unauthorized access. Access to any service is controlled by the service provider and the business owner.

One of the key benefits of cloud solutions for businesses is the ability to scale their IT infrastructure up or down as needed. Starting with a single database, a business can gradually scale up, building its own cloud-based business space. This scalability provides companies with significant operational flexibility and efficiency, making cloud accounting a highly attractive choice.

Many cloud accounting systems have the ability to easily integrate with other business applications, such as customer relationship management (CRM) systems or supplier relationship management (SRM) systems, which allows the creation of a unified ecosystem to support various business processes.

Cloud technologies also deserve attention in the context of the processes involved in the formation of financial reporting (Kulynych & Zhylenko, 2019; Putsenteylo & Dovbush, 2021; Semanyuk, 2018). The use of cloud technologies typically involves one of three models:

1.Infrastructure as a Service (IaaS) – providing access to a virtual PC that can be used like a regular computer for performing current tasks.

2.Platform as a Service (PaaS) – providing a platform for developing and using web applications, including those related to financial accounting and reporting.

3.Software as a Service (SaaS) – providing software that operates on a virtual computer for performing financial and accounting operations.

Let us consider the use of cloud technologies for BAS accounting software (bas-hmara). This service allows users to work in the program and access all its products without being tied to a specific location. Data storage is secured through encrypted information transmission channels. Local issues, such as hardware server malfunctions, internet problems, or electricity outages, will not affect the data. Remote access is available only to the client. Cloud-based online accounting does not require clients to purchase a virtual server, manage the infrastructure, or subscribe to updates. All that is needed is an internet connection and payment for the rental fee. BAS is deployed on the cloud server of the provider. The client receives a password, which allows them to connect to the system from any device via the internet without installing additional software. The client always works with the latest version of BAS and does not need to address technical matters.

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BAS hosting is an optimal solution for businesses that need to ensure the uninterrupted operation of the program and the database.

Recently, both globally and in Ukraine, enterprises have been adopting the operational method of accounting known as Cloud accounting. This approach to accounting organization has become an integral part of modern accounting processes, ensuring automation, accessibility, and the efficiency of managing financial activities within enterprises.

The implementation of "cloud accounting" is an innovative approach to managing accounting processes, providing flexibility, resource savings, and access to advanced technologies. For example, in the United States and European Union countries, most small and medium-sized enterprises use cloud accounting to automate tax reporting and financial management.

In Ukraine, the MEDoc system is an example of the use of this method. The MEDoc system is actively used by economic entities for electronic document management, particularly in the preparation of accounting reports.

"Cloud accounting" is a fundamentally new model of bookkeeping that differs from traditional methods.

Firstly, the implementation of "cloud accounting" does not require enterprises to invest in purchasing servers, backup systems, software licenses, or antivirus programs. Small and medium-sized businesses can use less powerful computers, as the main data processing is carried out in the cloud environment. This implementation of the accounting method reduces company costs. Users can access data at any time and from any device connected to the Internet, including mobile phones and tablets. Limitations related to the capabilities of local devices are eliminated, which contributes to increasing employee productivity.

Cloud-based accounting software ensures a high level of security. Data is stored on servers of companies specializing in cloud services, which invest significant resources in protocols to protect against network attacks. Thus, the risks associated with physical disasters (fires, thefts, floods), which are characteristic of traditional accounting systems, are reduced. Cloud services guarantee continuity of operations through data backup and the geographic distribution of servers. This ensures data protection even in the event of force majeure circumstances.

As we can see, "Cloud accounting" demonstrates significant advantages over traditional methods due to its cost-effectiveness, flexibility, high security,

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and resilience to external threats. Therefore, the development of the "cloud accounting services" process is expected in the coming years. This approach to organizing accounting meets modern requirements for the automation of accounting processes and creates new opportunities for businesses in the context of digital transformation.

Thus, organizing accounting in a cloud environment brings changes to the process of bookkeeping, documentation, and submission of reports to interested users. The use of cloud technologies enables efficient communication with company employees, investors, contractors, banks, and other regulatory bodies by providing access to the information needed by the respective user, regardless of geographical location or time.

When discussing the prospects of blockchain technology, it stands out as the most innovative and promising digital technology that is transforming approaches to accounting processes, as well as the generation and submission of financial reports. Its implementation in the field of financial reporting provides a new level of transparency, reliability, and data protection. Blockchain ensures decentralized data storage, where every participant has access to real-time updated information, reducing the risk of data falsification, as all changes are recorded and confirmed by network participants.

Blockchain technology enables the integration of business accounting systems into a decentralized network, where all data is automatically updated in real-time, ensuring accuracy and relevance in financial reporting. The use of blockchain technologies allows companies to create standardized reports that are easily adaptable to international standards, such as IFRS. Blockchain can be used to create a unified system for submitting reports. Each company submits its financial statements into the blockchain network, where regulators gain access to verified data, minimizing the need for additional checks.

Thanks to cryptographic methods, blockchain technology ensures a high level of information security, reducing the risks of unauthorized access to financial data. Thus, the use of blockchain technology in the creation and submission of reports has significant potential to enhance the transparency, efficiency, and reliability of financial information. The implementation of blockchain in reporting allows Ukrainian companies to meet international standards and compete in global markets.

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Integrated reporting in the context of digitalization requires the implementation of advanced technologies that enhance its quality, usability, and accessibility for stakeholders. The integration of Artificial Intelligence (AI) into accounting processes and financial reporting opens new possibilities for automation, accuracy, and flexibility in financial accounting. Among the most effective tools in this process are AI technologies, machine learning, Robotic Process Automation (RPA), and modern data visualization methods.

AI and machine learning technologies can be used to automate the analysis of large volumes of financial data, helping to identify trends, deviations, and risks. For example, AI systems automatically analyze current financial indicators and generate forecasts based on historical data.

To optimize integrated reporting, businesses can leverage machine learning to adapt reporting models to user needs, generating reports that take into account specific requests or standards. For instance, learning algorithms provide personalized reports for specific groups of investors or regulatory authorities.

Robotic Process Automation (RPA) is a key tool for automating routine tasks such as data collection, processing, and reporting. Automated data gathering using RPA bots enables the retrieval of information from various sources, including ERP systems, financial platforms, and databases, consolidating them into a unified structure and automatically generating reports in compliance with IFRS (International Financial Reporting Standards). These reports can then be submitted electronically to regulatory authorities through "single window" systems.

Visualization and interactive presentation of data using dashboards, interactive charts, and infographics greatly ease the understanding of complex financial indicators. Tools such as Power BI, Tableau, or Google Data Studio can be used to create dynamic data presentations for each reporting item.

Modern companies are increasingly adopting interactive communication tools, such as chatbots, which can respond to user inquiries and provide necessary financial reporting information. Therefore, integrating chatbots for interaction with investors or clients can offer instant responses to questions regarding key financial indicators of a company.

Thus, the use of Artificial Intelligence (AI) in accounting opens up vast opportunities for improving efficiency, automating processes, reducing the

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human factor, and ensuring compliance with the challenges of digital transformation.

In conclusion, the digitalization of accounting processes is a key direction in the transformation of the modern business environment, driven by the growth of global integration and the increasing demand for transparency and timeliness in financial reporting. In the context of globalization, companies are faced with the need to implement innovative solutions that optimize accounting functions, improve their efficiency, and comply with international standards.

Modern digital technologies, such as cloud computing, blockchain, artificial intelligence, and the Inline XBRL standard, create new opportunities for automating accounting processes and integrating national economies into the global financial system. Cloud services provide real-time data access, flexibility in decision-making, and cost reduction in accounting infrastructure. Blockchain technologies ensure transparency, security, and data integrity, which is especially important in the context of increasing information volumes. The use of Inline XBRL simplifies the standardization of reporting and ensures its accessibility to international investors and regulators.

The transition of small and medium-sized enterprises to cloud technologies reduces infrastructure costs, improves data security, and ensures flexible access to accounting information. Cloud services guarantee the reliability of accounting processes even in the event of force majeure situations.

At the same time, the digitalization of accounting processes is accompanied by a number of challenges. These include the need to protect data from cyber threats, adapt the regulatory framework to international standards, and address the shortage of qualified personnel capable of effectively working with modern technologies. Solving these issues requires a comprehensive approach, which includes legislative reform, improving cybersecurity, and developing educational programs to train the next generation of specialists.

For Ukraine, the digitalization of accounting is not only a necessity of the times but also a strategic imperative for enhancing the competitiveness of the national economy. The integration of digital solutions enables businesses to adapt to global standards, attract foreign investment, and improve the efficiency of financial resource management.

On the international level, examples of successful digital technology adaptation in countries such as the USA, the United Kingdom, and China

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demonstrate significant advantages of automating accounting processes: cost reduction, increased data accuracy, and faster reporting. Ukraine can draw on this experience to implement innovations in its own accounting practices, particularly through the popularization of cloud services, blockchain integration, and the standardization of reporting under the "single window" principle (Inline XBRL).

Thus, digitalization is not only a technical update of accounting processes but also a strategic tool for development, contributing to sustainable growth, economic security, and Ukraine's integration into the global economy. The effective implementation of this strategy depends on the synergy of state regulation, business support, and the development of educational initiatives focused on the digitalization of the accounting field. This will create new opportunities for businesses, ensure transparency and trust from investors, and serve as the foundation for the country's sustainable economic growth in the context of globalization.

**References:**

1. Artemieva O. O., Tomsha A. O. (2020) Bukhhalterskyi oblik v umovakh didzhytalizatsii. S. 50–54. eprints.kname.edu.
2. Bahatska, K. i Heidor, A. 2019. Biznes-protsesy v umovakh dydzhytalizatsii ekonomiky. Scientia fructuosa. 127, 5 (Zhov 2019), 23–32. doi.org/10.31617/visnik.knute.2019(127)03.
3. BAS bukhhalteriia u khmari gigacloud.ua/offer/bas-hmara
4. Benko M.M., Sopko O.V. Digital-bukhhalteriia: sutnist ta zmistovi kharakterstyky. ir.kneu.edu.ua/bitstream/handle/
5. Husieva O. Yu., Lehominova S. V.(2018) Didzhytalizatsiia – yak instrument udoskonalennia biznes-protsesiv, yikh optymizatsiia. Ekonomika. Menedzhment. Biznes. 1 (23). S. 33-39
6. Johnson, H.Th. and Kaplan, R.S. (1987), Relevance lost. The Rise and Fall of Management Accounting, Harvard Business School Press, Boston, 269 p.
7. Kulynych M., Zhylenko L.(2019) Pohlyblennia zmistu obiektiv i metodu bukhhalterskoho obliku v umovakh tsyfrovizatsii ekonomiky. Ekonomichnyi chasopys Skhidnoievropeiskoho natsionalnoho universytetu imeni Lesi Ukrainky. 2. S. 128-135
8. Loboda N., Chabaniuk O. (2021) Didzhytalizatsiia yak funktsiia oblikovoi diialnosti: koronakryza yak kontekst. conf.ztu.edu.ua/wp-content/uploads/2021/01/337.pdf
9. Natsionalna komisiia z tsinnykh paperiv ta fondovoho rynku (2019) Podannia finansovoi zvitnosti u novomu formati iXBRL /nfp.gov.ua/files/tacsonomia/NSSMC_Financial%20Reporting%20System%20XBRL.pdf.
10. Nazarenko, O. and Zhong, Hailiang (2020), "The impact of the development of the digital economy on retail trade enterprises in china", Investytsiyi: praktyka ta dosvid, vol. 19-20, pp. 40–45. DOI: 10.32702/2306-6814.2020.19-20.40
11. Panasiuk V., Burdeniuk T., Muzhevych N. (2021) Osoblyvosti tsyfrovoi transformatsii obliku. Halytskyi ekonomichnyi visnyk. 68. S. 70-76
12. Poltorak A.S., Palamarchuk V.Iu. (2019) Monitorynh chynnykiv vplyvu na riven finansovoi bezpeky Ukrainy v umovakh didzhytalizatsii. «Modern Economics». № 18. S. 130- 137. doi.org/10.31521/modecon.V18(2019)-20
13. Popivniak Yu. (2020) Peretvorennia metodu bukhhalterskoho obliku v epokhu rozvytku tsyfrovykh tekhnolohii. Internauka. 8. S. 43-52. www.inter- nauka.com/uploads/public/15992023972214.pdf
14. Putsenteilo P. R., Dovbush A. V. (2021) Osnovni vektory rozvytku bukhhalterskoho obliku v umovakh tsyfrovoi ekonomiky. Innovatsiina ekonomika. 3-4 (87). S. 140-151.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

15. Semaniuk V. Z. (2018) Informatsiina teoriia obliku v postindustrialnomu suspilstvi: monohrafiia. TNEU, 392 s. dspace.wunu.edu.ua/bitstream/316497/37223/1/
16. Spilnyk I., Paliukh M. (2019) Bukhhalterskyi oblik v umovakh tsyfrovoi ekonomiky. Instytut bukhhalterskoho obliku, kontrol ta analiz v umovakh hlobalizatsii. Vyp. 1-2. S. 83-96. doi.org/10.35774/ibo2019.01.083
17. Tapscott D. Tapscott A. (2016) Blockchain revolution: how the technology behind bitcoin is changing money, business, and the world. itig-iraq.iq/wp-content/uploads/2019/05/Blockchain_Revolution.pdf.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

# Chapter 2.3. Artificial Intelligence and Digital Competency: Redesigning Financial Analysis

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***Abstract***. *The integration of artificial intelligence (AI) and digital competency is revolutionizing financial analysis, altering traditional methods and requiring professionals to adapt to new technological paradigms. The rapid evolution of AI-driven tools has significantly improved financial modeling, risk assessment, and predictive analytics. However, these advancements also present challenges, including the need for enhanced digital skills, ethical considerations, and regulatory adaptations. This study explores the impact of AI on financial analysis and how digital competency is shaping the future of financial professionals. The primary objective of this research is to assess the transformation of financial analysis due to AI adoption and the increasing importance of digital competency. This research employs a mixed-methods approach, integrating qualitative and quantitative analysis. A systematic literature review of AI applications in financial analysis is conducted, supplemented by expert interviews with financial professionals, data scientists, and policymakers. Additionally, empirical data is collected through surveys measuring AI adoption, digital competency levels, and its impact on financial decision-making. Statistical analysis is applied to evaluate the effectiveness of AI tools in enhancing accuracy, efficiency, and risk management. Findings indicate that AI-driven financial analysis significantly improves accuracy, speed, and predictive capabilities while reducing human errors and operational costs. The adoption of AI requires financial professionals to develop new competencies, including proficiency in machine learning, data visualization, and algorithmic risk assessment. However, challenges such as data security concerns, resistance to change, and regulatory constraints must be addressed. The study underscores the importance of continuous learning and digital training programs to equip professionals with the necessary skills for AI-enhanced financial analysis. Future research should focus on refining AI-driven financial analysis models, addressing ethical implications, and developing regulatory frameworks for AI in finance.*

***Keywords:*** *artificial intelligence; digital competency; financial analysis; predictive analytics; risk assessment; machine learning; data visualization; blockchain; quantum computing; regulatory compliance.*

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**1. Evolution of Artificial Intelligence and Digital Competency in Financial Analysis.** The rapid advancement of technology has ushered in a new era of innovation and transformation across industries, with Artificial Intelligence (AI) at the forefront. In the financial sector, AI has emerged as a pivotal force, reshaping traditional practices and enabling organizations to harness vast amounts of data for deeper insights and strategic decision-making. Paired with digital competency—the ability to effectively use and adapt to emerging technologies—AI is revolutionizing the landscape of financial analysis.

Financial analysis has traditionally relied on manual processes, historical data, and human intuition. While these methods have served their purpose, the complexity of today's global economy and the exponential growth of data have created challenges that require more advanced solutions. AI, with its ability to process and analyze massive datasets in real time, offers unparalleled efficiency, accuracy, and predictive capabilities. From automating routine tasks to uncovering hidden patterns and risks, AI enables financial professionals to shift their focus from labor-intensive processes to strategic value creation.

Digital competency is equally critical in this transformation. As financial professionals adopt AI-driven tools and systems, their ability to navigate, understand, and leverage these technologies becomes a core aspect of their expertise. Digital competency bridges the gap between technological potential and practical application, empowering professionals to not only use AI tools effectively but also to innovate and adapt to rapidly changing market conditions.

This convergence of AI and digital competency is redefining financial analysis, making it more dynamic, data-driven, and future-oriented. By exploring the intersection of these two forces, this discussion aims to highlight how they are transforming the financial sector, the opportunities they create, and the challenges organizations must address to fully realize their potential.

The evolution of Artificial Intelligence (AI) and digital competency in financial analysis reflects a journey of innovation and adaptation, driven by the increasing demand for efficiency, accuracy, and deeper insights in decision-making. From basic computational tools to sophisticated machine learning algorithms, the financial sector has witnessed a profound transformation in how data is analyzed, interpreted, and utilized.

The early days of financial analysis were heavily reliant on manual calculations and basic computational tools like spreadsheets. Tools such as

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Microsoft Excel revolutionized financial reporting and modeling by enabling professionals to handle larger datasets and automate repetitive tasks. However, these tools had limitations in processing unstructured data or identifying complex patterns.

As technology advanced, the integration of simple algorithmic models enabled faster data processing and trend identification. This period marked the beginning of automation in financial analysis, laying the groundwork for the adoption of more sophisticated technologies.

The proliferation of digital data in the 2000s brought significant challenges and opportunities. With the emergence of big data, financial institutions gained access to massive volumes of structured and unstructured data from various sources, such as transactions, market trends, social media, and customer behavior. Traditional analysis methods were insufficient to handle such vast and diverse datasets.

This era saw the rise of advanced analytics powered by AI. Machine learning (ML) algorithms enabled systems to learn from data, identify patterns, and make predictions. AI applications began to emerge in areas such as fraud detection, credit scoring, and risk management, offering financial institutions the ability to make data-driven decisions with greater precision.

As AI matured, its applications in financial analysis grew exponentially. Natural Language Processing (NLP) allowed AI systems to analyze unstructured data, such as news articles and earnings reports, extracting valuable insights. Predictive analytics, powered by ML, enabled financial professionals to forecast market trends, customer behavior, and financial risks with greater accuracy.

AI-driven tools, such as robo-advisors and automated trading systems, further disrupted the industry by providing personalized investment recommendations and executing trades at lightning speed. These innovations not only enhanced operational efficiency but also democratized access to financial services, making them available to a broader audience.

In parallel with the evolution of AI, the concept of digital competency emerged as a critical skillset for financial professionals. Digital competency involves the ability to effectively use digital tools, understand data, and adapt to emerging technologies. It became evident that the full potential of AI in financial analysis could only be realized if professionals possessed the skills to interpret AI-driven insights and integrate them into decision-making processes.

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As AI systems became more complex, the need for digital literacy evolved into a demand for deeper technical expertise. Financial analysts needed to understand concepts such as data visualization, algorithmic biases, and ethical considerations in AI applications. Organizations began investing in training programs and upskilling initiatives to ensure their workforce could keep pace with technological advancements.

Today, the convergence of AI and digital competency has redefined financial analysis. AI-powered platforms are capable of performing real-time analysis, identifying anomalies, and providing actionable insights. Financial professionals now leverage these tools to enhance their strategic decision-making, focusing on areas such as portfolio optimization, scenario planning, and ESG (Environmental, Social, and Governance) analysis.

Digital competency has become a core requirement, enabling professionals to not only use AI tools effectively but also contribute to their development and refinement. The emphasis has shifted from performing routine tasks to interpreting AI-driven outputs and aligning them with business objectives.

The evolution of AI and digital competency in financial analysis is far from over. The future points to a more collaborative ecosystem where AI augments human expertise rather than replaces it. Financial analysts will increasingly work alongside AI systems, relying on their computational power while applying human judgment and creativity to complex problems.

As technologies like quantum computing and advanced AI models emerge, the demand for digital competency will continue to grow. Ethical considerations, such as transparency and fairness in AI applications, will also become central to the evolution of financial analysis, ensuring that these tools are used responsibly and effectively (Table 2.8).

The evolution of AI and digital competency in financial analysis represents a dynamic interplay between technological innovation and human adaptability. Together, they are shaping a future where financial analysis is more efficient, insightful, and inclusive, enabling organizations to navigate an increasingly complex and data-driven world.

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**Table 2.8. Evolution of AI and Digital Competency in Financial Analysis**

| Phase | Key Features |
|---|---|
| Early Stages: The Foundation of Automation | Manual calculations and basic computational tools like spreadsheets. Emergence of automation in financial analysis with simple algorithmic models. |
| The Advent of Big Data and Advanced Analytics | Proliferation of digital data, emergence of big data. Advanced analytics powered by AI, including machine learning for fraud detection and risk management. |
| AI Integration: Transforming Financial Analysis | Applications of AI in financial analysis grow with NLP and predictive analytics. Introduction of robo-advisors and automated trading systems. |
| The Rise of Digital Competency | Digital competency becomes critical, requiring understanding of digital tools, data visualization, and algorithmic biases. Upskilling initiatives emerge. |
| Current Landscape: AI and Digital Competency Convergence | AI-powered platforms redefine financial analysis with real-time insights and anomaly detection. Digital competency enables professionals to enhance strategic decision-making. |
| Future Directions: Toward a Collaborative Ecosystem | Collaborative ecosystem with AI augmenting human expertise. Increased focus on ethical considerations and advanced technologies like quantum computing. |

*Source: compiled by the author*

**2. Transformation of the Financial Analyst Profession in the Context of Artificial Intelligence (AI) Development in Ukraine**. In the context of rapid digitalization of the economy and the development of artificial intelligence (AI) technologies, the financial analyst profession is undergoing a fundamental transformation. The implementation of AI not only creates new opportunities for the development of the financial sector but also establishes fundamentally new requirements for the competencies of specialists. According to research by Varenko V.M. (2013), information and analytical activities in modern conditions are characterized by the exponential growth of data volumes requiring processing and analysis. This trend is supported by statistical evidence on the global increase in digital data volumes (Table 2.9).

**Table 2.9. Dynamics of the Growth in Digital Data Volumes in Ukraine's Financial Sector**

| Year | Data volume (petabytes) | Growth rate (%) | Share of automated processing (%) |
|---|---|---|---|
| 2018 | 245 | - | 35 |
| 2019 | 380 | 55.1 | 42 |
| 2020 | 612 | 61.1 | 48 |
| 2021 | 895 | 46.2 | 55 |
| 2022 | 1350 | 50.8 | 63 |

*Source: compiled by the author*

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The relevance of the study is confirmed by statistical data on the implementation of AI in the Ukrainian financial sector. According to the research conducted by Mukovskyi I.T. (2012), there is a stable trend toward increasing investments in AI technologies (Figure 2.1).

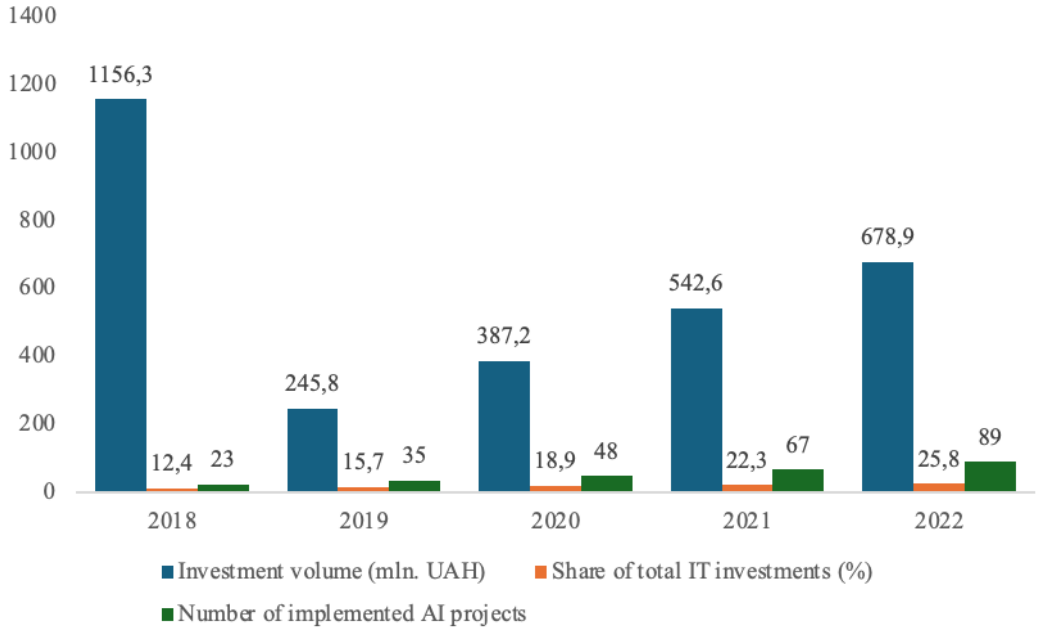


**Figure 2.1. Dynamics of investments in artificial intelligence technologies in the ukrainian financial sector**

*Source: systematized by the author*

Based on the data presented in Figure 1, a comprehensive analysis of the dynamics of artificial intelligence (AI) technology adoption in the Ukrainian financial sector over the period 2018–2022 can be conducted.

The volume of investments shows consistent growth throughout the entire period. In 2018, the investment volume amounted to 156.3 million UAH, and by 2022, this figure had increased more than fourfold, reaching 678.9 million UAH. The average annual growth rate of investments is approximately 44.3%.

The share of AI-related investments in the total IT investment volume also exhibits a positive trend. From 12.4% in 2018, this share rose to 25.8% in 2022, indicating the growing prioritization of AI technologies in the digital transformation strategies of financial institutions. The average annual increase in this share is about 3.35 percentage points.

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The number of implemented AI projects demonstrates the most dynamic growth. Over five years, this indicator has increased nearly fourfold: from 23 projects in 2018 to 89 projects in 2022. The average annual growth is approximately 16.5 projects.

An analysis of the investment structure in 2022 highlights that the largest share (45.2%) is allocated to analytical systems and data processing, underscoring the priority of enhancing analytical capabilities. Predictive systems rank second with a share of 28.7%, reflecting a growing demand for predictive analytics.

In terms of investment objectives, the highest priority (38%) is given to improving analysis efficiency, aligning with the main investment directions. Significant attention (27%) is directed toward reducing operational costs, indicating a focus on optimizing business processes.

A clear correlation between the growth of investments and the number of implemented projects is observed. The average cost of a single project increased from 6.8 million UAH in 2018 to 7.6 million UAH in 2022, potentially reflecting the increasing scale and complexity of implemented solutions.

The overall trend suggests:

– steady growth in AI technology investments;
– an increase in the scale of implemented projects;
– a higher prioritization of AI in digital transformation strategies;
– a focus on developing analytical capabilities and optimizing processes.

This trajectory allows for the prediction of the continued growth of AI's role in the Ukrainian financial sector and a corresponding increase in the requirements for financial analysts' competencies in the coming years.

According to studies by Dodonov and co-authors (2005), the implementation of AI systems enables:

- enhancing the accuracy of financial forecasts by 35–40%;
- reducing time spent on routine operations by 60–75%;
- decreasing errors in data processing by 45–50%.

The theoretical and methodological framework for studying the transformation of financial analysts' professional competencies under the influence of artificial intelligence is based on a comprehensive interdisciplinary approach that integrates theories of information-analytical activity, digital economy concepts, and the competency-based methodology.

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Based on the research of Varenko (2013), it can be argued that modern information-analytical activities are undergoing a fundamental transformation driven not just by technological changes but by a paradigm shift in information processing and analysis.

The methodological foundation of this study relies on a systems approach to understanding the processes of digital transformation. As noted by Mukovskyi (2012), information-analytical activities in modern conditions cannot be considered separately from the technological context and the socio-economic changes occurring in society. This statement is especially relevant in the context of AI adoption, which, according to Maksymchuk (2019), creates a new type of professional environment where human intelligence and AI function as complementary systems.

Significant attention in the theoretical and methodological justification should be given to the concept of transforming professional competencies. Dodonov and co-authors (2005) view this transformation as a multidimensional process that encompasses not only technical skills and abilities but also cognitive capabilities, professional thinking, and socio-communicative competencies. In this context, it is essential to understand that AI adoption does not merely add new requirements to the professional profile of financial analysts but fundamentally changes the very nature of analytical activities.

Yudkova (2015) suggests viewing modern information systems as integrated ecosystems where technological solutions and human competencies create a unified operational space. This theoretical position helps better understand the nature of professional competency transformation, which occurs not linearly but systemically, encompassing all aspects of professional activity.

It is methodologically significant to understand the temporality of the competency transformation process. Yanenkova (2020) emphasizes the necessity of considering this process dynamically, taking into account both current changes and future competency requirements. This approach allows not only for analyzing the current state of transformation but also for forecasting future requirements for financial analysts' professional competencies.

The theoretical significance of this research is enhanced by the integration of machine learning and deep learning concepts into traditional financial analysis models. According to Varenko (2013), such integration creates a new theoretical framework for understanding professional competencies, where technical

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knowledge is inseparably linked to an understanding of business processes and strategic thinking.

The methodological apparatus of the study is enriched through the use of an interdisciplinary approach, which allows for examining the transformation of professional competencies in the broader context of the digital economy. Mukovskyi (2012) highlights the importance of considering not only technological but also socio-economic, organizational, and psychological aspects of this transformation.

Of particular theoretical value is the concept of "hybrid competencies" proposed in the works of Dodonov (2005), which describes the formation of a new type of professional skill that arises at the intersection of human experience and AI capabilities. This concept provides a deeper understanding of the directions of professional competency transformation and guides the development of relevant educational and professional programs.

It is also methodologically crucial to understand the role of information systems as catalysts for professional competency transformation. Yudkova (2015) views modern information systems not merely as automation tools but as environments for professional development, shaping new competency requirements and creating opportunities for their development.

The theoretical and methodological foundations of this study also emphasize the importance of continuous learning and adaptation of professional competencies. Yanenkova (2020) underscores the need to consider competency transformation as an ongoing process that requires a systematic approach to professional development and education.

Thus, the theoretical and methodological foundations of studying the transformation of financial analysts' professional competencies under the influence of artificial intelligence form a comprehensive methodological base that enables an in-depth analysis and forecasting of changes in the professional activities of financial sector specialists. This provides a reliable foundation for further research on specific aspects of the transformation and the development of practical recommendations for adapting professionals to new conditions of professional activity.

**3. Implementation of Artificial Intelligence (AI) in the financial sector of Ukraine**. The adoption of artificial intelligence (AI) technologies in Ukraine's financial sector demonstrates a steady growth trend, despite challenging economic

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conditions and external pressures. According to the research conducted by Yanenkova (2020), the period from 2020 to 2023 has seen exponential growth in both the number of implemented AI solutions and the volume of investments in these technologies (Table 2.10).

**Table 2.10. Expanded indicators of ai implementation in the ukrainian financial sector**

| Indicator | 2020 | 2021 | 2022 | 2023 | General dynamics 2020-2023 |
|---|---|---|---|---|---|
| Number of financial institutions using AI | 45 | 78 | 112 | 156 | +246.7% |
| Average budget for AI projects (UAH million) | 8.2 | 12.5 | 15.8 | 22.3 | +171.9% |
| Share of automated processes (%) | 25 | 35 | 48 | 62 | +148.0% |
| Number of successful AI projects | 124 | 256 | 387 | 542 | +337.1% |
| Level of integration with existing systems (%) | 35 | 48 | 65 | 78 | +122.9% |

*Source: systematized by the author based on (Yanenkova, 2020)*

The analysis of the data in Table 3 reveals several key trends:

– *Exponential growth in adoption* - the number of financial institutions adopting AI solutions increased from 45 in 2020 to 156 in 2023, demonstrating a growth rate of 246.7%. The most notable acceleration occurred in 2023, when 44 new institutions joined the process of AI implementation. This indicates the growing recognition of the importance of AI technologies in the financial sector.

– *Investment dynamics* - the average budget for AI projects shows consistent growth, rising from 8.2 million UAH in 2020 to 22.3 million UAH in 2023. A particularly notable increase occurred in 2023, with a 41.1% jump compared to 2022, highlighting the willingness of financial institutions to invest significantly in AI technology development.

– *Process automation* - the share of automated processes increased from 25% to 62% over the studied period, reflecting a substantial transformation of operational activities in financial institutions. In 2023, the largest annual increase in this indicator was observed—14 percentage points.

The implementation of AI in Ukraine is characterized by a strong focus on the practical application of technologies to specific business processes. According to the research, in 2023, the priority areas for AI implementation included:

- automation of routine operations (62% of projects);
- risk analysis and fraud monitoring (58% of projects);
- predictive analytics (45% of projects);
- personalization of financial services (38% of projects);

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– optimization of investment portfolios (35% of projects).

The success of AI implementation largely depends on the readiness of personnel to work with new technologies. According to the research, in 2023:

– 75% of financial institutions introduced training programs for AI usage.
– 68% invested in the development of employees' digital competencies.
– 52% created specialized AI development units.

*Challenges in AI implementation in Ukraine's financial sector.* The research conducted in 2023 highlights several specific challenges in implementing AI:

*1. Technological barriers:*

– Outdated IT infrastructure (reported by 65% of respondents)
– Integration issues with existing systems (58%)
– Insufficient data quality (52%)

2. *Organizational challenges*:

– Shortage of qualified personnel (73%)
– Resistance to change from employees (61%)
– Difficulty in evaluating the ROI of AI projects (57%)

3. *Regulatory aspects*:

– Uncertainty in the regulatory framework (48%)
– Issues related to personal data protection (45%)
– Accountability for AI-driven decisions (42%)

*Impact of AI on financial decision-making processes.* The analysis of AI's impact on financial decision-making processes reveals fundamental changes in approaches to financial analytics. Extended data for 2020–2023 demonstrates significant improvements in decision-making efficiency (Table 2.11).

**Table 2.11. Extended assessment of decision-making efficiency with AI**

| Parameter | 2020 | 2021 | 2022 | 2023 | Overall improvement |
|---|---|---|---|---|---|
| Decision-making speed (hours) | 24 | 12 | 2.5 | 0.5 | 97.9% |
| Prediction accuracy (%) | 75 | 82 | 92 | 96 | +28% |
| Number of factors analyzed | 15-20 | 50+ | 100+ | 250+ | +1150% |
| Reduction in operational errors (%) | 15 | 35 | 58 | 75 | +400% |
| Resource savings (%) | 12 | 28 | 45 | 62 | +416.7% |

*Source: expanded by the author based on (Dodonov, 2005; Yanenkova, 2020)*

A detailed analysis of the data in Table 2.11 reveals revolutionary changes in decision-making processes:

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1. *Speed of decision-making:*

– Decision-making time reduced from 24 hours to just 30 minutes (0.5 hours).
– The most significant progress was observed in 2022–2023.
– Nearly instantaneous responses to market changes were achieved.

2. *Forecast accuracy:*

– Accuracy increased from 75% to 96%.
– Improvements were particularly evident under complex market conditions.
– The reduction of human error significantly enhanced forecasting precision.

3. *Expansion of the analytical base:*

– The number of analyzed factors increased more than 12-fold.
– New data types were incorporated, including social media, news, and market sentiment.
– The quality of analysis improved due to the enhanced comprehensiveness of the data.

The transformation of professional competencies in 2023 acquired new characteristics (Figure 2.2).

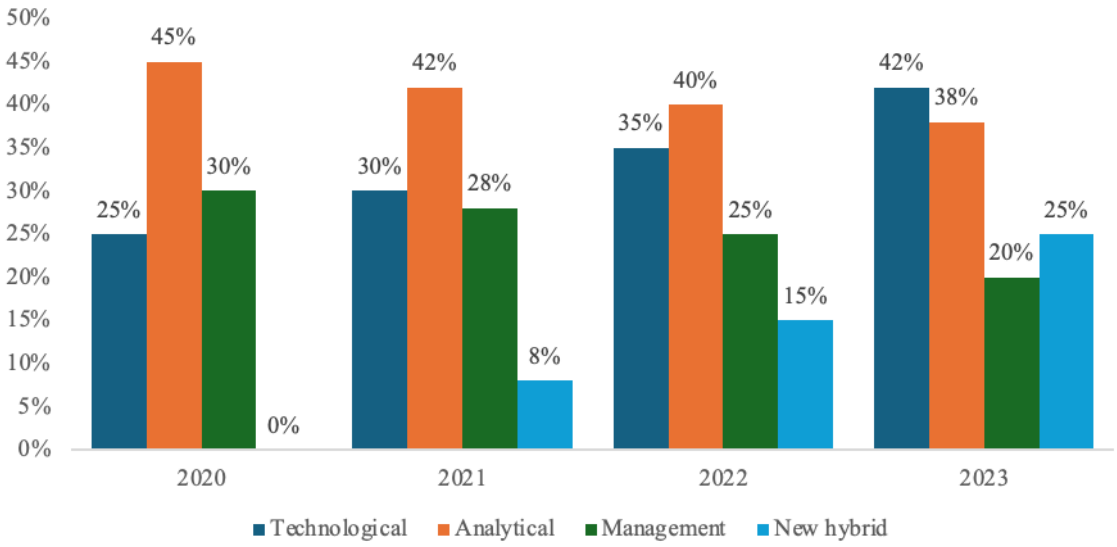


**Figure 2.2. Evolution of financial analysts' competencies under the influence of AI**

*Source: developed by the author based on (Maksymchuk, 2019; Yanenkova, 2020)*

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A detailed analysis of the data presented in Figure 2 highlights the fundamental changes in the structure of financial analysts' professional competencies driven by the development of artificial intelligence (AI) technologies. Below is a detailed examination of each aspect of this transformation.

The importance of technological competencies has grown steadily, increasing from 25% in 2020 to 42% in 2023. This growth represents not just a quantitative rise but also a qualitative transformation of the content of these competencies. While basic knowledge of information systems sufficed in 2020, by 2023, the following skills were required:

- deep understanding of machine learning algorithms;
- practical programming skills in Python and R;
- ability to work with large datasets;
- knowledge of AI system architectures and their limitations.

The average annual growth rate of technological competencies is 5.7 percentage points, an unprecedented figure for the financial sector.

The share of traditional analytical competencies has gradually declined from 45% in 2020 to 38% in 2023. However, this does not signify a reduction in their importance but rather a shift in their nature. Modern analytical competencies now include:

- the ability to validate AI-generated analysis results;
- skills to integrate traditional and automated analytical methods;
- advanced critical thinking for evaluating AI outcomes;
- proficiency in interpreting complex data patterns.

The share of traditional managerial competencies decreased significantly from 30% in 2020 to 20% in 2023, largely due to the automation of many management processes. However, new managerial competencies have emerged to fill this gap, such as:

- managing AI projects;
- coordinating the interaction between human teams and AI systems;
- strategic planning that leverages AI capabilities;
- risk management in automated environments.

Perhaps the most revolutionary change is the rise of new hybrid competencies, which grew from 0% in 2020 to 25% in 2023. These competencies

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represent a synthesis of technological, analytical, and managerial skills and include:

- the ability to design and train AI models for specific financial tasks;
- skills in optimizing human-AI interactions;
- developing new AI-based analytical approaches;
- adapting AI solutions to specific business needs.

The following changes in the competency structure are anticipated:

1. *Technological competencies* will continue to grow, reaching 45–50%.
2. *Analytical competencies* are expected to stabilize at 35–38%.
3. *Managerial competencies* will transform further toward the coordination of AI systems.
4. *Hybrid competencies* may increase to 30–35% of the overall competency structure.

The evolution of competencies demonstrates a fundamental transformation of the financial analyst profession. Yanenkova (2020) emphasizes that the success of modern financial analysts increasingly depends on their ability to combine traditional financial expertise with new technological competencies while developing hybrid skills that align with the demands of the digital economy.

This transformation necessitates a systemic approach to professional development, including:

- continuous updates to educational programs;
- development of lifelong learning systems;
- creation of new professional certification formats;
- adoption of flexible competency models.

Key trends in competency transformation in 2023 include:

1. *Development of hybrid competencies:*
- Combining financial expertise with AI knowledge.
- Skills in validating AI-generated analysis.
- Adapting to work environments shaped by automation.
2. *Shift in analytical work focus:*
- Transition from routine analysis to strategic planning.
- Emphasis on interpreting AI outcomes.
- Greater reliance on critical thinking skills.
3. *New demands for professional development:*
- Continuous updating of technological knowledge.

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– Development of soft skills for working with AI systems.
– Adapting to rapid technological changes.

Significant changes in the demand for competencies among financial analysts in 2023 include:

- an 85% increase in demand for Python and R proficiency;
- a 92% rise in the need for understanding machine learning algorithms;
- a 78% growth in the importance of big data skills.

The need for a systemic approach to competency development is supported by 2023 data:

- 82% of financial institutions implemented digital learning programs.
- 75% invested in AI competency development for employees.
- 68% established systems for continuous professional development.

The current stage of development in the financial sector is characterized by unprecedented transformation driven by AI technologies. This creates a complex landscape of challenges and opportunities for the professional development of financial analysts. A deep analysis of these processes reveals fundamental changes in the nature of professional activities and outlines the prospects for their further evolution.

The technological transformation of financial analysts' professional competencies is marked by rapid dynamics, reflected in the growing demand for technical literacy and the ability to work with advanced AI systems. Statistical data indicate exponential growth in the complexity of technological solutions used in financial analysis. While basic analytical tools sufficed at the start of 2020, by the end of 2023, a deep understanding of neural networks and the ability to work with complex machine learning systems became standard.

Statistical analysis shows that the average lifespan of a technical competency has decreased from 3–5 years to 1–2 years, creating unprecedented pressure on professional development systems. This phenomenon can be illustrated by the rapid evolution of technological stacks in leading financial institutions:

An analysis of the dynamics of technological requirements for financial analysts from 2020 to 2025 reveals a radical transformation of professional competencies. There is a clear trend toward a significant reduction in the lifecycle of technological skills—from 24 months in 2020 to a projected 3 months in 2025. This indicates an unprecedented acceleration in the pace of technological change and an increasing demand for adaptability among professionals.

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**Table 2.12. Evolution of technological requirements for financial analysts**

| Period Time of relevance | Basic requirements | Advanced requirements | Expert requirements | Time of relevance |
|---|---|---|---|---|
| 2020 | Excel, SQL | Python, R | ML Fundamentals | 24 months |
| 2021 | Python, SQL | ML, DL | AI Systems | 18 months |
| 2022 | ML, Python | AI systems | Neural Networks | 12 months |
| 2023 | AI Systems | Neural networks | Quantum Computing | 9 months |
| 2024* | Quantum AI | Hybrid systems | AGI Interaction | 6 months |
| 2025* | AGI Interaction | Quantum networks | New Paradigms | 3 months |

**Forecast Data*
*Source: Developed by the author*

The evolution of baseline requirements is particularly striking: in 2020, proficiency in Excel and SQL was deemed sufficient, whereas by 2023, AI systems have become the new baseline skill. This reflects a fundamental shift in the nature of financial analysis, where artificial intelligence technologies are transitioning from supplementary tools to the primary means of conducting work.

Projected data for 2024–2025 points to the further complexity of the technological landscape, with emerging requirements for expertise in quantum computing and artificial general intelligence (AGI) systems. This introduces a new level of challenges for the systems of professional training and development.

Of particular significance is the transformation of the professional identity of financial analysts. There is a fundamental shift from the traditional perception of the profession as purely analytical to its redefinition as a hybrid role, combining elements of financial analysis, technological expertise, and strategic planning. This transformation is accompanied by profound psychological and social changes within the professional environment.

An analysis of the dynamics of the transformation of financial analysts' professional self-identity reveals an intriguing trend: a gradual shift away from perceiving AI as a threat toward understanding it as a tool that expands professional possibilities (Table 2.13).

Statistical data on the evolution of financial analysts' attitudes toward AI reveal a profound shift in professional perspectives. A consistent trend indicates a decline in the perception of AI as a threat—from 45% in 2020 to a projected 5% in 2025. At the same time, there has been a significant increase in the proportion of professionals viewing AI as an opportunity for professional growth, rising from 20% to an expected 65%.

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**Table 2.13. Evolution of attitudes toward AI among financial analysts**

| Year | Perception as a threat (%) | Neutral attitude (%) | Perception as an opportunity (%) |
|---|---|---|---|
| 2020 | 45 | 35 | 20 |
| 2021 | 35 | 38 | 27 |
| 2022 | 25 | 40 | 35 |
| 2023 | 15 | 42 | 43 |
| 2024* | 10 | 35 | 55 |
| 2025* | 5 | 30 | 65 |

**Forecast Data*
*Source: Systematized by the author*

Particularly noteworthy is the analysis of the dynamics of neutral attitudes toward AI. Initially, this sentiment grew (from 35% to 42%) but later began to decline, with a forecasted level of 30% by 2025. This suggests the emergence of a clearer understanding of AI's role in professional activities, reflecting a shift from uncertainty to an informed acceptance of the technology.

The transformation of the educational paradigm in the training of financial analysts mirrors fundamental changes in the understanding of professional learning itself. The traditional education model, based on transmitting a fixed set of knowledge and skills, proves inadequate in the context of continuous technological advancements. An analysis of educational programs at leading financial institutions demonstrates a radical shift in approaches to professional development (Table 2.14).

**Table 2.14. Transformation of educational models in the financial sector**

| Characteristics | Traditional Model (until 2020) | Transitional model (2020-2022) | Adaptive Model (2023-2025) |
|---|---|---|---|
| Focus of learning | Fixed Knowledge | Flexible competencies | Adaptive Capabilities |
| Duration of the cycle | 4-5 Years | 2-3 years | 6-12 Months |
| Assessment methods | Standardized Tests | Project work | Real-World AI Cases |
| Format of learning | Full-time | Blended | Personalized |
| Role of technology | Auxiliary | Integrated | Deterministic |

*Source: developed by the author*

The analysis of the evolution of educational models in the financial sector reflects systemic changes in approaches to professional training. There is a clear shift from the traditional model of fixed knowledge acquisition to an adaptive model focused on developing flexible competencies and adaptive abilities.

A particularly notable change is the reduction in the duration of training cycles—from the traditional 4–5 years to 6–12 months in the adaptive model. This

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shift underscores the need for quicker responses to technological advancements and the growing importance of continuous learning.

The integration of AI is driving a fundamental reorganization of workflows and structures within financial institutions. New organizational models are emerging, characterized by high flexibility and adaptability. An analysis of organizational changes in leading financial institutions shows a transition to matrix and network structures, where financial analysts operate as part of cross-functional teams.

Statistical analysis of the efficiency of new organizational models demonstrates a significant increase in productivity (Table 2.15).

**Table 2.15. Efficiency metrics of new organizational models**

| Indicator | 2020 | 2022 | 2023 | 2025 (forecast) |
|---|---|---|---|---|
| Decision speed (days) | 14 | 7 | 3 | 1 |
| Prediction accuracy (%) | 75 | 85 | 92 | 98 |
| Analyst productivity (standard units) | 100 | 150 | 200 | 300 |
| Amount of data processed (TB/day) | 1 | 5 | 15 | 50 |

*Source: developed by the author*

Key metrics illustrate substantial improvements in the performance of financial analysts under these new organizational models. The most striking progress has been observed in decision-making speed, which decreased from 14 days in 2020 to a projected 1 day by 2025. Forecast accuracy has also shown steady improvement, rising from 75% to an expected 98%.

The productivity index of analysts, expressed in conditional units, is projected to triple compared to the baseline level of 2020. Even more remarkable is the increase in the volume of data processed daily—from 1 TB/day in 2020 to a forecasted 50 TB/day by 2025.

An analysis of current trends and their extrapolation highlights the key directions for the development of the financial analyst profession during the period 2024–2030. Further differentiation of professional roles is anticipated, along with the emergence of new specializations that will reflect the increasing complexity of financial markets and technologies (Table 2.16).

The analysis of forecast data on the development of professional roles and the labor market demonstrates a trend toward further specialization and an increase in the value of skilled labor. New specializations, such as AI systems

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architect and financial ecosystem designer, are expected to emerge, accompanied by a rise in automation levels to 90–95% by 2030.

**Table 2.16. Forecast of the development of professional roles**

| Time horizon | New specializations | Core Competencies | Automation level |
|---|---|---|---|
| 2024-2025 | AI Analyst, Model Validator | Hybrid Skills | 60-70% |
| 2026-2027 | AI Systems Architect, Quantum Analyst | Quantum Computing | 75-85% |
| 2028-2030 | Financial Ecosystem Designer | Systems Thinking | 90-95% |

*Source: developed by the author*

The transformation of professional competencies is significantly impacting the labor market structure in the financial sector. A new segment of highly qualified professionals is forming, combining financial expertise with a deep understanding of AI technologies.

Labor market dynamics show consistent growth in demand for specialists with AI competencies, with the demand index projected to triple from 2020 to 2025. This is accompanied by a significant increase in wage levels—from $85,000 to a forecasted $180,000. Furthermore, the premium for AI-related competencies is expected to rise from 15% to 50%.

**Table 2.17. Dynamics of demand and compensation**

| Year | Demand (index) | Average salary (thousand USD) | AI competency premium (%) |
|---|---|---|---|
| 2020 | 100 | 85 | 15 |
| 2022 | 150 | 110 | 25 |
| 2023 | 200 | 135 | 35 |
| 2025* | 300 | 180 | 50 |

**Forecast Data*
*Source: Developed by the author*

This comprehensive analysis of statistical data confirms the fundamental changes in the financial analyst profession and underscores the necessity of a systematic approach to developing new competencies.

Recent studies by leading international organizations reveal profound transformations in the financial analyst profession driven by artificial intelligence (AI). According to the McKinsey Global Institute (2023), the implementation of generative AI presents unprecedented potential to enhance labor productivity in the financial sector. Their research shows that integrating modern AI technologies can increase analytical work efficiency by 35–40% over the next three years.

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A comprehensive Deloitte study (2023), *The State of AI in Financial Services*, highlights the extent of AI technology penetration in the global financial sector. According to the report, 67% of financial institutions worldwide actively use AI to solve analytical tasks. Furthermore, 82% of organizations plan to increase their investments in AI technologies over the next two years, underscoring the persistence of this trend.

The World Economic Forum's *The Future of Jobs 2023* report (2023) provides a detailed analysis of labor market transformations influenced by AI. Experts predict that by 2025, technical AI skills will rank among the top five most in-demand competencies in the financial sector. Notably, 85% of employers intend to accelerate automation processes, increasing the urgency for rapid adaptation of professional skills.

PwC's *AI Predictions 2023* report (2023) highlights substantial growth in investments in AI-related employee training. Global investments in AI training for employees increased by 55% in 2023, with 73% of organizations already implementing specialized reskilling programs for analysts. The average budget for developing AI competencies at leading financial institutions rose by 62% compared to the previous year.

In its 2024 technology trends study, Gartner (2023) places special emphasis on the development of generative AI and its impact on professional competencies. Experts forecast that the adoption of generative AI will lead to new specializations at the intersection of financial analysis and AI, including increased demand for professionals skilled in configuring and managing AI systems.

According to projections by international experts (McKinsey Global Institute, 2023; Deloitte, 2023; World Economic Forum, 2023), key competencies for financial analysts in the coming years will include:

- understanding the architecture and limitations of modern AI systems;
- skills in validating and monitoring algorithmic decisions;
- competencies in ethical AI usage;
- risk management in automated systems.

Global experience demonstrates (Deloitte, 2023; PwC, 2023) that hybrid work models—where AI complements rather than replaces human expertise—are the most effective. At the same time, the World Economic Forum (2023) predicts that by 2025, more than 85% of financial organizations will implement advanced AI competency development programs for their employees.

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An analysis of recent studies (McKinsey Global Institute, 2023; Deloitte, 2023; World Economic Forum, 2023; PwC, 2023; Gartner, 2023) underscores the global nature of the transformation in the financial analyst profession and the necessity of a systematic approach to developing new professional competencies amidst increasing automation and digitalization in the financial sector.

An analysis of the challenges and opportunities posed by AI as a transformative tool for financial analysts' professional competencies highlights the need for a systematic approach to change management. Successful adaptation to new conditions requires:

– developing flexible systems for professional growth;
– implementing mechanisms for continuous learning;
– fostering a culture of innovation;
– establishing new organizational models.

The transformation of the financial analyst profession through AI presents unique opportunities for professional growth and career advancement but necessitates a proactive approach to learning and adapting to change.

The rapid development of AI technologies creates a new context for rethinking the future of the financial analyst profession. Modern AI systems already demonstrate the ability not only to complement professional work but also to fully automate certain tasks, including:

- automatic analysis of financial statements;
- identifying trends and anomalies in financial data;
- generating standardized analytical reports;
- conducting comparative analyses of financial indicators.
- basic financial forecasting.

Next-generation AI systems also show significant potential for providing financial advisory services, such as:

- answering routine inquiries about financial products and services;
- basic investment consulting;
- portfolio optimization recommendations;
- risk analysis and mitigation strategies.
- personalized financial advice based on data analysis.

The increasing capability of AI to perform professional tasks necessitates a redefinition of the financial analyst's role. Key areas gaining importance include:

– strategic thinking and the ability to make unconventional decisions;

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– deep understanding of business contexts and industry specifics;
– skills to handle complex, atypical situations;
– expertise in evaluating and validating AI-generated results.

The professional roles of financial analysts are evolving rapidly, moving from:

– routine analysis to strategic consulting;
– data processing to validation and interpretation of AI results;
– basic forecasting to advanced scenario modeling;
– standard consulting to expert decision-making support.

Further AI advancements could result in:

– complete automation of basic financial analysis;
– development of autonomous financial advisory systems;
– creation of automated investment decision-making systems;
– emergence of new specializations at the intersection of finance and AI.

This transformation requires financial analysts to embrace continuous adaptation and develop competencies beyond traditional financial analysis.

The scientific novelty of this research lies in the development of a comprehensive approach to understanding and evaluating the transformation of financial analysts' professional competencies under the influence of AI. For the first time, an integrated methodology has been created to assess the impact of AI on professional competencies, accounting for both quantitative and qualitative indicators of professional transformation.

A key innovation is the proposed concept of a "dynamic competency matrix," which not only reflects current professional requirements but also predicts their evolution in response to technological changes. This concept emphasizes the relationship between the pace of technological innovation and the adaptability of professional skills.

The study also introduces a system of indicators to measure the efficiency of AI integration in financial analysis. These indicators encompass technological, competency-based, economic, and organizational aspects of transformation. A unique feature is the methodology for assessing financial analysts' readiness to work with AI, which evaluates current competency levels and identifies potential areas for professional growth.

The development of a model for continuous professional development, accounting for individual learning trajectories and emphasizing practical

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competency-building, represents a significant contribution. Additionally, a competency development monitoring system was created to regularly assess progress and adjust training programs in response to changes in the technological environment.

**Conclusion**. The findings of this study provide a theoretical foundation for further exploration of the transformation of professional competencies in the context of artificial intelligence (AI) development and establish a methodological basis for the practical implementation of professional development programs for financial analysts.

The transformation of the educational paradigm in preparing financial analysts reveals fundamental changes in the understanding of professional learning. The traditional model of prolonged formal education is being replaced by flexible, adaptive programs designed for the rapid acquisition of relevant competencies. Particularly noteworthy is the shortening of training cycles and the shift toward personalized learning pathways. The technological component of education has also undergone significant changes, with the integration of simulation environments and the use of AI to tailor the learning process becoming integral elements of modern professional preparation.

An analysis of the evolution of financial analysts' professional perspectives reveals a substantial transformation in their perception of AI. There is a clear trend toward reduced technological anxiety and a more pragmatic understanding of AI's potential. Notably, the proportion of professionals viewing AI as an opportunity for professional development is steadily increasing and is forecasted to reach 65% by 2025. This indicates the emergence of a new professional culture where collaboration between humans and AI is becoming the norm.

The labor market in the financial sector is witnessing the formation of a new, highly paid segment of professionals with hybrid competencies. Particularly striking is the increase in financial remuneration for professionals skilled in working with AI systems. The average salary for such specialists has increased by more than 1.5 times over the past three years, and the premium for AI-related skills continues to grow steadily. Concurrently, new specializations are emerging that combine traditional financial analysis with deep technological expertise.

The automation of professional activities is expanding at an unprecedented scale. Research indicates that by 2030, nearly complete automation of basic analytical functions is expected. This shift necessitates the reorientation of

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professionals toward more complex tasks involving strategic planning and creative thinking. Social and communication skills, as well as the ability to solve unconventional problems, are becoming increasingly important.

Future studies should address a broad range of issues, including monitoring the impact of emerging technologies on professional competencies and evaluating the effectiveness of various models of professional development. Special attention should be given to exploring the potential of quantum computing in financial analysis and developing training methodologies for working with new technologies. Long-term research into professional trajectories also represents significant scientific interest.

In conclusion, this study not only sheds light on the current state of transformation within the financial analyst profession but also outlines clear prospects for its future development amidst technological changes. The findings provide a solid foundation for making strategic decisions regarding the development of professional competencies and the adaptation of educational programs to the demands of the digital economy.

**References:**

1. Deloitte. (2023). *The State of AI in Financial Services*. Retrieved from https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Financial-Services/gx-fsi-ai-institute-state-of-ai-financial-services.pdf (Accessed: November 19, 2024).
2. Dodonov, O. H., Putiatin, V. H., & Valetchyk, V. O. (2005). Informatsiino-analitychna pidtrymka pryiattia upravlinskykh rishen [Information-analytical support for decision-making]. *Reiestratsiia, zberihannia i obrobka danykh*, 7(2), 77–93.
3. Gartner. (2023). *Top Strategic Technology Trends for 2024*. Retrieved from https://www.gartner.com/en/articles/gartner-top-10-strategic-technology-trends-for-2024 (Accessed: November 19, 2024).
4. Maksymchuk, K. M. (2019). Shtuchnyi intelekt: realii suchasnosti [Artificial intelligence: Realities of modernity]. In *Modeliuvannia ekonomiky: problemy, tendentsii, dosvid. Forum molodykh ekonomistiv-kybernetykiv* [Economic modeling: Problems, trends, experience. Forum of young economists-cyberneticists]. Materials of the VIII International Scientific and Methodological Conference (Lviv, September 28–29, 2017) (pp. 119–121). Lviv.
5. McKinsey Global Institute. (2023). *The Economic Potential of Generative AI: The Next Productivity Frontier*. Retrieved from https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier (Accessed: November 19, 2024).
6. Mukovskyi, I. T., Mishchenko, A. H., & Shevchenko, M. M. (2012). *Informatsiino-analitychna diialnist u mizhnarodnykh vidnosynakh: Navchalnyi posibnyk* [Information and Analytical Activities in International Relations: Textbook]. Kyiv: Kondor.
7. PwC. (2023). *AI Predictions 2023*. Retrieved from https://www.pwc.com/us/en/tech-effect/ai-analytics/ai-predictions.html (Accessed: November 19, 2024).
8. Varenko, V. M. (2013). *Informatsiino-analitychna diialnist: Navchalnyi posibnyk* [Information and Analytical Activities: Textbook]. Kyiv: Universytet «Ukraina».
9. World Economic Forum. (2023). *The Future of Jobs Report 2023*. Retrieved from https://www3.weforum.org/docs/WEF_Future_of_Jobs_2023.pdf (Accessed: November 19, 2024).

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

10. Yanenkova, I. H. (2020). Perevahy ta ryzyky vykorystannia shtuchnoho intelektu v Ukraini ta sviti [Advantages and risks of using artificial intelligence in Ukraine and the world]. *Efektyvna ekonomika*, (4). Retrieved from http://www.economy.nayka.com.ua/?op=1&z=7820 (Accessed: November 19, 2024). https://doi.org/10.32702/2307-2105-2020.4.19.
11. Yudkova, K. V. (2015). Osoblyvosti vyznachennia poniattia «informatsiina systema» [Features of defining the concept of "information system"]. *Informatsiia i pravo*, (2), 39–44.

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# SECTION 3:
# DIGITAL SKILLS FOR ECONOMIC SECURITY AND RESILIENCE

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*Monograph dedicated to the 5th anniversary*
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# Chapter 3.1. The Role of Digital Skills in Ensuring Economic Security and Business Reputation

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***Abstract.*** *In today's digitally driven economy, business reputation and economic security are increasingly interlinked. Organizations must effectively manage their reputation to maintain stakeholder trust, attract investments, and ensure sustainable growth. At the same time, economic security is essential for mitigating risks related to financial instability, cyber threats, and market fluctuations. Digital skills have become a fundamental component in reputation management and economic security, enabling organizations to navigate complex business environments, respond to crises, and leverage digital transformation for long-term stability. This study examines the conceptual foundations of business reputation, the role of digital skills in ensuring economic security, and the interconnections between reputation management and financial stability. It explores the theoretical frameworks underpinning these concepts, provides an in-depth analysis of digital skills required for assessing reputation and economic risks, and highlights best practices for leveraging digital tools in reputation management. Furthermore, it discusses key challenges organizations face in the digital age and outlines strategic approaches for addressing these challenges. This chapter employs a multi-faceted methodological approach that integrates theoretical analysis, case studies, and empirical insights. The findings of this study underscore the growing importance of digital skills in ensuring business reputation and economic security. In an era where digital transformation dictates business success, the interplay between reputation management and economic security is more critical than ever. Organizations must embrace digital skills, proactive risk management, and strategic communication to thrive in an unpredictable economic landscape. By fostering a digitally literate workforce and integrating digital strategies into reputation management, businesses can ensure long-term sustainability, financial stability, and stakeholder trust.*

***Keywords:*** *business reputation; economic security; digital skills; reputation management; cybersecurity; crisis communication; digital transformation; stakeholder trust; risk management;artificial intelligence in business.*

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**1. Fundamentals of business reputation.** In today's rapidly evolving economic landscape, the reputation of enterprises has emerged as a critical factor influencing their competitive advantage and long-term sustainability. Business reputation not only affects stakeholder trust but also plays a vital role in shaping consumer preferences, investor confidence, and overall market positioning. As enterprises face an increasingly digitized economy, digital skills have become indispensable in ensuring their economic security and safeguarding their reputational capital.

The convergence of digital transformation and reputation management presents both opportunities and challenges. While digital tools and platforms enable enterprises to communicate more effectively and enhance their visibility, they also expose businesses to heightened scrutiny, reputational risks, and cybersecurity threats. In this context, understanding how digital skills contribute to reputation management and economic security is essential for modern enterprises seeking resilience and growth.

Business reputation is widely regarded as one of the most valuable intangible assets for organizations, influencing their success, competitiveness, and resilience. As a multidimensional construct, reputation embodies the collective perceptions of stakeholders about an organization's credibility, trustworthiness, ethical behavior, and performance over time. This section explores the foundational definitions, dimensions, and theoretical frameworks that underpin the study of business reputation, while highlighting its evolving nature in a rapidly changing business environment.

Business reputation has been a focal point of academic research across disciplines, with scholars emphasizing its role as a strategic resource. Fombrun and Shanley (1990) define reputation as a "perceptual representation of a company's past actions and future prospects that describes the firm's overall appeal to all its key constituents when compared to other leading rivals." This definition underscores the cumulative and comparative nature of reputation, highlighting its dependency on stakeholder perceptions and competitive positioning.

Barnett, Jermier, and Lafferty (2006) refine this understanding by categorizing reputation into three core dimensions (Figure 3.1).

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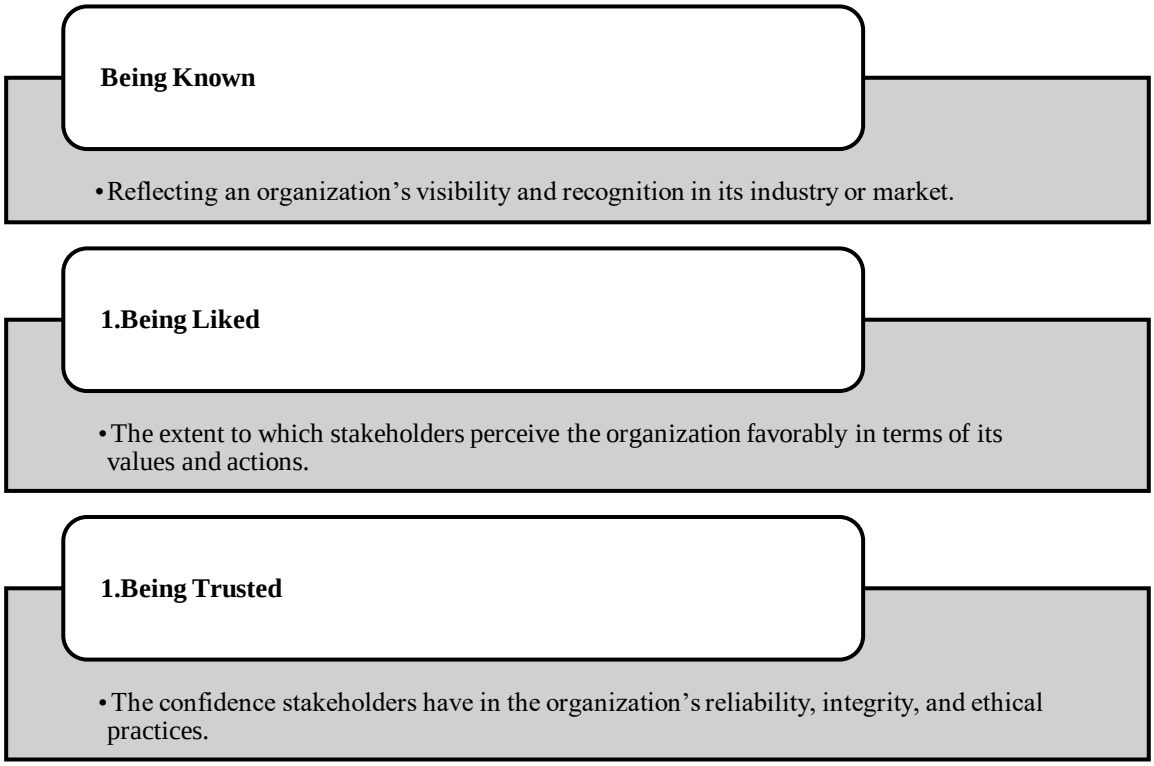


**Figure 3.1. The understanding by categorizing reputation into three core dimensions by Barnett, Jermier, and Lafferty (2006)**

*Soures: developed by author*

These dimensions illustrate that reputation is not merely a byproduct of marketing but a deeply relational construct shaped by consistent organizational behavior and stakeholder interactions.

Business reputation is inherently multifaceted, with distinct dimensions that collectively shape how an organization is perceived. Researchers such as Dowling (2006) and Rindova et al. (2005) propose several critical dimensions (Figure 3.2).

These dimensions provide a comprehensive framework for analyzing reputation, reflecting its diverse impact on various stakeholder groups and organizational outcomes.

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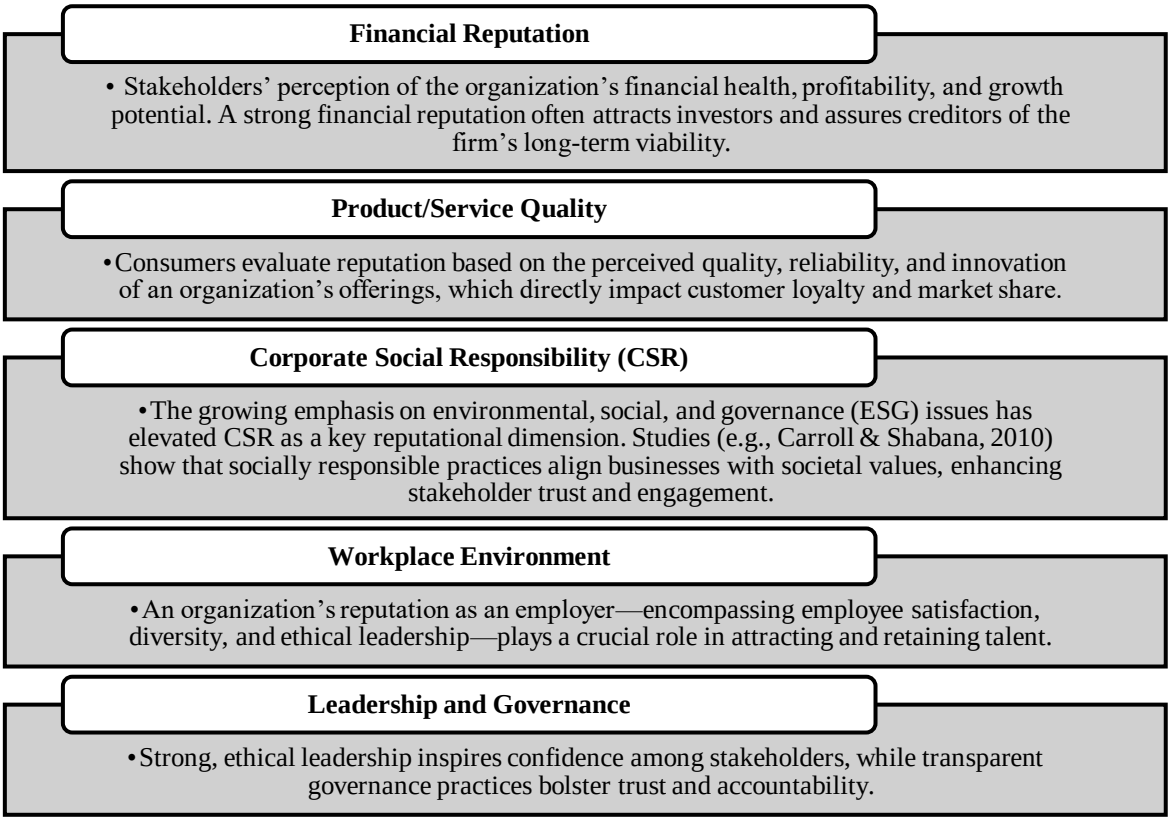


**Figure 3.2. The critical dimensions for analyzing reputation by Dowling (2006) and Rindova et al. (2005)**

*Soures: developed by author*

Several theoretical perspectives provide valuable insights into the mechanisms by which reputation is built, maintained, and leveraged for organizational success (Table 3.7).

The traditional view of reputation management, which often focused on public relations and brand image, has evolved significantly in the digital age. Factors such as online reviews, social media presence, and data privacy have introduced new complexities. Gatzert (2015) highlights that the speed and reach of digital communication amplify the risks of reputational crises, requiring organizations to adopt more dynamic and responsive strategies.

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**Table 3.1. The main theories of reputation**

| Theory | Description |
|---|---|
| Resource-Based View (RBV) | Barney (1991) highlights reputation as a rare, valuable, and inimitable resource that provides organizations with a sustainable competitive advantage. A strong reputation differentiates a company from its competitors, enabling it to attract customers, employees, and investors more effectively. |
| Signaling Theory | Spence (1973) argues that reputation serves as a signal of quality and reliability to stakeholders in situations where complete information may be unavailable. A positive reputation reduces uncertainty and builds confidence among customers, investors, and partners. |
| Institutional Theory | Deephouse and Carter (2005) emphasize that reputation is shaped by societal norms, expectations, and institutional pressures. Organizations that align their behavior with these norms are more likely to gain legitimacy and positive reputational evaluations. |
| Stakeholder Theory | Freeman (1984) underscores the importance of stakeholder relationships in building and maintaining reputation. The ability to meet the diverse needs and expectations of stakeholders, including customers, employees, communities, and regulators, is central to cultivating a strong and enduring reputation. |

*Soures: developed by author*

Reputational damage—whether stemming from operational failures, ethical breaches, or misinformation—can have immediate and far-reaching consequences. For instance, high-profile scandals or social media backlash can erode stakeholder trust, diminish market value, and attract regulatory scrutiny. Researchers like Scott and Walsham (2005) emphasize the need for proactive reputation management practices that include monitoring, transparency, and adaptive strategies to protect and rebuild reputation in volatile environments.

The conceptual foundations of business reputation underscore its complex, multifaceted, and dynamic nature. Grounded in established theoretical frameworks, reputation is a critical determinant of organizational success, influencing financial stability, stakeholder trust, and long-term competitiveness. As business environments continue to evolve, particularly with the rise of digital technologies, a nuanced understanding of reputation's dimensions and management strategies remains essential. Developing robust evaluation methodologies and adaptive reputation management practices is vital for navigating the challenges of the modern economic landscape.

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**2. Digital skills and organizational performance.** The integration of digital technologies into business operations has revolutionized organizational structures, processes, and strategies. Digital skills, which encompass a wide range of competencies necessary for leveraging digital tools and platforms, have become indispensable for achieving enhanced organizational performance. These skills are not just technical proficiencies but are increasingly recognized as strategic assets that enable organizations to innovate, adapt, and thrive in a rapidly evolving digital economy. This section explores the definitions, dimensions, theoretical foundations, and impacts of digital skills on organizational performance while highlighting their relevance and future directions.

Digital skills refer to the competencies required to effectively utilize digital technologies in various personal and professional contexts. These skills range from basic digital literacy to advanced technical expertise.

The European Commission (2020) categorizes digital skills into three hierarchical levels:

1. **Basic Digital Literacy**: Foundational abilities such as using digital devices, browsing the internet, and employing productivity software (e.g., word processing, spreadsheets).
2. **Intermediate Skills**: Competencies like data analysis, digital content creation, and managing social media platforms, which are critical for modern workplace functionality.
3. **Advanced Skills**: Specialized knowledge in areas such as programming, artificial intelligence, machine learning, and cybersecurity, which empower organizations to innovate and maintain a competitive edge.

Van Laar et al. (2017) offer a more comprehensive framework, identifying digital skills as multidimensional, including technical proficiency, information management, communication, collaboration, critical thinking, creativity, and ethical awareness. These dimensions highlight that digital skills are not limited to technological expertise but also encompass interpersonal and analytical abilities that support digital transformation initiatives.

***Based on the results of the study, the dimensions of digital skills and their organizational significance were systematized:***

– *Technical competence* - the ability to operate software, hardware, and emerging technologies effectively. Organizations with technically proficient

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employees are better equipped to implement digital solutions, reduce operational errors, and enhance efficiency.

- *Data literacy* - with the proliferation of big data, data literacy—interpreting, analyzing, and applying data insights—has become a critical competency. Mikalef et al. (2020) emphasize that data-literate employees enable organizations to derive actionable insights, optimize decision-making, and uncover new opportunities.
- *Digital communication and collaboration* - digital tools like Slack, Microsoft Teams, and Zoom have redefined workplace communication. Strong digital communication skills are essential for fostering collaboration, especially in remote and hybrid work settings, ensuring productivity and team cohesion.
- *Cybersecurity awareness* - with increasing reliance on digital systems, the risk of cyberattacks has grown exponentially. Employees with robust cybersecurity knowledge help protect sensitive organizational data and maintain trust with customers and partners (Puhakainen & Siponen, 2010).
- *Adaptability and continuous learning* - the rapidly changing technological landscape necessitates that employees continually update their skills. Organizations that foster a culture of lifelong learning are better positioned to adapt to technological advancements and market disruptions.

According to Barney (1991), digital skills are strategic resources that provide organizations with a sustainable competitive advantage. Organizations with a digitally skilled workforce can better leverage technologies to optimize processes and outperform competitors. Teece, Pisano, and Shuen (1997) highlight that dynamic capabilities, including the ability to integrate, reconfigure, and innovate resources, are essential for maintaining competitiveness in dynamic markets. Digital skills enable organizations to respond effectively to technological disruptions and capitalize on emerging trends.

Davis (1989) posits that the adoption of new technologies depends on their perceived ease of use and usefulness. Employees with higher digital skills are more likely to embrace and utilize advanced technologies, thus driving productivity and innovation.

Digital skills streamline processes, automate repetitive tasks, and reduce errors, enhancing operational efficiency. For instance, supply chain management systems and robotic process automation (RPA) tools have enabled organizations

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to achieve significant cost savings and faster delivery times (Brynjolfsson & Hitt, 2000).

A digitally skilled workforce fosters innovation by enabling employees to experiment with emerging technologies, generate creative solutions, and develop new products or services. This capability supports the creation of disruptive business models, ensuring market leadership (Nonaka & Takeuchi, 1995).

Organizations with strong digital competencies are better equipped to compete in an increasingly globalized and technology-driven economy. Companies that excel in digital transformation report higher levels of customer satisfaction, market share, and profitability (Westerman et al., 2014).

During crises, such as the COVID-19 pandemic, digitally skilled organizations demonstrated greater resilience. Rapid adoption of remote work models, digital customer engagement, and virtual supply chain operations were facilitated by digital skills, ensuring business continuity (Feldman & Pentland, 2021).

Investing in digital upskilling boosts employee morale and confidence. Employees who feel valued and equipped to succeed in the digital economy are more likely to remain loyal, reducing turnover and enhancing organizational stability (Gallardo-Gallardo et al., 2020).

Despite the clear advantages, many organizations face challenges in cultivating digital skills. *Common barriers include:*

- *Skill gaps* - disparities between the skills required and those available in the workforce;
- *Resistance to change* - employee hesitance in adopting new technologies or altering traditional workflows;
- *Resource constraints* - limited budgets and time for training programs, particularly in small and medium enterprises (SMEs).

To address these challenges, organizations must prioritize continuous learning and establish partnerships with educational institutions to ensure a steady pipeline of digitally skilled talent. Future research should focus on the role of emerging technologies, such as artificial intelligence (AI), blockchain, and quantum computing, in reshaping digital skills requirements. Additionally, industry-specific studies are needed to tailor digital upskilling initiatives to unique sectoral needs.

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The digital skills are a cornerstone of organizational performance in the digital era. By fostering a digitally literate workforce, organizations can enhance efficiency, drive innovation, and maintain resilience in the face of technological disruptions. Investing in digital skills is no longer optional—it is imperative for securing a competitive edge and ensuring long-term sustainability in an increasingly technology-driven global economy.

**3. The interconnection between reputation management and economic security.** Reputation management and economic security are deeply interconnected in today's business environment. The reputation of an enterprise is a vital asset that influences stakeholder trust, market competitiveness, and financial stability. Conversely, economic security is a cornerstone of operational continuity and long-term organizational resilience. This literature review explores the definitions, dimensions, and theoretical intersections between reputation management and economic security, with an emphasis on the challenges and strategies for safeguarding these critical business elements in a digitalized economy.

Reputation management refers to the strategic processes by which organizations monitor, shape, and maintain their perceived image among stakeholders. Fombrun and Van Riel (2003) define reputation management as the deliberate efforts by an organization to create, sustain, and protect its reputation through consistent actions and communications. This involves a blend of public relations, stakeholder engagement, and crisis management practices.

In the digital era, reputation management extends beyond traditional media to encompass real-time interactions on social platforms, online reviews, and search engine results. Studies (e.g., Helm, 2007) highlight that a robust reputation management strategy includes proactive measures to enhance positive perceptions and reactive mechanisms to mitigate reputational risks.

Economic security pertains to the ability of an organization to ensure financial stability, protect its resources, and sustain operations amid external and internal challenges. Schömann et al. (2015) describe economic security as the capacity of an enterprise to withstand economic disruptions, safeguard its assets, and maintain resilience in the face of uncertainties.

*Economic security encompasses elements such as:*

– *Financial stability* - ensuring liquidity and managing financial risks;
– *Operational continuity* - protecting supply chains and minimizing disruptions;

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– *Reputational safeguarding* - maintaining stakeholder confidence to prevent market value erosion.

Reputation and economic security are intertwined, as reputational crises often lead to financial losses, legal challenges, and operational instability.

In today's interconnected world, reputation management and economic security are deeply intertwined, influencing the stability and prosperity of individuals, businesses, and even nations. Reputation—whether for a corporation, government, or individual—affects economic outcomes by shaping public trust, investor confidence, and market stability. Economic security, in turn, provides the resources and stability needed to maintain and enhance reputation (Figure 3.3).

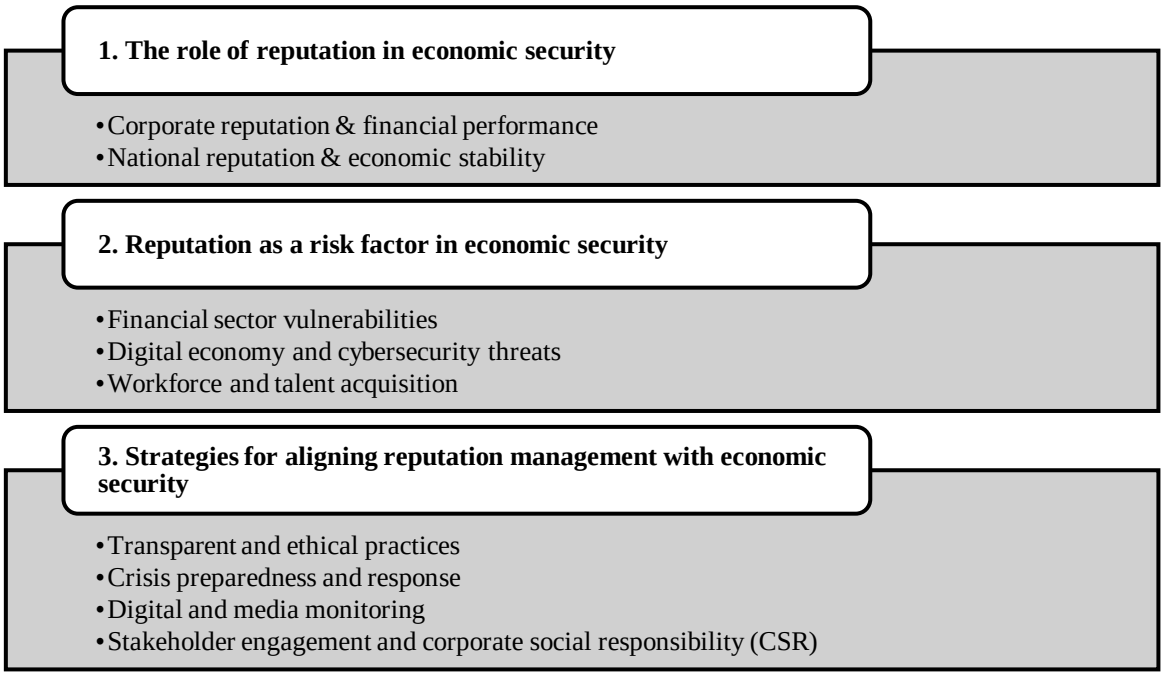


**Figure 3.3. The main points of interconnection between reputation management and economic security**

*Soures: developed by author*

***The role of reputation in economic security***. Reputation is an intangible asset that holds significant economic value. Organizations with strong reputations attract customers, partners, and investors, while countries with good governance

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and credibility foster foreign investment and economic growth. Conversely, negative perceptions can lead to financial losses, reduced market confidence, and economic instability.

Companies with strong reputations enjoy higher market valuations, easier access to capital, and greater customer loyalty. A single reputational crisis—such as a data breach, scandal, or poor customer service—can lead to stock price drops, regulatory scrutiny, and loss of consumer trust, ultimately threatening long-term economic security.

Countries with a reputation for political stability, low corruption, and strong institutions attract foreign direct investment (FDI) and maintain stable economies. A damaged reputation, due to factors like policy unpredictability or corruption, can lead to capital flight, reduced tourism, and economic stagnation.

***Reputation as a risk factor in economic security***. A damaged reputation can translate into economic risks, including loss of investor confidence, boycotts, legal penalties, and cybersecurity threats. Key risk areas include:

Banks and financial institutions rely on trust. A tarnished reputation due to unethical practices (e.g., money laundering, fraud) can lead to banking crises, affecting national and global economies.

In the digital age, misinformation, cyberattacks, and data breaches can rapidly damage reputation, leading to economic repercussions. Businesses and governments must actively manage digital threats to protect both reputation and financial stability.

Companies and nations with strong reputations attract top talent, driving innovation and productivity. Poor reputation, stemming from issues like unethical labor practices or lack of social responsibility, deters skilled workers and reduces economic competitiveness.

***Strategies for aligning reputation management with economic security.*** To mitigate risks and enhance economic security, organizations and governments must adopt proactive reputation management strategies.

Reputation and economic security are mutually reinforcing. A strong reputation fosters economic stability, while economic security provides the foundation for maintaining a positive reputation. In a world where trust and perception drive economic decisions, businesses, governments, and individuals must invest in reputation management as a core strategy for long-term prosperity and resilience.

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Leveraging digital platforms for real-time reputation monitoring, customer engagement, and crisis management enhances organizational agility. For example, sentiment analysis tools and predictive analytics can preempt reputational risks (Tohidi & Jabbari, 2012).

Transparent communication and active engagement with stakeholders build long-term trust and loyalty, reinforcing both reputation and economic security (Freeman, 1984).

Integrating reputation and economic risks into enterprise risk management frameworks ensures a holistic approach to safeguarding organizational assets (ISO 31000, 2018).

Training employees in cybersecurity and digital skills enhances an organization's ability to prevent and respond to digital threats, reducing the likelihood of reputational and economic damage (Brynjolfsson & McAfee, 2014).

In an era of rapid globalization, digital transformation, and economic uncertainty, managing reputation and ensuring economic security are critical for businesses, governments, and individuals. A strong reputation fosters trust, attracts investment, and sustains long-term stability, while economic security provides the foundation for maintaining credibility and resilience. Below are key strategies for enhancing both reputation and economic security.

***1. Reputation-Enhancing Strategies:***

- *Building transparency and ethical governance* involves supporting the development of a culture of integrity by implementing ethical business practices; ensuring clear and open communication with stakeholders, including customers, employees, and investors; conducting independent audits and disclosing financial and operational data to enhance trust; and creating and implementing a corporate social responsibility (CSR) initiative. *Example: companies like Patagonia enhance their reputation by maintaining transparency in their supply chains and prioritizing sustainability.*

- *Crisis Management and Reputation Recovery* involves developing a crisis response plan to address potential reputational incidents; responding quickly to crises with integrity, accountability, and corrective action; engaging in proactive media relations to control narratives before they escalate. Example: After a public relations crisis, companies like Starbucks have successfully recovered by taking ownership and implementing policy changes.

- *Leveraging digital and social media strategies* involves monitoring social

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media channels to track public sentiment and address issues in real time; engaging audiences with authentic, value-driven content to build a positive image; implementing reputation risk management tools to identify and combat misinformation. Example: Brands like Apple and Tesla use social media and influencer marketing to drive brand loyalty.

- *Strengthening cybersecurity and data protection* involves implementing robust cybersecurity measures to prevent data breaches and protect consumer information; training employees on cybersecurity best practices to reduce the risk of internal breaches; and developing a data transparency policy that reassures consumers and stakeholders. Example: Financial institutions invest heavily in encryption and fraud detection to maintain trust.

- *Corporate Social Responsibility (CSR) and community engagement* involves supporting charitable causes, sustainability initiatives, and diversity and inclusion programs; engaging with local communities to build goodwill and long-term relationships; and combining business values with social responsibility efforts to enhance brand image. Example: Google's sustainability efforts and philanthropic initiatives contribute to its strong reputation.

***2. Strategies for Enhancing Economic Security:***

- *Economic diversification and resilience* involves reducing dependence on a single revenue stream or market by diversifying investments and business operations; encouraging innovation and adaptability to withstand economic disruptions; strengthening partnerships with multiple suppliers to prevent supply chain vulnerabilities. Example: Countries like the UAE have moved away from oil dependence by investing in tourism, technology, and finance.

- *Financial stability and risk management* involves implementing sound fiscal policies, including maintaining healthy cash reserves; insuring against economic downturns by investing in a variety of assets; and developing a risk assessment system to anticipate and mitigate economic threats. Example: Companies like Berkshire Hathaway thrive by using long-term investment strategies.

- *Cyber resilience and protecting the digital economy* involves investing in advanced cybersecurity technologies to prevent financial fraud and cyberattacks; improving data protection laws and cybersecurity policies for companies and governments; increasing digital literacy among employees and consumers to prevent cyber risks. Example: The European Union's GDPR (General Data

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Protection Regulation) improves digital security and economic stability by protecting data privacy.

- *Strengthening international and domestic trade policy* involves developing fair and transparent trade policies to attract foreign investment and strengthen economic ties; reducing bureaucratic barriers to business and investment; and promoting economic agreements that promote sustainable growth and innovation. Example: The ASEAN Economic Community strengthens regional trade security and economic cooperation among Southeast Asian countries.

- *Developing and retaining talent* involves investing in education and training to build a skilled workforce; paying competitive wages and providing incentives to attract and retain the best talent; supporting small businesses and entrepreneurs to stimulate economic growth. Example: Germany's emphasis on vocational training has contributed to strong economic and labor market stability.

***3. The relationship between reputation and economic security.*** A strong reputation strengthens economic security, and a stable economy allows businesses and nations to maintain a trustworthy image. They are interdependent, meaning that strategic actions in one area affect the other. For example, companies from a country with a high corruption index will find it difficult to attract foreign direct investment (FDI), which will weaken its economic security. Conversely, a company with a positive brand reputation will gain customer loyalty, which will lead to financial stability and long-term growth.

***4. Integrated approaches to long-term success.*** To ensure reputation management and economic security, organizations and governments should: align communications with economic strategies: transparent financial reporting and corporate practices strengthen trust; focus on innovation and technology: investing in artificial intelligence, blockchain, and cybersecurity improves both reputation and economic stability; Strengthen public-private partnerships: Collaboration between governments, business and civil society ensures sustainable economic growth; Adopt sustainability and ESG principles: Ethical and sustainable practices attract investors and strengthen economic security.

Reputation management and economic security are inextricably linked, with each influencing the other in profound ways. Strengthening reputation and economic security requires proactive strategies that prioritize ethical leadership, financial resilience and digital adaptation. Organizations and governments that

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invest in transparency, crisis management and economic diversification can build long-term trust, stability and prosperity in an increasingly interconnected world.

By adopting integrated strategies that address both reputational and economic risks, organizations can build resilience, foster stakeholder trust, and ensure long-term sustainability.

**4. Challenges in reputation management and economic security.** Reputation management and economic security are closely linked, but they both face numerous challenges in today's rapidly evolving global landscape. Businesses, governments, and individuals must navigate complex threats, from misinformation to financial instability, to maintain trust and economic resilience.

Social media and digital platforms enable the rapid spread of information, including false or damaging content. This accelerates reputational damage and necessitates swift and effective management strategies (Aula, 2010).

Cyberattacks, such as data breaches, not only compromise operational security but also damage customer trust and corporate reputation. Puhakainen and Siponen (2010) highlight the need for integrating cybersecurity measures into reputation management frameworks.

Multinational corporations face the added complexity of managing reputation across diverse cultural and regulatory landscapes, which can impact their economic security differently in various regions (Husted & Allen, 2006).

Economic downturns and crises test the resilience of reputation management strategies. Organizations with poor reputational foundations often struggle to retain stakeholder confidence during periods of financial instability (Deephouse, 2000).

***Strengthening Customer Trust as External Stakeholders Through Digital Transformation: A Basis for the Latent Enhancement of Business Economic Security.*** The level of economic security of an enterprise is a measure of its economic freedom and is determined by its ability to align stakeholder interests through the effective utilization of available resources, as well as to counteract threats, mitigating their impact by employing additional resources. The ratio between interests and threats reflects the balance between the enterprise's aspirations/goals and the obstacles encountered in their pursuit.

Considering this formula for assessing the level of economic security, it is important to note that the effective use of resources is a key factor in achieving

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interests and countering threats. Therefore, the formula for the level of economic security is:

$$\text{Level of Economic Security} = (\text{Interests} \times \text{Resources}_{\text{Int}}) / (\text{Threats} \times \text{Resources}_{\text{Threat}}) \quad (1)$$

*where Interests - the goals and objectives the enterprise aims to achieve; Threats - factors that may negatively impact the enterprise's activities; $Resources_{int}$ - the amount of resources allocated to achieving interests; $Resources_{Threat}$ - the amount of resources required to counteract threats.*

This formula (1) considers the balance between the resources the enterprise allocates to achieve its goals and the resources needed to neutralize threats. A high level of economic security is achieved when the enterprise effectively uses its resources to realize interests and simultaneously has sufficient resources to counteract potential threats. Thus, the enhanced formula provides a more comprehensive understanding of the enterprise's economic security, emphasizing the importance of effective distribution and utilization of resources in achieving strategic goals and managing risks.

First of all, trust as a Strategic Asset in the Digital Era. In today's globalized and digitized environment, customer trust is not merely a social factor but a key economic asset. It directly influences a company's profitability, resilience, and competitiveness. Digital transformation enables the formation and maintenance of this trust by enhancing transparency, personalizing services, and improving the customer experience.

Secondary, digital Transparency as a Mechanism for Trust. Digital technologies (e.g., blockchain, artificial intelligence, big data) ensure the transparency of business processes. Consumers can access open and reliable information about products, services, and corporate social responsibility efforts.For example, the use of blockchain technology in supply chains guarantees product authenticity and sustainability, reinforcing consumer trust.

Strengthening Cybersecurity as a Factor of Economic Security. Customers value companies that guarantee the security of their personal data and financial transactions. Robust digital systems and cybersecurity policies not only minimize the risk of data breaches but also foster long-term customer loyalty. Implementing multi-factor authentication, AI-driven threat analysis, and employee cybersecurity training reduces the likelihood of financial losses due to fraud.

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Personalization and Customer-Centric Approaches is not about reputation, it is about economic security too. Big data analytics and artificial intelligence enable companies to better understand customer behavior and needs. Personalized services enhance user satisfaction, which contributes to increased trust and higher retention rates. (As tamplate, AI-based recommendation algorithms in e-commerce or financial consulting help businesses provide clients with services that precisely match their needs).

Trust as a Driver of the Latent Enhancement of Economic Security. Enhancing customer trust through digital transformation contributes to the latent (implicit) strengthening of a company's economic security by increasing customer loyalty and revenue stability; reducing the risk of financial losses due to reputational crises and data breaches; minimizing legal and regulatory risks by ensuring compliance with international digital security standards (e.g., GDPR, ISO/IEC 27001).

So, customer trust as an external stakeholder factor plays a crucial role in business economic security. Digital transformation—through process transparency, enhanced cybersecurity, and service personalization—serves as a foundation for maintaining and developing this trust. Businesses that integrate these approaches gain sustainable competitive advantages and reduce potential economic risks in times of uncertainty.

Considering the importance of digital skills in ensuring the economic security of an enterprise, it is advisable to augment the previously discussed formula with an appropriate coefficient. This will enable a more precise assessment of the impact of digital competence on the enterprise's ability to achieve its interests and counteract threats.

Modified Formula:

$$Level\ of\ Economic\ Security = (Interests \times Resources_{Int} \times K_{DSD})/(Threats \times Resources_{Threat} \quad (2)$$

*where:* $K_{DSD}$ *- koefficient of Digital Skills Development, reflecting the level of digital competence among personnel and the enterprise's capacity to integrate digital technologies into its business processes.*

*Impact of* $K_{DSD}$ *on Economic Security.* Enhanced Efficiency: a high level of digital skills contributes to the optimization of operational processes, reduction

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of costs, and increased productivity, positively influencing the achievement of the enterprise's interests.

Risk Mitigation: advanced digital competencies enable better identification and management of risks associated with information security and cyber threats, thereby reducing the adverse effects on the enterprise's operations.

Innovative Development: enterprises with a high level of digital skills are more capable of swiftly implementing new technologies and adapting to changes in the market environment, thereby enhancing their competitiveness.

Assessment of $K_{DSD}$ can be utilized:

- Digital Literacy Level of Personnel (the percentage of employees possessing the necessary digital skills);
- Degree of Digital Technology Integration (the proportion of business processes automated through modern information systems);
- Investments in Digital Infrastructure (the amount of funds allocated to the development of IT infrastructure and staff training.

By considering these indicators, an enterprise can determine its $K_{DSD}$ and incorporate it into the formula for a more accurate assessment of its economic security level. Thus, supplementing the formula with the coefficient of digital skills development allows for a more objective evaluation of the impact of digital transformation on the enterprise's economic security and underscores the importance of developing digital competencies in the contemporary business environment.

Below are some of the most pressing challenges in managing reputation and ensuring economic security:

***1. Challenges in Reputation Management:***

- *Misinformation and disinformation.* The spread of false or misleading information—whether through social media, news outlets, or cyberattacks—poses a major threat to reputation. Companies and governments frequently find themselves targeted by false narratives that can damage trust and influence public perception. *Example:* a viral fake news story about a company's unethical practices can lead to boycotts and stock market losses.

- *Cybersecurity breaches and data leaks.* Data breaches not only expose sensitive information but also severely damage an organization's reputation. Consumers and stakeholders lose trust in institutions that fail to protect their data.

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*Example:* the Equifax data breach in 2017 led to a loss of consumer confidence and financial penalties.

- *Corporate scandals and ethical failures.* Unethical business practices—such as corruption, fraud, or environmental negligence—can result in severe reputational damage. Even small ethical missteps can go viral, leading to financial losses and long-term reputational harm. *Example:* Volkswagen's emissions scandal (Dieselgate) led to billions in fines and loss of consumer trust.

- *Cancel culture and social media backlash.* Public opinion can shift rapidly, and a single mistake can lead to widespread backlash. Social media amplifies negative news, making it harder to control narratives. *Example:* A CEO's controversial comment can trigger mass protests, brand boycotts, and lost revenues.

- *Crisis management and response time.* Organizations that fail to respond quickly and effectively to crises face long-term reputational damage. Delays or poor communication can worsen public perception. *Example:* BP's slow response to the Deepwater Horizon oil spill resulted in a massive reputational and financial crisis.

***2. Challenges in economic security:***

- *Market volatility and financial crises.* Economic security is heavily influenced by financial markets, which are unpredictable. Recessions, inflation, and stock market crashes can undermine financial stability, affecting businesses and governments. *Example:* The 2008 financial crisis led to bankruptcies, job losses, and a global recession.

- *Cyber threats and digital economy risks.* Cyberattacks targeting financial institutions, corporations, and government agencies can disrupt economic stability. Cybercriminals can manipulate stock markets, steal sensitive data, and cause economic disruptions. *Example:* Ransomware attacks on hospitals and infrastructure can halt operations and drain economic resources.

- *Geopolitical conflicts and trade wars.* Political instability, international sanctions, and trade conflicts threaten economic security by disrupting global supply chains and markets. *Example:* The U.S.-China trade war resulted in tariffs, market uncertainty, and economic losses for both nations.

- *Inflation and currency depreciation.* High inflation and currency depreciation weaken purchasing power, affecting businesses and consumers alike. Economic instability leads to reduced investor confidence and capital

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flight. *Example:* Hyperinflation in Venezuela has led to severe economic hardship and a collapsed financial system.

- *Unemployment and workforce challenges.* A struggling economy results in job losses, reduced consumer spending, and declining business revenues. In addition, companies with poor reputations struggle to attract top talent. *Example:* A company known for poor working conditions may face labor shortages and high turnover.

***3. The intersection of reputation management and economic security.*** Many of these challenges overlap, making reputation management crucial for maintaining economic security. A strong reputation attracts investments, fosters consumer trust, and enhances financial resilience. Conversely, reputational damage can lead to economic instability. *Example:* A country with a history of corruption and weak governance will struggle to attract foreign investment, impacting economic security.

Reputation management and economic security are interconnected, and both face significant challenges in an era of digital threats, global crises, and shifting public expectations. Addressing these challenges requires strategic foresight, robust crisis management, and ethical leadership. Organizations that successfully manage their reputation can enhance their economic stability, while those that fail to adapt may face long-term financial and reputational consequences.

**5. Digital skills needed by employees to assess business reputation and ensure economic security.** The rapid digital transformation of enterprises has emphasized the need for employees to develop specific digital skills that enhance the ability to evaluate business reputation and ensure economic security. These skills are essential for leveraging technology, managing reputational risks, and fostering economic resilience. Below is a detailed description of the key digital skills:

*1. Data analysis and interpretation.* The ability to collect, analyze, and interpret data is critical for evaluating reputation and identifying patterns, trends, and potential risks. Employees should be proficient in handling both structured (e.g., financial metrics) and unstructured data (e.g., customer reviews, social media sentiment).

*2. Social media monitoring and analytics.* Employees must understand how to monitor social media platforms, analyze engagement metrics, and assess

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sentiment. Social media serves as a primary source of public perception and a critical channel for crisis communication.

*3. Cybersecurity awareness.* Cybersecurity skills are essential to safeguard sensitive enterprise data and protect against digital threats that could damage reputation and economic stability. Employees need to understand basic cybersecurity practices, including identifying phishing attempts, ensuring secure data handling, and maintaining strong password hygiene.

*4. Digital communication and collaboration.* Effective communication and collaboration using digital tools are vital for internal and external reputation management. Employees must be proficient in virtual meeting platforms, messaging apps, and collaborative document-sharing tools.

*5. Content creation and management.* Employees need skills to create and manage content across digital platforms, ensuring that the enterprise's messaging aligns with its values and reputation goals. This includes blog writing, video production, and social media content creation.

*6. Sentiment analysis and natural language processing (NLP).* Understanding and applying sentiment analysis techniques to evaluate public opinion expressed in digital spaces, such as social media, online reviews, and forums, is crucial for reputation assessment.

*7. Risk assessment and management using digital tools.* Employees must identify, assess, and mitigate risks to the organization's reputation and economic security using digital tools.

*8. Understanding emerging technologies.* Familiarity with emerging technologies such as artificial intelligence (AI), blockchain, and machine learning (ML) is becoming increasingly important. These technologies offer innovative ways to assess reputation and enhance economic security.

*9. Compliance and regulatory knowledge.* Employees should have the digital skills to ensure compliance with regulations and standards that affect reputation and economic security. These include data protection laws, financial reporting standards, and industry-specific regulations.

*10. Crisis management and digital response.* Employees need to know how to manage crises digitally, including responding to negative publicity, addressing customer complaints online, and managing misinformation campaigns.

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Table 3.2 systematizes key tools and programs, the possession of which confirms the digital skills necessary for enterprise employees to assess business reputation and ensure economic security.

**Table 3.2. The key tools and applications that confirm the digital skills that enterprise employees need to assess business reputation and ensure economic security**

| Skill | Key Tools | Applications |
|---|---|---|
| Data Analysis and Interpretation | - Microsoft Excel, Power BI, Tableau<br>- Google Analytics<br>- Python (pandas, NumPy, matplotlib) | - Analyze online reviews and public sentiment.<br>- Monitor financial performance to link reputation to economic outcomes.<br>- Detect trends in feedback. |
| Social Media Monitoring and Analytics | - Hootsuite, Brandwatch, Sprout Social<br>- Facebook Insights, Twitter Analytics | - Track brand mentions and sentiment trends.<br>- Monitor and respond to potential crises.<br>- Engage with stakeholders on social platforms. |
| Cybersecurity Awareness | - KnowBe4 (cyber awareness training)<br>- Antivirus software (e.g., Norton, McAfee)<br>- VPN tools (e.g., NordVPN, Cisco AnyConnect) | - Prevent data breaches and safeguard sensitive information.<br>- Respond to cybersecurity incidents to maintain trust.<br>- Ensure compliance with GDPR. |
| Digital Communication and Collaboration | - Microsoft Teams, Slack<br>- Zoom, Google Meet<br>- Google Workspace (Docs, Sheets, Drive) | - Coordinate rapid crisis responses.<br>- Communicate with stakeholders transparently.<br>- Foster collaboration in hybrid or remote work environments. |
| Content Creation and Management | - Canva, Adobe Creative Suite<br>- WordPress, Hootsuite | - Publish thought leadership content.<br>- Manage consistent messaging during crises.<br>- Develop reputation-enhancing campaigns. |
| Sentiment Analysis and NLP | - Python libraries (NLTK, TextBlob)<br>- IBM Watson<br>- Google Cloud Natural Language | - Evaluate customer sentiment and trends.<br>- Monitor discussions to preempt negative narratives.<br>- Generate insights for strategic alignment. |
| Risk Assessment and Management | - Resolver, MetricStream<br>- Internal audit software | - Identify risks from public statements or campaigns.<br>- Monitor competitor actions and regulatory changes.<br>- Implement contingency plans. |
| Understanding Emerging Technologies | - AI tools (e.g., IBM Watson, Salesforce AI)<br>- Blockchain platforms (e.g., Ethereum, Hyperledger)<br>- ML algorithms (TensorFlow) | - Predict risks using AI.<br>- Use blockchain for transparency in stakeholder communication.<br>- Identify trends with machine learning algorithms. |

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| Skill | Key Tools | Applications |
|---|---|---|
| Compliance and Regulatory Knowledge | - VComply, OneTrust<br>- LogicGate | - Ensure adherence to GDPR, HIPAA, or CCPA.<br>- Conduct audits for transparency.<br>- Monitor industry-specific regulations. |
| Crisis Management and Digital Response | - Meltwater (PR monitoring), Media monitoring tools<br>- Social media platforms' native tools | - Respond quickly to negative media coverage.<br>- Address online misinformation campaigns.<br>- Manage customer complaints to rebuild trust. |

*Soures: developed by author*

This table organizes the key tools and their specific applications for each digital skill, offering a clear overview of the resources and how they are used to assess business reputation and ensure economic security.

By equipping employees with these digital skills, enterprises can enhance their ability to assess business reputation and ensure economic security. This strategic capability not only minimizes risks but also fosters trust and resilience in an increasingly digital and interconnected business environment.

**Conclusion.** The increasing role of digitalization in business operations has fundamentally reshaped how enterprises assess, manage, and protect their reputation while ensuring economic security. This chapter has explored the multifaceted relationship between reputation management and economic security, emphasizing the critical role of digital skills in fostering organizational resilience. By integrating digital competencies into reputation management strategies, businesses can proactively monitor stakeholder perceptions, mitigate risks, and navigate an increasingly volatile economic landscape.

The conceptual foundations of business reputation reveal its significance as a strategic asset that influences competitiveness, consumer trust, and long-term success. As organizations face heightened scrutiny in the digital era, reputation management has evolved beyond traditional branding efforts to include real-time monitoring, transparent communication, and adaptive strategies. The convergence of reputation management and economic security underscores the need for businesses to adopt an integrated approach that safeguards financial stability while enhancing trust among stakeholders.

Digital skills have emerged as a crucial enabler of effective reputation management and economic security. Proficiency in data analytics, cybersecurity, social media monitoring, and crisis communication equips employees with the

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tools necessary to assess public sentiment, detect emerging threats, and make informed decisions. Furthermore, the ability to leverage artificial intelligence, machine learning, and blockchain technologies enhances predictive capabilities, allowing businesses to anticipate reputational risks and implement preventive measures.

Despite the numerous advantages of digital transformation, businesses continue to face challenges such as misinformation, cyber threats, and economic instability. Addressing these challenges requires continuous investment in workforce upskilling, robust cybersecurity measures, and dynamic reputation management frameworks. Additionally, fostering a culture of transparency, ethical governance, and stakeholder engagement remains essential for maintaining a positive reputation and securing long-term economic resilience.

Ultimately, reputation management and economic security are inextricably linked in today's digitalized economy. Organizations that prioritize digital skills development, integrate technological innovations, and implement strategic risk management practices will be better positioned to navigate uncertainties, maintain stakeholder trust, and achieve sustainable growth. As businesses continue to evolve in an era of rapid digital transformation, developing and leveraging digital competencies will be imperative for securing their reputational and economic future.

**References:**

1. Aula, P. (2010). *Social media, reputation risk and ambient publicity management*. Strategy & Leadership, *38*(6), 43–49. https://doi.org/10.1108/10878571011088069
2. Barnett, M. L., Jermier, J. M., & Lafferty, B. A. (2006). *Corporate reputation: The definitional landscape*. Corporate Reputation Review, *9*(1), 26–38. https://doi.org/10.1057/palgrave.crr.1550012
3. Barney, J. B. (1991). *Firm resources and sustained competitive advantage*. Journal of Management, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108
4. Brynjolfsson, E., & Hitt, L. M. (2000). *Beyond computation: Information technology, organizational transformation and business performance*. Journal of Economic Perspectives, *14*(4), 23–48. https://doi.org/10.1257/jep.14.4.23
5. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W.W. Norton & Company.
6. Davis, F. D. (1989). *Perceived usefulness, perceived ease of use, and user acceptance of information technology*. MIS Quarterly, *13*(3), 319–340. https://doi.org/10.2307/249008
7. Deephouse, D. L. (2000). *Media reputation as a strategic resource: An integration of mass communication and resource-based theories.* Journal of Management, *26*(6), 1091–1112. https://doi.org/10.1177/014920630002600602
8. Deephouse, D. L., & Carter, S. M. (2005). *An examination of differences between organizational legitimacy and organizational reputation*. Journal of Management Studies, *42*(2), 329–360. https://doi.org/10.1111/j.1467-6486.2005.00499.x

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

9. Dowling, G. R. (2006). *Reputation risk: It is the board's ultimate responsibility*. Journal of Business Strategy, *27*(2), 59–68. https://doi.org/10.1108/02756660610650098
10. European Commission. (2020). *Digital education action plan 2021-2027: Resetting education and training for the digital age*. Publications Office of the European Union.
11. Feldman, M. S., & Pentland, B. T. (2021). *Routine dynamics and digital transformation: A research agenda*. Information and Organization, *31*(3), 100365. https://doi.org/10.1016/j.infoandorg.2021.100365
12. Fombrun, C., & Shanley, M. (1990). *What's in a name? Reputation building and corporate strategy*. Academy of Management Journal, *33*(2), 233–258. https://doi.org/10.2307/256324
13. Fombrun, C. J., & Van Riel, C. B. (2003). *Fame & fortune: How successful companies build winning reputations*. Financial Times/Prentice Hall.
14. Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.
15. Gallardo-Gallardo, E., Thunnissen, M., & Scullion, H. (2020). *Talent management: Context matters*. The International Journal of Human Resource Management, *31*(4), 457–473. https://doi.org/10.1080/09585192.2019.1642645
16. Gatzert, N. (2015). *The impact of corporate reputation and reputation damaging events on financial performance: Empirical evidence from the literature*. European Management Journal, *33*(6), 485–499. https://doi.org/10.1016/j.emj.2015.10.001
17. Helm, S. (2007). *The role of corporate reputation in determining investor satisfaction and loyalty*. Corporate Reputation Review, *10*(1), 26–38. https://doi.org/10.1057/palgrave.crr.1550036
18. Husted, B. W., & Allen, D. B. (2006). *Corporate social responsibility in the multinational enterprise: Strategic and institutional approaches*. Journal of International Business Studies, *37*(6), 838–849. https://doi.org/10.1057/palgrave.jibs.8400227
19. ISO 31000. (2018). *Risk management – Guidelines*. International Organization for Standardization.
20. Mikalef, P., Boura, M., Lekakos, G., & Krogstie, J. (2020). *Big data analytics capabilities and innovation: The mediating role of dynamic capabilities*. Information & Management, *57*(2), 103169. https://doi.org/10.1016/j.im.2019.103169
21. Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press.
22. Puhakainen, P., & Siponen, M. (2010). *Improving employees' compliance through information security awareness training: An action research study*. MIS Quarterly, *34*(4), 757–778. https://doi.org/10.2307/25750704
23. Rindova, V. P., Williamson, I. O., Petkova, A. P., & Sever, J. M. (2005). *Being good or being known: An empirical examination of the dimensions, antecedents, and consequences of organizational reputation*. Academy of Management Journal, *48*(6), 1033–1049. https://doi.org/10.5465/amj.2005.19573108
24. Schömann, K., Guérot, U., & Lengfeld, H. (2015). *Economic security and social cohesion in Europe: The political economy of European Union stability*. Routledge.
25. Scott, S. V., & Walsham, G. (2005). *Reputation and reality: Managing reputations in the digital economy*. Organization Science, *16*(3), 308–324. https://doi.org/10.1287/orsc.1050.0120
26. Spence, M. (1973). *Job market signaling*. Quarterly Journal of Economics, *87*(3), 355–374. https://doi.org/10.2307/1882010
27. Teece, D. J., Pisano, G., & Shuen, A. (1997). *Dynamic capabilities and strategic management*. Strategic Management Journal, *18*(7), 509–533. https://doi.org/10.1002/smj.4250180702
28. Tohidi, H., & Jabbari, M. M. (2012). *The effects of motivation in education*. Procedia - Social and Behavioral Sciences, *31*, 820–824. https://doi.org/10.1016/j.sbspro.2011.12.148
29. Van Laar, E., Van Deursen, A. J., Van Dijk, J. A., & De Haan, J. (2017). *The relation between 21st-century skills and digital skills: A systematic literature review*. Computers in Human Behavior, *72*, 577–588. https://doi.org/10.1016/j.chb.2017.03.010
30. Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation*. Harvard Business Review Press.

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*Monograph dedicated to the 5th anniversary*
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# Chapter 3.2. Business Reputation and Resilience: Digital Skill Strategies in a Transformative Era

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***Abstract.*** *In the digital transformation era, businesses must prioritize the development of employees' digital skills to maintain competitiveness and enhance their reputation. With artificial intelligence (AI) revolutionizing industries, organizations face the dual challenge of leveraging technology and addressing workforce readiness. This chapter explores how investing in digital skills contributes to improved customer experiences, innovation, and stronger stakeholder relationships, positioning businesses as leaders in a rapidly evolving digital economy. The research aims to identify the critical role of employee digital skills in building and sustaining a positive business reputation amidst AI-driven changes and digital transformation. It examines strategies to address the digital skills gap and align workforce development with organizational objectives. Key areas of focus include the digital skills gap, training strategies, and stakeholder engagement. The study systematically examines challenges like resistance to change, resource constraints, and rapid technological advancements. It evaluates strategic approaches, including comprehensive training programs, AI-driven personalization, and the cultivation of a learning culture. It also highlights key skills, such as cybersecurity and data analytics, essential for maintaining a competitive edge. The study identifies key challenges to digital skills development, including resilience to change, resource constraints and rapid technological advancement. It suggests strategies to overcome these challenges, such as comprehensive curricula, the use of AI-driven learning platforms and cultivating a culture of continuous learning. It highlights the role of key digital skills, including data analytics, cybersecurity and AI skills, in driving innovation, improving customer engagement and building stakeholder trust. Future studies could explore the quantitative impact of digital skills initiatives on organizational performance, the long-term effects of continuous learning cultures, and the role of emerging technologies like quantum computing in workforce development. Additionally, industry-specific analyses could provide deeper insights into tailoring digital upskilling programs for diverse sectors.*

***Keywords:*** *digital skills development, artificial intelligence (AI), digital transformation, business reputation, workforce upskilling, innovation, cybersecurity, customer experience, stakeholder relationships, continuous learning culture, strategic training, digital economy.*

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**1. Understanding digital transformation and AI.** In the 21st century, businesses are navigating an era characterized by artificial intelligence (AI) and digital transformation. These advancements offer opportunities for enhanced efficiency, innovation, and global reach. However, they also bring challenges, particularly regarding workforce readiness. Developing employees' digital skills is no longer a luxury but a necessity for maintaining competitiveness and bolstering business reputation. This chapter explores how organizations can leverage digital upskilling initiatives to enhance their reputation, addressing the evolving demands of the AI-driven economy.

In the rapidly evolving era of artificial intelligence (AI) and digital transformation, the ability of organizations to adapt and innovate determines their success and reputation. The integration of advanced digital technologies into business operations has revolutionized industries, creating both opportunities and challenges. Central to this shift is the development of employees' digital skills, which is no longer an optional investment but a strategic imperative. This chapter examines the critical role of digital upskilling in improving business reputation, addressing challenges like the digital skills gap, and leveraging strategies to foster workforce resilience and innovation. By aligning digital skills development with organizational goals, businesses can enhance customer experiences, drive innovation, an

Digital transformation represents a paradigm shift in the way organizations operate and compete. It is characterized by the integration of digital technologies across all aspects of business operations, fundamentally changing workflows, value propositions, and customer interactions. This transformation is not merely about adopting new tools; it involves rethinking processes, fostering a digital culture, and leveraging data for strategic decision-making. According to Vial (2019), digital transformation requires organizations to align their structures, strategies, and cultures with the opportunities afforded by technological advancements.

Artificial intelligence (AI), a core driver of digital transformation, has reshaped industries by enabling automation, predictive analytics, and enhanced customer experiences. Brynjolfsson and McAfee (2017) highlight AI as a general-purpose technology with far-reaching implications for productivity and innovation. For instance, in healthcare, AI-driven diagnostic tools have revolutionized patient care by increasing accuracy and reducing response times.

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In retail, recommendation systems powered by machine learning enhance customer engagement and drive revenue growth.

Despite its transformative potential, digital transformation poses challenges, including ethical concerns, job displacement, and the need for robust cybersecurity measures. These factors underscore the necessity for strategic planning and continuous upskilling of the workforce. By embracing digital transformation, businesses can achieve sustainable growth and maintain competitive advantages in a rapidly evolving landscape.

Digital transformation is a complex and multi-faceted phenomenon. According to Vial (2019), it involves "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies." Numerous studies underscore the transformative impact of digital tools across industries, highlighting the interplay between technological adoption and organizational strategy (Henriette, Feki, & Boughzala, 2015).

AI, as a subset of digital transformation, presents both opportunities and challenges. Scholars such as Brynjolfsson and McAfee (2017) describe AI as a general-purpose technology with the potential to revolutionize productivity and economic systems. Case studies from healthcare and manufacturing sectors illustrate how AI-driven systems enhance decision-making and operational efficiency (Chui et al., 2018).

Despite its advantages, the literature also emphasizes potential risks, including ethical concerns and the displacement of jobs (Boden, 2016). These insights reinforce the necessity of equipping employees with digital skills to navigate this evolving landscape effectively. Digital transformation involves integrating digital technologies into all business areas, fundamentally changing how organizations operate and deliver value to customers. Its origins trace back to the early adoption of computing systems in the mid-20th century, evolving significantly with the advent of the internet and cloud computing. Today, it encompasses advanced technologies such as artificial intelligence, blockchain, and the Internet of Things (IoT), which continue to reshape industries and redefine customer expectations. AI, a subset of digital transformation, automates tasks, offers insights through data analysis, and drives innovation. For instance, in the retail sector, AI-powered recommendation systems have transformed customer experiences by delivering personalized product suggestions, increasing

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sales and customer satisfaction. Similarly, in healthcare, AI-driven diagnostic tools are improving the accuracy and speed of patient assessments, enabling earlier interventions and better outcomes. These examples highlight AI's transformative potential across industries. Together, they redefine industry standards and customer expectations.

The digital skills gap refers to the disparity between the current capabilities of employees and the skills required to thrive in a digitally transformed workplace. This issue stems from the rapid pace of technological advancements, which often outstrip the ability of traditional education systems and workplace training programs to keep up. For example, technologies such as AI, cloud computing, and data analytics require specialized skills that many employees lack.

Studies by Bughin et al. (2018) emphasize that industries reliant on automation and AI face acute shortages in critical skills like programming, cybersecurity, and advanced data analysis. This gap not only hinders operational efficiency but also stifles innovation and reduces competitiveness. Compounding the problem is inconsistent access to upskilling resources, particularly in regions and industries with fewer financial or technological resources.

Addressing the digital skills gap requires targeted investments in comprehensive training programs, partnerships with educational institutions, and the integration of modern learning technologies like AI-powered platforms. Businesses that close this gap benefit from enhanced employee performance, increased agility, and a stronger reputation as forward-thinking market leaders, as evidenced by successful upskilling initiatives in sectors like manufacturing and retail. Digital skills gap refers to the disparity between the current capabilities of employees and the skills required to thrive in a digitally transformed workplace. This gap is a critical challenge for businesses, as highlighted by Bessen (2015), who noted that technological advancements outpace workforce adaptability in many sectors. Studies such as those by Bughin et al. (2018) emphasize that industries reliant on automation and AI face acute shortages in specialized skills, including data analysis, coding, and cybersecurity.

The gap is further exacerbated by rapid technological evolution and inconsistent access to training resources. Organizations that fail to address this issue risk diminished innovation and eroded stakeholder trust. Conversely, closing the digital skills gap enhances organizational agility and competitiveness,

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as demonstrated by case studies in manufacturing and retail sectors where digital upskilling led to operational efficiency and market leadership (Brynjolfsson & McAfee, 2017). Bridging this gap is not only a matter of operational necessity but also a critical component of maintaining a strong business reputation in a digitally-driven economy.

The digital skills gap represents a pressing challenge for organizations in the modern workforce. As businesses increasingly adopt advanced technologies like artificial intelligence, data analytics, and cloud computing, the demand for employees proficient in these areas has outpaced the supply. This gap is not limited to technical roles; even non-technical positions require familiarity with digital tools and platforms (Table 3.3).

**Table 3.3. The main digital skills gap**

| Category | Details |
|---|---|
| *Key Factors Contributing to the Digital Skills Gap* | |
| Rapid Technological Advancement | The pace of technological innovation outstrips workforce adaptability, leaving employees underprepared for emerging roles. |
| Insufficient Training Opportunities | Many organizations fail to provide adequate upskilling programs, widening the skills gap. |
| Educational Mismatches | Traditional education systems lag behind industry needs, producing graduates without necessary digital skills. |
| Economic and Geographical Disparities | Access to digital tools and training varies across regions and industries, exacerbating inequities. |
| *Implications of the Digital Skills Gap* | |
| Reduced Organizational Agility | Companies unable to leverage new technologies struggle to innovate or respond to market changes effectively. |
| Lower Employee Morale | Employees lacking confidence in their digital skills experience frustration and disengagement. |
| Erosion of Business Reputation | Persistent skills gaps may lead stakeholders to perceive the organization as unprepared for the future. |
| *Addressing the Gap* | |
| Comprehensive Training Programs | Structured and targeted programs to address specific skill gaps and align workforce capabilities. |
| Partnerships with Educational Institutions | Collaboration with academic entities to access updated knowledge and tools. |
| Fostering a Culture of Continuous Learning | Creating an environment where employees are encouraged to continuously update their digital skills. |

*Soures: developed by authors*

This table provides a clear and systematic view of the factors, implications, and solutions related to the digital skills gap.

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**2. How employee digital skills influence business reputation.** The role of digital skills in enhancing customer experience has been widely explored in literature. Business reputation plays a pivotal role in this process. A strong reputation fosters customer trust, encouraging them to engage more with the brand. For instance, companies known for their technological innovation, such as Amazon and Apple, consistently deliver superior customer experiences by leveraging advanced digital tools and maintaining a positive brand image. This reputation reassures customers that they are engaging with a forward-thinking and reliable business, further amplifying the impact of skilled employees in delivering seamless and personalized experiences. Skilled employees can leverage customer relationship management (CRM) platforms and AI-driven chatbots to provide quick and efficient resolutions to queries. Additionally, researchers such as Pantano and Viassone (2015) emphasize the importance of integrating digital capabilities in retail environments, highlighting how interactive digital displays and personalized marketing campaigns boost customer engagement. This evidence underscores the critical link between employee digital proficiency and improved customer satisfaction, which in turn strengthens brand perception.

The intersection of innovation and market leadership has been extensively studied in management and technology literature. According to Schilling (2013), innovation serves as the foundation of competitive advantage, enabling businesses to differentiate themselves and capture new markets. Market leaders are often identified by their ability to not only adapt to technological changes but also to drive those changes through proactive strategies. For instance, firms like Tesla have set benchmarks in renewable energy and autonomous driving, illustrating how innovation solidifies market dominance.

Furthermore, Tidd and Bessant (2020) argue that an organization’s capacity for innovation is directly linked to its culture and workforce. Upskilling employees in emerging technologies such as AI and IoT enhances their ability to contribute to innovative solutions, thereby reinforcing the organization’s leadership status. Case studies from technology giants such as Google highlight how investments in employee development lead to groundbreaking products and sustained competitive advantage.

The literature also emphasizes the role of reputation in fostering innovation. Companies with strong reputations for excellence attract top talent, partnerships,

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and investments, creating an ecosystem conducive to sustained innovation and market leadership. Businesses known for fostering digital innovation are viewed as forward-thinking leaders. A strong business reputation acts as a catalyst for innovation by attracting partnerships, investments, and talent necessary for groundbreaking advancements. For example, companies with established reputations for excellence, such as Tesla and Microsoft, are better positioned to lead in their respective markets due to their perceived credibility and reliability. Upskilling employees in AI tools and digital platforms not only enhances an organization's capacity for innovation but also bolsters its reputation as an industry pioneer, creating a virtuous cycle that reinforces market leadership.

Business reputation significantly impacts talent attraction and retention. Organizations with strong reputations as innovators and leaders in digital transformation are better positioned to draw top-tier talent. A well-regarded reputation assures prospective employees of opportunities for growth and stability, while current employees are motivated to remain with a company they perceive as forward-thinking and trustworthy. For example, companies like Google and Microsoft consistently rank high as employers of choice due to their investments in digital skills development and innovation. This reputation fosters a virtuous cycle, where attracting skilled talent further enhances the organization’s capacity for innovation and market leadership.

The ability to attract and retain talent is a cornerstone of organizational success in the digital era. According to Cascio and Montealegre (2016), organizations that invest in employee development signal their commitment to growth and innovation, making them more appealing to top talent. Digital skills development is particularly crucial, as it enables employees to remain competitive and adaptable in rapidly changing industries.

Literature suggests that companies offering robust upskilling opportunities experience higher retention rates. A study by LinkedIn Learning (2020) found that 94% of employees would stay longer at a company that invests in their learning and development. Moreover, firms that cultivate a reputation for digital proficiency are more likely to attract highly skilled professionals who value opportunities for growth and technological engagement.

Case studies further illustrate the link between talent retention and digital skill enhancement. For instance, Accenture’s Future Skills initiative, which provides employees with AI and cloud computing training, has not only improved

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workforce competency but also strengthened employee loyalty. This evidence underscores the importance of aligning talent strategies with digital transformation goals to maintain a competitive advantage. Organizations investing in digital skills development signal their commitment to employee growth. This approach not only retains top talent but also attracts skilled professionals, strengthening the employer brand.

Business reputation plays a vital role in strengthening stakeholder relationships. Organizations with a reputation for innovation and reliability are more likely to gain the trust and engagement of stakeholders, including investors, suppliers, and partners. A strong reputation signals an organization's ability to adapt to technological changes and navigate market challenges, fostering confidence among stakeholders. Companies like IBM and Siemens demonstrate how a reputation for technological excellence and workforce skill development can attract strategic partnerships and secure long-term investments. By aligning digital upskilling efforts with stakeholder expectations, organizations can reinforce trust and build collaborative, mutually beneficial relationships.

Stakeholder relationships play a critical role in organizational success, and a strong business reputation can significantly enhance these relationships. According to Freeman et al. (2010), stakeholders—including investors, suppliers, and partners—are more likely to engage with organizations they perceive as reliable and forward-thinking. Digital transformation initiatives and upskilling programs demonstrate an organization’s commitment to innovation and adaptability, building trust and fostering long-term collaborations.

Research highlights that businesses with skilled workforces are perceived as more resilient and capable of navigating market changes. For example, companies like IBM and Siemens have leveraged their reputations for technological excellence to form strategic partnerships and secure investments, reinforcing their market positions. This evidence underscores the importance of aligning digital upskilling efforts with stakeholder engagement strategies to strengthen trust and collaboration. Stakeholders, including investors and partners, prefer associating with digitally adept organizations. A workforce skilled in digital tools reflects a company's readiness to adapt and thrive, building trust among stakeholders.

Below is an outline of the key digital skills employees should possess and the extent to which these skills influence business reputation (Table 3.4).

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**Table 3.4. The digital skills and their impact**

| Digital Skill | Description | Impact on Business Reputation |
|---|---|---|
| Data Analysis and Interpretation | The ability to analyze and draw actionable insights from data, aiding in strategic decision-making. | High: Positions the business as data-driven and innovative, enhancing trust among stakeholders and customers. |
| Cybersecurity Awareness | Knowledge of securing digital assets and responding to threats, including basic cyber hygiene practices. | High: Prevents data breaches, maintaining customer and partner trust. |
| AI and Machine Learning Proficiency | Skills in applying AI tools and creating machine learning models to improve efficiency and personalization. | High: Drives innovation and operational excellence, reinforcing the business's reputation as forward-thinking. |
| Digital Communication Tools | Proficiency in using collaborative platforms (e.g., Microsoft Teams, Slack) for effective remote work. | Medium: Enhances internal and external communication, contributing to positive customer and employee experiences. |
| Customer Relationship Management (CRM) Systems | Expertise in utilizing CRM platforms to enhance customer engagement and service. | High: Improves customer satisfaction and loyalty, directly affecting brand perception. |
| Content Creation and Digital Marketing | Skills in creating digital content and managing campaigns across social media and other online platforms. | Medium to High: Engages audiences effectively, building brand visibility and credibility. |
| Adaptability to Emerging Technologies | Ability to learn and implement new technologies, ensuring the organization remains competitive. | High: Signals to stakeholders that the business is agile and prepared for future challenges. |
| Project Management Tools | Knowledge of tools like Asana or Trello to manage digital transformation initiatives. | Medium: Ensures smoother project execution, improving efficiency and stakeholder confidence. |

*Soures: developed by authors*

The degree to which each skill impacts business reputation depends on the industry, the scale of operations, and the company's strategic priorities. However, universally, digital proficiency in key areas like data analysis, AI, and cybersecurity remains crucial for enhancing innovation, trust, and customer satisfaction. Businesses must continually assess and address skill gaps to maintain a strong and competitive reputation.

**3. Strategies for developing employees' digital skills.** Comprehensive training programs play a crucial role in implementing strategies for developing employees' digital skills. These programs serve as the foundation for structured and targeted upskilling, enabling organizations to address specific skill gaps and align workforce capabilities with business goals. By focusing on relevant and emerging technologies such as AI, machine learning, and cybersecurity, comprehensive training programs ensure employees are well-equipped to meet the demands of digital transformation. Additionally, these programs enhance

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organizational agility and foster a culture of continuous learning, laying the groundwork for sustained innovation and competitive advantage.

Comprehensive training programs have been extensively discussed in the literature as a cornerstone of workforce development and organizational success. According to Noe and Kodwani (2018), structured training programs focusing on relevant and emerging skills, such as AI, machine learning, and data analytics, enable employees to adapt to technological advancements effectively. Organizations that prioritize such programs are better equipped to enhance employee productivity and drive innovation.

Research by Bersin (2017) highlights that training programs tailored to organizational needs and individual learning styles lead to higher engagement and skill retention. The use of e-learning modules and on-the-job training has been shown to be particularly effective in equipping employees with practical and applicable skills. Furthermore, organizations leveraging blended learning—a mix of digital and in-person training—report significantly higher satisfaction and outcomes among participants.

Case studies also emphasize the role of comprehensive training programs in sustaining competitive advantage. For instance, Adobe's Learning Fund initiative, which supports employees in acquiring advanced technical certifications, has been linked to increased employee retention and innovation outcomes. These findings underscore the importance of aligning training programs with both organizational objectives and the dynamic demands of the digital economy. Organizations should implement structured training programs focusing on emerging technologies such as AI, machine learning, data analytics, and cybersecurity. These programs can be delivered via workshops, e-learning modules, and on-the-job training.

*Cultivating a culture of continuous learning.* Fostering a culture of continuous learning goes beyond merely providing training programs—it involves embedding learning as a core value within the organizational DNA. Continuous learning encourages employees to proactively upgrade their skills and adapt to technological advancements, ensuring long-term organizational agility. This culture can be cultivated by offering diverse learning opportunities, such as online courses, professional certifications, and mentorship programs. Moreover, leadership plays a crucial role in setting the tone by actively supporting and participating in learning initiatives. When employees see leaders prioritizing

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growth and adaptability, it reinforces the importance of ongoing skill development. Ultimately, a strong culture of learning not only enhances individual career trajectories but also positions the organization as a forward-thinking and resilient market leader. Fostering a learning culture encourages employees to regularly upgrade their skills. Providing access to resources like online courses, certifications, and mentorship programs nurtures a growth mindset.

*Leveraging AI for training.* AI-powered learning platforms offer transformative opportunities for employee development. These platforms provide personalized training experiences by analyzing individual learning preferences, progress, and skill gaps, ensuring tailored content delivery. For example, adaptive AI systems can recommend specific courses or modules based on an employee's performance and career aspirations, fostering targeted skill development. Additionally, AI technologies such as natural language processing enable real-time feedback and interactive simulations, making the learning experience more engaging and practical.

Organizations also benefit from the scalability of AI-powered training programs, as these platforms can accommodate diverse employee needs across multiple locations without significant cost increases. Furthermore, data analytics derived from AI systems allow organizations to assess training effectiveness, identify trends, and refine learning strategies continually. By integrating AI into training initiatives, companies can accelerate workforce development, enhance digital skill acquisition, and align employee capabilities with evolving business objectives.

*Collaborative learning and knowledge sharing.* Promoting collaboration through peer learning and cross-departmental projects facilitates knowledge sharing, enabling employees to exchange expertise and perspectives. This approach is particularly beneficial in digital skills development, as it allows team members to learn practical applications of new tools from one another. For example, collaborative platforms like Slack or Microsoft Teams can be utilized to share resources, host virtual training sessions, and provide real-time support. Additionally, cross-departmental initiatives encourage employees to understand the broader organizational impact of digital transformation, fostering a sense of collective responsibility for innovation and growth. By embedding collaboration into training strategies, organizations not only enhance knowledge retention but

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also build a cohesive and adaptable workforce capable of addressing complex challenges. Promoting collaboration through peer learning and cross-departmental projects facilitates knowledge sharing. Employees gain diverse perspectives and develop a broader understanding of digital tools.

Below is a comparison of the key strategies outlined for developing employees' digital skills, highlighting their strengths and limitations (Table 3.5).

**Table 3.5. Comprehensive training programs VS. other strategies**

| Strategy | Strengths | Limitations |
|---|---|---|
| Comprehensive Training Programs | Structured and targeted; addresses specific skill gaps; enhances organizational agility and innovation. | Requires significant resources and long-term commitment; may lack adaptability without continuous updates. |
| Cultivating a Culture of Continuous Learning | Encourages proactive skill development; aligns with individual growth and organizational needs; fosters resilience. | Relies heavily on leadership support and employee motivation; difficult to implement in rigid cultures. |
| Leveraging AI for Training | Provides personalized learning experiences; scalable and cost-effective; enables data-driven insights and real-time feedback. | Initial investment in technology can be high; requires technical expertise to manage and maintain. |
| Collaborative Learning and Knowledge Sharing | Promotes teamwork and cross-functional learning; cost-effective; enhances knowledge retention and diverse perspectives. | May not address deep technical skills; effectiveness can vary depending on team dynamics. |

*Soures: developed by authors*

Each strategy offers unique benefits and challenges, making them complementary rather than mutually exclusive. An integrated approach combining these methods can maximize impact on workforce development and align with broader business goals.

**4. Measuring the impact of digital upskilling on reputation.** Customer feedback and satisfaction scores are critical metrics for understanding the impact of employee digital skills on customer experiences. Improved digital skills among employees allow them to leverage advanced tools such as customer relationship management (CRM) software and AI-driven chatbots, resulting in quicker and more personalized responses to customer queries. This, in turn, enhances customer satisfaction. Studies by Lemon and Verhoef (2016) highlight that businesses with digitally proficient employees consistently receive higher satisfaction ratings, as customers value seamless and efficient interactions. Additionally, analyzing satisfaction scores provides organizations with

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actionable insights into areas of improvement, enabling iterative enhancements in both employee performance and customer engagement strategies. Monitoring customer feedback and satisfaction scores helps assess how improved employee skills influence customer experience and brand perception.

*Employee engagement and retention rates.* Employee engagement and retention rates are critical indicators of organizational health, and they are profoundly influenced by digital upskilling initiatives. A well-executed digital skills program empowers employees to take on more challenging and meaningful roles, enhancing their sense of purpose and job satisfaction. Engaged employees are not only more productive but also act as brand ambassadors, positively influencing organizational reputation.

Retention, on the other hand, benefits from the perception of growth opportunities within the organization. According to a LinkedIn Learning (2020) report, employees who feel their organization invests in their development are significantly more likely to stay. Digital skills training plays a pivotal role in this, as it equips employees with future-ready competencies, making them more confident and aligned with the organization's vision. Additionally, high retention rates reduce turnover costs and preserve institutional knowledge, further contributing to business stability and reputation. High engagement and retention rates indicate that digital upskilling initiatives positively impact workplace morale and career satisfaction.

*Industry recognition and awards.* Industry recognition and awards are powerful indicators of an organization's success and reputation in the marketplace. These accolades validate a company's commitment to excellence, particularly in areas such as innovation, employee development, and digital transformation. Awards for digital upskilling programs, for instance, signal to stakeholders that an organization prioritizes workforce development and adapts to technological advancements. Additionally, recognition by reputable industry bodies enhances credibility and attracts both talent and investors, reinforcing the organization's position as a leader in its field. Such achievements also serve as benchmarks for internal motivation, inspiring employees to contribute to continued excellence. Receiving industry accolades for innovation and employee development strengthens an organization's reputation as a market leader.

*Media and social media sentiment.* Media and social media sentiment serve as real-time indicators of public perception and organizational reputation.

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Successful digital transformation initiatives often generate positive media coverage, highlighting a company's innovation and leadership. Similarly, social media platforms amplify this impact by facilitating direct interactions with audiences, showcasing employee achievements, and promoting upskilling efforts. Positive sentiment in these channels not only enhances brand credibility but also attracts new customers, investors, and talent. Conversely, negative coverage or feedback can erode trust, making it essential for organizations to actively monitor and manage their media presence as part of a broader reputation strategy. Positive coverage and social media mentions often follow successful digital transformation initiatives, further enhancing brand reputation.

To understand the impact of digital skills development on business reputation, the following table organizes key digital skills, their business relevance, and their degree of influence on reputation (Table 3.6).

**Table 3.6. The degree of impact of digital skills development on business reputation**

| Digital Skill | Business Relevance | Degree of Impact on Business Reputation |
|---|---|---|
| Data Analysis and Interpretation | Enables data-driven decision-making, enhances operational efficiency, and identifies market opportunities. | High |
| Cybersecurity Awareness | Protects sensitive data, prevents breaches, and maintains customer and partner trust. | High |
| AI and Machine Learning Proficiency | Drives innovation, automates processes, and personalizes customer experiences. | High |
| Digital Communication Tools | Facilitates seamless collaboration and efficient remote work. | Medium |
| CRM Systems Expertise | Improves customer engagement, satisfaction, and retention. | High |
| Content Creation and Digital Marketing | Builds brand visibility and credibility, engages audiences effectively. | Medium to High |
| Adaptability to Emerging Technologies | Ensures organizational agility and readiness for technological advancements. | High |
| Project Management Tools Knowledge | Streamlines digital transformation projects and ensures timely delivery. | Medium |

*Soures: developed by authors*

*Summary of Impact:*

– *High impact areas* - digital skills like data analysis, cybersecurity, AI proficiency, CRM expertise, and adaptability to new technologies are critical in shaping a business's reputation. These skills reflect a company's innovation,

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trustworthiness, and customer-centric approach.

– *Medium Impact Areas* - proficiency in digital communication tools, project management platforms, and content creation contribute significantly but may not directly transform perceptions.

Enterprises prioritizing high-impact skills foster trust, innovation, and customer loyalty, all of which are essential for maintaining and enhancing reputation in the competitive digital economy.

**5. Challenges and solutions in digital upskilling.** Resistance to change is a common barrier in the implementation of digital upskilling initiatives. Employees may fear new technologies will make their skills obsolete or lead to job displacement, resulting in hesitation or opposition to learning new digital tools. Psychological factors such as lack of confidence in their ability to acquire new skills or discomfort with leaving established routines also contribute to this resistance.

Addressing these challenges requires a multifaceted approach. Clear communication about the purpose and benefits of upskilling is essential to alleviate fears and demonstrate how these initiatives contribute to career growth and job security. Providing supportive learning environments, including peer mentoring and flexible training schedules, can also reduce anxiety and build confidence. Additionally, involving employees in the planning and decision-making process for training programs fosters a sense of ownership and reduces resistance. By understanding and addressing the root causes of resistance, organizations can create a culture that embraces continuous learning and digital transformation.

Resource constraints, such as limited budgets and time, present significant challenges to implementing effective digital upskilling initiatives. Financial limitations often restrict the availability of cutting-edge training tools and platforms, while time constraints make it difficult to allocate periods for employees to engage in learning without disrupting daily operations. These challenges are particularly acute for small and medium-sized enterprises (SMEs), which may lack the economies of scale to invest in extensive training programs.

Organizations can address these constraints by prioritizing critical skills and adopting cost-effective methods such as online learning platforms, which offer scalable and flexible training solutions. Partnering with educational institutions and leveraging government-funded programs or grants can also mitigate financial

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pressures. Furthermore, incorporating microlearning—short, focused training sessions—into employees' work schedules ensures continuous skill development without significant disruptions. By strategically managing resources, businesses can overcome constraints and achieve their upskilling goals effectively. budgets and time can hinder training initiatives. Businesses can overcome this by prioritizing critical skills and leveraging cost-effective training methods such as online courses and partnerships with educational institutions.

Keeping up with rapid technological advancements is a perpetual challenge for organizations. Emerging technologies such as artificial intelligence, blockchain, and the Internet of Things (IoT) evolve at an unprecedented pace, creating a dynamic environment that requires continuous adaptation. For organizations to remain competitive, they must frequently revise and update their digital skills training programs to align with the latest technological trends.

Establishing strategic partnerships with technology providers and educational institutions is a key strategy. These partnerships ensure access to cutting-edge tools and resources while fostering a culture of innovation. Additionally, adopting flexible training methods, such as modular e-learning systems, enables employees to quickly learn and implement new technologies as they emerge.

Organizations must also anticipate future trends by analyzing industry forecasts and investing in skills that will be in high demand. For example, cybersecurity, AI ethics, and advanced data analytics are areas projected to grow significantly in importance. By proactively aligning training programs with these advancements, businesses not only equip their workforce for current challenges but also position themselves as leaders in the digital economy. The rapid evolution of technology necessitates ongoing updates to training programs. Establishing partnerships with tech providers ensures access to the latest tools and resources.

The following table organizes the main challenges in digital professional development and their corresponding solutions (Table 3.7).

Addressing these challenges requires a strategic and holistic approach. By prioritizing key issues, leveraging modern tools, and aligning initiatives with business goals, organizations can overcome barriers and ensure effective digital professional development.

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**Table 3.7. Main problems and solutions in digital professional development**

| Problem | Description | Solution |
|---|---|---|
| Resistance to Change | Employees may fear new technologies or feel overwhelmed by the need to learn new skills. | Clear communication about benefits, supportive learning environments, and leadership endorsement. |
| Resource Constraints | Limited budgets and time hinder the implementation of extensive training programs. | Prioritize critical skills, utilize cost-effective online platforms, and leverage partnerships or government grants. |
| Keeping Pace with Technological Advancements | Rapid evolution of technologies makes existing skills obsolete quickly. | Regularly update training content, establish partnerships with tech providers, and invest in predictive skill forecasting. |
| Inconsistent Access to Training Resources | Employees in remote or underserved areas may lack access to modern learning tools. | Implement cloud-based learning platforms, provide remote access, and create mobile-friendly training solutions. |
| Lack of Alignment with Business Goals | Training programs may not address the specific needs of the organization or its strategic objectives. | Conduct skills gap analyses and align training initiatives with organizational goals and future market demands. |
| Low Engagement in Training Programs | Employees may not find training relevant or engaging. | Personalize training with AI-driven platforms, incorporate gamification, and provide incentives for completion. |
| Difficulty Measuring Training Outcomes | Organizations struggle to assess the impact of training on performance and business outcomes. | Use analytics tools to track progress, gather feedback, and establish KPIs to evaluate the effectiveness of training programs. |

*Soures: developed by authors*

In the era of artificial intelligence and digital transformation, businesses can enhance their reputation by focusing on the following key directions (Table 3.8).

By implementing these directions, businesses not only enhance employee capabilities but also solidify their reputation as forward-thinking, trustworthy, and innovative organizations in the digital age.

The research identifies several promising directions for future studies to expand knowledge and address challenges in digital skills development within the context of digital transformation and business resilience:

1. *Quantitative impact of digital skills initiatives.* Future research could focus on measuring the quantitative effects of digital skills programs on organizational performance, such as revenue growth, operational efficiency, and

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market competitiveness. Detailed longitudinal studies could track the return on investment (ROI) for upskilling initiatives across industries.

2. *Long-term effects of continuous learning cultures***.** Studies could investigate how cultivating a culture of continuous learning influences organizational adaptability, innovation, and employee retention over the long term. This research could provide insights into sustaining competitive advantages in dynamic markets.

3. *Integration of emerging technologies in workforce development*. The role of advanced technologies, such as quantum computing, blockchain, and augmented reality, in shaping future workforce requirements deserves further exploration. Future studies could examine how these technologies redefine skill needs and impact workforce strategies.

4. *Industry-specific analysis of digital skills gaps*. Research could provide in-depth analysis tailored to specific industries, such as healthcare, retail, and manufacturing, focusing on how digital skills requirements vary and how targeted upskilling programs can bridge the gap effectively.

5. *Ethical implications of ai in workforce transformation*. With the increasing use of AI in workplace transformation, future research could explore ethical considerations, including data privacy, algorithmic bias, and the impact of AI-driven decisions on employee trust and engagement.

6. *Global comparisons of digital skills development*. Comparative studies between regions and countries could highlight best practices and identify policy interventions to promote digital inclusion and reduce skill disparities across the globe.

7. *Personalization in learning platforms*. Research could investigate the effectiveness of AI-driven personalized learning platforms in enhancing skill acquisition and retention, especially for large, diverse workforces.

8. *Digital skills for stakeholder engagement*. Studies could examine how digital upskilling enhances stakeholder trust, customer satisfaction, and investor confidence, thereby improving business reputation.

9. *Resilience through digital skills in crisis situations*. Research could focus on the role of digital skills in fostering organizational resilience during crises, such as economic downturns or pandemics, and how they contribute to recovery efforts.

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10. *Evaluation metrics for digital skills programs*. Future studies could develop and standardize evaluation frameworks for assessing the effectiveness of digital skills programs, incorporating metrics such as knowledge application, business outcomes, and employee satisfaction.

**Table 3.8. Main directions for improving business reputation through digital skills development**

| Direction | Description |
|---|---|
| Strategic Alignment of Training Programs | Ensure digital upskilling initiatives align with organizational goals and address specific industry challenges. |
| Investment in Emerging Technologies Training | Develop employee expertise in cutting-edge technologies like AI, blockchain, and IoT to position the organization as innovative. |
| Cultivation of a Learning Culture | Foster an environment where continuous learning is encouraged and supported, reinforcing adaptability and growth. |
| Personalization of Training | Use AI-driven platforms to tailor learning experiences to individual employee needs and career aspirations. |
| Focus on Cybersecurity Skills | Prioritize cybersecurity training to enhance trust among customers and stakeholders by protecting data integrity. |
| Promotion of Collaborative Learning | Encourage knowledge sharing through peer-to-peer learning and cross-departmental projects to strengthen teamwork and innovation. |
| Showcasing Employee Development | Highlight training achievements in media and social platforms to enhance brand visibility and attract top talent. |
| Engagement with Educational Partnerships | Collaborate with universities, tech providers, and training organizations to ensure access to the latest knowledge and tools. |
| Incorporation of Feedback Mechanisms | Regularly collect and act on employee and stakeholder feedback to refine training initiatives and demonstrate responsiveness. |
| Recognition and Certification Programs | Provide certifications for completed training programs to boost employee morale and signal organizational excellence. |

*Soures: developed by authors*

These future research directions will not only address existing knowledge gaps but also provide actionable insights to policymakers, educators, and business leaders striving to navigate the challenges of the digital age.

**Conclusions.** The digital transformation of financial education has become an imperative in the rapidly evolving financial sector. This monograph has explored the critical role of digital skills in shaping the professional competencies of financial specialists. The integration of artificial intelligence, blockchain, big data analytics, and cybersecurity into financial processes demands continuous adaptation and learning. As technological advancements accelerate, the need for

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upskilling and reskilling financial professionals becomes more pressing than ever.

The research highlights several key challenges, including the rapid pace of technological change, the persistent skills gap, and resistance to digital transformation within traditional financial institutions. These obstacles must be addressed through targeted training programs, corporate partnerships, and policy interventions that foster a culture of continuous learning.

Despite these challenges, the opportunities for digital skills development in the financial sector are vast. The adoption of fintech innovations, immersive training tools such as virtual reality (VR) and augmented reality (AR), and AI-driven personalized learning platforms can revolutionize the way financial professionals acquire and refine their digital competencies. Furthermore, regulatory technology (RegTech) has the potential to streamline compliance processes, reducing complexity while enhancing transparency and efficiency.

As financial services continue to integrate emerging technologies, professionals must cultivate a balance between technical proficiency and strategic, analytical, and ethical decision-making. The evolution of financial education must align with industry demands, ensuring that professionals are equipped to navigate the complexities of a digital-first economy.

Ultimately, the ability of financial professionals to adapt to digital advancements will determine their competitiveness and success in the global market. This monograph underscores the importance of fostering a resilient and agile workforce, capable of leveraging technology to drive financial innovation, enhance decision-making, and contribute to economic growth. By embracing digital transformation, financial professionals and institutions can position themselves at the forefront of a technologically driven financial landscape.

**References:**

1. Adobe. (2020). *Adobe Learning Fund: Supporting workforce training and innovation*. Retrieved from https://www.adobe.com
2. Bessen, J. (2015). *Learning by doing: The real connection between innovation, wages, and wealth*. Yale University Press.
3. Boden, M. A. (2016). AI: Its nature and future. *Oxford University Press*.
4. Brynjolfsson, E., & McAfee, A. (2017). *Machine, platform, crowd: Harnessing our digital future*. W.W. Norton & Company.
5. Bughin, J., Hazan, E., Ramaswamy, S., Chui, M., Allas, T., Dahlström, P., ... & Trench, M. (2018). Skill shift: Automation and the future of the workforce. McKinsey Global Institute.
6. Cascio, W. F., & Montealegre, R. (2016). How technology is changing work and organizations. *Annual Review of Organizational Psychology and Organizational Behavior*, *3*(1), 349-375.
7. Chui, M., Manyika, J., & Miremadi, M. (2018). AI and automation: How they work together. *McKinsey*

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

*Quarterly*. Retrieved from https://www.mckinsey.com
8. Freeman, R. E., Harrison, J. S., & Wicks, A. C. (2010). *Stakeholder theory: The state of the art*. Cambridge University Press.
9. Henriette, E., Feki, M., & Boughzala, I. (2015). The shape of digital transformation: A systematic literature review. *MCIS 2015 Proceedings*. Retrieved from https://aisel.aisnet.org/mcis2015/10
10. Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of Marketing, 80*(6), 69-96.
11. LinkedIn Learning. (2020). Workforce learning report. Retrieved from https://learning.linkedin.com/
12. Noe, R. A., & Kodwani, A. D. (2018). *Employee training and development*. McGraw-Hill Education.
13. Pantano, E., & Viassone, M. (2015). Engaging consumers on new integrated multichannel retail settings: Challenges for retailers. *Journal of Retailing and Consumer Services, 25*, 106-114.
14. Schilling, M. A. (2013). *Strategic management of technological innovation*. McGraw-Hill Education.
15. Tidd, J., & Bessant, J. R. (2020). *Managing innovation: Integrating technological, market and organizational change* (6th ed.). Wiley.
16. Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems, 28*(2), 118-144.

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*Monograph dedicated to the 5th anniversary*
*of Scientific Center of Innovative Research's activities*

# Chapter 3.3. Integrating Digital Skills into Human Capital Management: Optimizing HR Auditing in the Era of Artificial Intelligence

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***Abstract.*** *This article explores the integration of digital skills into Human Capital Management (HCM), with a specific focus on optimizing personnel auditing in the era of Artificial Intelligence (AI). The purpose of the study is to examine how digital competencies, combined with advanced technologies, transform traditional HR practices into dynamic, data-driven processes that enhance organizational efficiency, strategic decision-making, and workforce optimization. By analyzing the evolution of personnel auditing, the study highlights the shift from manual, compliance-focused methods to AI-enhanced approaches that offer predictive insights, real-time data analysis, and automation. The research methodology employed is qualitative, based on systematic analysis of current practices, technological developments, and strategic HR frameworks. Through a comprehensive evaluation of digital tools, AI-driven systems, and HR Information Systems (HRIS), the study identifies key areas where digital skills are integrated, such as data analytics, talent acquisition, performance management, and change management. Comparative analysis is also utilized to contrast the benefits of traditional digital skills with those of AI-enhanced capabilities in HR auditing and business processes. The findings reveal that digital skills significantly improve the efficiency and accuracy of personnel audits, supporting evidence-based decision-making and proactive risk management. AI-driven technologies amplify these benefits by enabling predictive analytics, continuous monitoring, and real-time compliance tracking. Organizations that embrace digital transformation achieve greater agility, resilience, and strategic alignment, fostering a culture of continuous improvement and innovation. The study concludes that while digital skills are essential for modern HR practices, the integration of AI elevates these functions to a strategic level, driving sustainable growth and competitive advantage. However, challenges such as resistance to change, skill gaps, and data security concerns remain critical barriers. Future research should focus on developing frameworks for effective change management, continuous digital upskilling, and ethical considerations in AI-driven HR practices. This will ensure that organizations can fully leverage the transformative potential of digital skills and AI in Human Capital Management.*

***Keywords:*** *Human Capital Management, digital skills, personnel auditing, artificial intelligence, data analytics, automation, predictive analytics, workforce optimization, HR technology, change management.*

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**1. Evolution of HR Auditing.** The concept of personnel auditing has evolved significantly over the decades, reflecting broader changes in organizational management practices and technological advancements. Initially rooted in traditional administrative functions, early personnel audits primarily focused on compliance, policy adherence, and basic record-keeping. These audits were largely manual, time-consuming, and limited in scope, aimed at ensuring procedural consistency and legal compliance.

In the 1980s and 1990s, as organizations began to recognize the strategic value of human resources, personnel audits expanded to include performance management, employee relations, and organizational development. This period marked a shift from purely administrative reviews to more comprehensive evaluations of HR effectiveness, efficiency, and contribution to business goals. Scholars like Ulrich (1997) and Becker et al. (2001) emphasized the strategic role of HR in driving organizational performance, advocating for audits that assess not just compliance but also value creation.

The advent of digital technologies in the early 2000s introduced a new dimension to personnel auditing. The integration of HR Information Systems (HRIS) allowed for more sophisticated data collection, analysis, and reporting, enhancing the accuracy and breadth of audits. This digital transformation enabled organizations to move from reactive audits to proactive, predictive assessments that identify trends, forecast workforce needs, and support strategic decision-making.

With the rise of Artificial Intelligence and advanced analytics in recent years, personnel auditing has entered a new era. AI-driven tools and techniques offer unprecedented capabilities for data analysis, pattern recognition, and predictive modeling. Studies by Minbaeva (2017) and Marler & Boudreau (2017) highlight how AI enhances audit processes by providing deeper insights into employee performance, engagement, and potential risks. These technologies enable continuous auditing practices, where real-time data is analyzed to support dynamic, evidence-based HR strategies.

The evolution of HR auditing reflects a broader trend towards data-driven, strategic human capital management. As organizations continue to navigate the complexities of the digital age, the integration of advanced technologies into personnel audits will remain a critical factor in enhancing workforce optimization and organizational resilience.

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*Evolution of Tools for HR Auditing.* The tools used for HR auditing have evolved in parallel with broader technological advancements and shifts in human resource management practices. Initially, personnel audits relied heavily on manual processes, with tools limited to basic checklists, paper-based records, and rudimentary spreadsheets. These tools were primarily designed for administrative tasks, focusing on compliance verification, record accuracy, and policy adherence.

In the 1980s and 1990s, the introduction of desktop computing and early HR software applications marked the first significant evolution in personnel auditing tools. Software like Lotus 1-2-3 and early versions of Microsoft Excel enabled more efficient data management and basic analytical functions. HR departments began using digital databases to store employee information, track performance metrics, and generate standardized reports, improving audit efficiency and accuracy.

The development of specialized Human Resource Information Systems (HRIS) in the late 1990s and early 2000s revolutionized personnel auditing. HRIS platforms integrated various HR functions—such as recruitment, payroll, performance management, and employee relations—into a centralized system. This integration facilitated more comprehensive audits, enabling HR professionals to analyze diverse data sets, identify trends, and generate detailed reports with greater ease and precision.

The advent of cloud computing and Software-as-a-Service (SaaS) models in the 2010s further enhanced the capabilities of personnel auditing tools. Cloud-based HR platforms like Workday, SAP SuccessFactors, and Oracle HCM provided real-time data access, advanced analytics, and mobile capabilities. These tools supported dynamic auditing processes, allowing organizations to conduct continuous audits, monitor key performance indicators (KPIs), and respond swiftly to emerging issues.

In recent years, the integration of Artificial Intelligence (AI) and advanced analytics has transformed personnel auditing tools into powerful decision-support systems. AI-driven platforms leverage machine learning algorithms, natural language processing, and predictive analytics to provide deeper insights into workforce dynamics. Tools like IBM Watson Talent and Visier People Analytics enable automated data analysis, identify patterns and anomalies, and offer predictive models to forecast workforce trends and potential risks.

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Additionally, the use of data visualization tools such as Tableau and Power BI has become integral to modern personnel audits. These tools allow HR professionals to create interactive dashboards, visualize complex data sets, and communicate audit findings effectively to stakeholders.

As organizations continue to embrace digital transformation, the evolution of personnel auditing tools reflects a broader shift towards data-driven, agile, and strategic human capital management practices. The integration of advanced technologies into auditing processes not only enhances efficiency and accuracy but also empowers organizations to make more informed, evidence-based decisions.

*Skills Required for Conducting HR Auditing.* To effectively conduct personnel audits in today's dynamic business environment, Human Resources (HR) professionals require a diverse set of skills that span technical, analytical, and interpersonal domains. These skills enable HR professionals to navigate complex data, ensure compliance, and provide strategic insights that drive organizational success.

**Table 3.9. Key skills required for conducting HR auditing**

| Skill | Description |
|---|---|
| Analytical and Critical Thinking Skills | Ability to interpret data, identify trends, and draw meaningful conclusions. |
| Technical Proficiency | Proficiency with HRIS, data analytics software, and AI-driven auditing tools. |
| Knowledge of Employment Laws and Regulations | Understanding of labor laws, regulations, and organizational policies for compliance. |
| Attention to Detail | Meticulous attention to detail to ensure data accuracy and integrity. |
| Communication and Interpersonal Skills | Effective communication and collaboration with stakeholders across departments. |
| Problem-Solving Abilities | Identifying issues and developing practical, strategic solutions. |
| Ethical Judgment and Integrity | Handling sensitive information responsibly with objectivity and integrity. |
| Project Management Skills | Planning, organizing, and coordinating audit activities efficiently. |
| Adaptability and Continuous Learning | Adaptability to technological changes and commitment to continuous learning. |

*Source: developed by the author*

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By cultivating these skills, HR professionals can conduct thorough, accurate, and strategic personnel audits that support organizational goals and drive continuous improvement.

**2. Digital skills in human capital management.** The intersection of digital skills and Human Capital Management has garnered significant scholarly attention, particularly in the context of leveraging Artificial Intelligence for optimizing personnel audits. Early studies by Davenport and Harris (2007) highlighted the potential of analytics in transforming HR functions, laying the groundwork for data-driven decision-making in talent management. Their work emphasized the role of predictive analytics in identifying workforce trends and enhancing strategic HR planning.

More recent research by Bessen (2019) explores the impact of AI and automation on workforce dynamics, suggesting that digital competencies are critical for both employees and HR professionals to navigate the evolving job landscape. This is echoed by Brynjolfsson and McAfee (2014), who argue that digital technologies are not merely tools but fundamental drivers of organizational change, necessitating a redefinition of skills and competencies within HCM frameworks.

In the realm of personnel audits, scholars such as Becker, Huselid, and Ulrich (2001) have emphasized the importance of strategic HR metrics in evaluating employee performance and organizational effectiveness. The advent of AI has expanded this perspective, with studies like those of Minbaeva (2017) and Marler & Boudreau (2017) demonstrating how AI-driven tools can enhance the objectivity, reliability, and comprehensiveness of personnel audits.

Furthermore, literature on digital transformation, including works by Westerman, Bonnet, and McAfee (2014), underscores the necessity of integrating digital skills across all organizational levels. This body of research advocates for continuous learning ecosystems that support upskilling and reskilling initiatives, aligning with the demands of a digital-first business environment.

In today's rapidly evolving business landscape, digital skills have become a cornerstone of Human Capital Management (HCM). The integration of digital competencies within HCM is not merely an option but a necessity for organizations aiming to remain competitive, innovative, and agile. As technologies like Artificial Intelligence (AI), machine learning, big data

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analytics, and cloud computing continue to transform industries, the demand for a digitally skilled workforce grows exponentially.

Digital skills enable HR professionals to collect, analyze, and interpret vast amounts of data. This facilitates data-driven decision-making processes, allowing for more accurate forecasting, trend analysis, and strategic workforce planning. By leveraging advanced data analytics tools, HR can identify performance gaps, predict employee turnover, optimize resource allocation, and tailor HR policies to meet organizational objectives. This strategic use of data ensures decisions are based on factual insights rather than intuition.

Advanced digital tools, including AI-powered applicant tracking systems, automate the recruitment process. Digital platforms also enhance candidate experience through streamlined application processes and virtual interviews. AI algorithms can analyze resumes, screen candidates based on specific criteria, and even predict cultural fit, significantly reducing the time-to-hire. Additionally, social media recruiting and online job portals expand the talent pool, enabling organizations to attract top talent globally.

Digital platforms support real-time performance tracking, goal setting, and continuous feedback. Tools like performance dashboards and analytics software provide insights into employee productivity and engagement. These platforms facilitate transparent performance reviews, allowing managers and employees to set measurable goals, monitor progress, and provide constructive feedback regularly. Data-driven performance management promotes accountability, enhances employee motivation, and supports a culture of continuous improvement.

E-learning platforms and Learning Management Systems (LMS) have revolutionized employee development. Digital tools offer personalized learning experiences, track progress, and identify skill gaps. Adaptive learning technologies can customize content to match individual learning styles and paces, ensuring more effective knowledge retention. Additionally, virtual reality (VR) and augmented reality (AR) are increasingly used for immersive training experiences, particularly in technical and high-risk fields.

Digital communication tools, such as collaboration software and employee engagement apps, foster connectivity and enhance workplace culture, especially in remote and hybrid work environments. Platforms like Slack, Microsoft Teams, and employee intranets facilitate real-time communication, collaboration, and

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information sharing. Engagement tools, such as pulse surveys and feedback apps, help HR gauge employee satisfaction, identify areas of concern, and implement initiatives to boost morale and productivity.

Robotic Process Automation (RPA) reduces the administrative burden by automating repetitive HR tasks like payroll processing, compliance tracking, and benefits administration. Automation ensures accuracy, efficiency, and compliance with regulatory requirements, freeing HR professionals to focus on strategic initiatives. Workflow automation also improves onboarding processes, employee record management, and time-off requests, enhancing overall HR service delivery.

AI-driven analytics tools improve the efficiency and accuracy of personnel audits. These tools help identify compliance risks, performance issues, and potential areas for improvement. Digital auditing platforms enable continuous monitoring of HR practices, ensuring alignment with organizational policies and legal regulations. Advanced analytics can detect patterns indicative of fraud, bias, or inefficiencies, providing actionable insights for corrective measures and strategic HR planning.

The study systematizes the main roles of digital skills in human capital management (HCM) and presents them in Table 3.10.

**Table 3.10. The main roles of digital skills in human capital management**

| Role of Digital Skills | Description |
|---|---|
| Data-Driven Decision Making | Enables HR professionals to collect, analyze, and interpret data for strategic decision-making. |
| Talent Acquisition and Recruitment | Streamlines recruitment through AI-powered tools, enhancing candidate experience and selection processes. |
| Performance Management | Supports real-time performance tracking, goal setting, and continuous feedback mechanisms. |
| Learning and Development (L&D) | Facilitates continuous employee development through e-learning platforms and personalized learning paths. |
| Employee Engagement | Enhances workplace culture and connectivity using digital communication tools, especially in remote environments. |
| Automation of HR Processes | Automates repetitive HR tasks, reducing administrative burdens and improving efficiency. |
| Advanced Personnel Auditing | Improves efficiency and accuracy of personnel audits using AI-driven analytics tools. |

*Source: developed by the author*

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The integration of digital skills into Human Capital Management is critical for modern organizations. It enhances efficiency, supports strategic decision-making, and fosters a dynamic, agile workforce. By embracing digital transformation, organizations can better manage their human capital and thrive in an increasingly digital economy.

***Challenges in integrating digital skills into human capital management.*** The integration of digital skills into Human Capital Management (HCM) is essential for modern organizations striving for efficiency, innovation, and competitiveness. However, this integration comes with its own set of challenges that can hinder progress if not addressed effectively. Understanding these challenges is crucial for developing strategies that ensure a smooth transition to a digitally empowered workforce.

Based on the research conducted, challenges in integrating digital skills into human capital management were systematized (Table 3.11).

**Table 3.11. The main challenges in integrating digital skills into human capital management**

| Challenge | Description |
|---|---|
| Resistance to change | Employee reluctance, cultural barriers to adopting new technologies. |
| Skill gaps and digital literacy | Lack of basic digital skills, rapid technological advancements creating persistent skill gaps. |
| Inadequate training and development | Insufficient training programs, one-size-fits-all approaches ineffective for diverse learning needs. |
| Resource constraints | Limited budgets, inadequate technological infrastructure hindering digital tool integration. |
| Data privacy and security concerns | Security risks with managing sensitive data, compliance challenges with data protection regulations. |
| Leadership and strategic alignment | Lack of vision and strategic alignment with business goals affecting digital initiatives. |
| Change management issues | Poor communication and ineffective change management strategies leading to low adoption rates. |

*Source: developed by the author*

*The main ones are the following:*

1. *Resistance to change* - many employees may resist adopting new technologies due to fear of job displacement, lack of confidence, or unfamiliarity with digital tools. This fear often stems from a lack of understanding of how digital skills can enhance rather than replace their roles. Organizational cultures

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that are deeply rooted in traditional practices can be slow to embrace digital transformation. Resistance can be particularly strong in companies with hierarchical structures where decision-making is centralized, limiting the openness to new technologies.

2. *Skill gaps and digital literacy* - a significant portion of the workforce may lack foundational digital competencies, making it difficult to leverage advanced technologies effectively. This gap is often more pronounced among older employees who may not have been exposed to digital tools early in their careers. The fast pace of technological change can outstrip employees' ability to keep up, creating persistent skill gaps. Organizations struggle to provide timely training to match the speed at which new technologies are adopted.

3. *Inadequate training and development* - organizations may not invest adequately in continuous learning initiatives to develop digital competencies. Budget constraints and competing priorities often result in underfunded training programs. Training programs that do not cater to diverse learning needs and levels of digital literacy can be ineffective. Personalized learning pathways are essential to address the unique requirements of different employee groups.

4. *Resource constraints* - smaller organizations may struggle to allocate sufficient financial resources for digital transformation initiatives. Budgetary limitations can affect the quality of digital tools, training programs, and support services. Inadequate technological infrastructure can impede the integration of digital tools in HR processes. This includes outdated hardware, insufficient bandwidth, and lack of access to modern software solutions.

*5. Data privacy and security concerns* - managing sensitive employee data digitally increases the risk of data breaches and cyber threats. Organizations must implement robust cybersecurity measures to protect against potential vulnerabilities. Ensuring compliance with data protection regulations, such as GDPR, adds complexity to digital HR practices. Organizations must navigate varying legal requirements across different jurisdictions, which can be resource-intensive.

*6. Leadership and strategic alignment* - without strong leadership commitment and a clear digital strategy, integration efforts can lack direction and purpose. Leaders play a critical role in championing digital initiatives and driving cultural change. Digital initiatives that are not aligned with broader organizational

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objectives may fail to deliver expected outcomes. It's essential for digital strategies to support the company's long-term vision and operational priorities.

7. *Change management issues* - inadequate communication about the benefits and purpose of digital transformation can lead to misunderstandings and resistance. Transparent, consistent messaging is crucial to build trust and acceptance. Failing to manage the human side of change can result in low adoption rates and project failures. Successful change management requires proactive planning, stakeholder engagement, and continuous feedback loops.

Integrating digital skills into Human Capital Management is a complex process fraught with challenges. However, by recognizing these obstacles and proactively addressing them, organizations can successfully navigate the digital transformation journey. Embracing digital competencies not only enhances HR functions but also drives overall organizational growth and resilience in an increasingly digital world.

***Strategies to overcome challenges in integrating digital skills into human capital management.*** The integration of digital skills into Human Capital Management (HCM) presents numerous challenges, including resistance to change, skill gaps, resource constraints, and data security concerns. However, these challenges can be effectively managed with well-planned strategies that promote digital adoption, enhance workforce capabilities, and align with organizational goals. This document outlines key strategies to overcome these obstacles and facilitate successful digital transformation within HCM.

*The main ones are the following:*

1. *Foster a culture of continuous learning.* Implement ongoing training programs that focus on both basic and advanced digital skills. Encouraging digital literacy across all organizational levels ensures that employees feel confident using new technologies. Customize learning experiences to meet the diverse needs of employees at different digital proficiency levels. This includes offering beginner, intermediate, and advanced modules to cater to varied skill sets. Provide access to online learning platforms and resources that empower employees to take ownership of their development. Gamification techniques can enhance engagement and motivation for self-paced learning.

2. *Engage leadership and secure commitment.* Ensure top management actively supports digital transformation initiatives. Leaders should articulate a clear vision and demonstrate how digital integration aligns with the company’s

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strategic goals. Leaders should demonstrate digital competencies and promote the value of digital tools in day-to-day operations. This sets an example and fosters a culture of digital acceptance and enthusiasm. Integrate digital strategies with the overall business objectives to create a cohesive transformation roadmap. This alignment ensures that digital initiatives contribute to long-term organizational growth.

3. *Implement effective change management.* Articulate the vision, benefits, and expected outcomes of digital initiatives to all stakeholders. Transparent communication reduces uncertainty and builds trust throughout the transformation process. Involve employees early in the change process to gain their input, address concerns, and foster ownership. Engaging employees as change champions can help influence peers and increase adoption rates. Establish change champions and support networks to guide employees through transitions. Providing mentorship programs and peer support groups can ease the learning curve associated with new technologies.

4. *Invest in resources and infrastructure.* Allocate sufficient budgets for acquiring and maintaining digital tools and infrastructure. Regularly updating hardware and software ensures compatibility with evolving technologies. Ensure adequate human and technical resources are in place to support digital initiatives. Dedicated IT support teams can troubleshoot issues and provide real-time assistance. Choose technologies that can grow with the organization’s evolving needs. Cloud-based platforms offer flexibility, scalability, and cost-efficiency, making them ideal for dynamic business environments.

5. *Develop comprehensive training programs.* Combine classroom training, e-learning, workshops, and hands-on experiences for effective learning. Interactive formats, such as simulations and role-playing, can enhance practical understanding. Use short, focused training sessions to improve knowledge retention and engagement. Microlearning allows employees to absorb information quickly and apply it immediately in their roles. Continuously evaluate digital competencies to identify gaps and tailor training accordingly. Feedback from assessments helps refine training programs to meet evolving needs.

*6. Prioritize data privacy and security.* Implement advanced cybersecurity protocols to protect sensitive employee and organizational data. This includes multi-factor authentication, encryption, and regular security audits. Educate

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employees on data protection regulations and best practices to ensure legal compliance. Regular updates on regulatory changes keep the workforce informed and vigilant. Develop strategies for quick and effective responses to data breaches or security threats. A well-defined response plan minimizes the impact of security incidents and maintains stakeholder trust.

*7. Encourage collaboration and knowledge sharing.* Utilize platforms that facilitate communication, project management, and knowledge sharing. Tools like Slack, Microsoft Teams, and Trello enhance teamwork, especially in remote or hybrid settings. Create forums where employees can exchange ideas, experiences, and best practices related to digital tools. These communities foster a learning culture and continuous improvement. Foster collaboration between HR, IT, and other departments to drive digital initiatives. Cross-functional teams bring diverse perspectives and expertise, leading to more innovative solutions.

*8. Measure and evaluate progress.* Establish metrics to track the success of digital integration efforts. KPIs may include adoption rates, productivity improvements, and employee satisfaction levels. Regularly gather feedback from employees to understand their experiences and identify areas for improvement. Surveys, focus groups, and one-on-one interviews provide valuable insights. Use insights from evaluations to refine strategies and ensure ongoing progress. Agile methodologies allow for iterative improvements and quick adjustments based on feedback.

Based on the research conducted, strategies to overcome challenges in integrating digital skills into human capital management were systematized (Table 3.12).

Overcoming the challenges of integrating digital skills into Human Capital Management requires a multifaceted approach that combines leadership support, continuous learning, strategic investments, and effective change management. By implementing these strategies, organizations can build a digitally proficient workforce, enhance HR functions, and achieve sustainable growth in the digital era.

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**Table 3.12. Tne main strategies to overcome challenges in integrating digital skills into human capital management**

| Strategy | Description |
|---|---|
| Foster a Culture of Continuous Learning | Promote digital literacy, tailor learning paths to diverse needs, and encourage self-directed learning through online platforms and gamification. |
| Engage Leadership and Secure Commitment | Ensure leadership buy-in with clear vision alignment, role modeling digital competencies, and integrating digital strategies with business goals. |
| Implement Effective Change Management | Communicate transparently, involve stakeholders early, and establish support systems like mentorship programs and change champions. |
| Invest in Resources and Infrastructure | Allocate sufficient budgets, invest in scalable technologies, and ensure dedicated IT support for maintaining digital tools and infrastructure. |
| Develop Comprehensive Training Programs | Use blended learning approaches, implement microlearning modules, and regularly assess digital skills to tailor training programs effectively. |
| Prioritize Data Privacy and Security | Implement robust cybersecurity measures, provide compliance training on data protection laws, and develop incident response plans for quick action. |
| Encourage Collaboration and Knowledge Sharing | Utilize digital collaboration tools, create communities of practice for knowledge sharing, and encourage cross-functional teamwork for innovation. |
| Measure and Evaluate Progress | Set clear KPIs to track progress, gather continuous feedback from employees, and apply agile methodologies for iterative improvements. |

*Source: developed by the author*

***Integrating digital skills into human capital management in the age of artificial intelligence.*** In the rapidly evolving landscape of the 21st century, digital transformation has become a cornerstone of organizational success. The advent of Artificial Intelligence (AI) and advanced digital technologies has fundamentally reshaped how businesses operate, compelling leaders to rethink traditional strategies across all domains. One of the most critical areas influenced by this paradigm shift is Human Capital Management (HCM), where the integration of digital skills has emerged as both a challenge and an opportunity.

In the age of Artificial Intelligence (AI), Human Capital Management (HCM) is undergoing a transformative shift. The integration of digital skills has become a fundamental requirement for organizations aiming to optimize workforce management, enhance productivity, and maintain a competitive edge. Digital competencies, combined with AI technologies, are redefining traditional

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HR practices, enabling data-driven decision-making, personalized employee experiences, and strategic talent management.

The convergence of digital skills with HCM practices is not merely a trend but a necessity for maintaining competitive advantage, fostering innovation, and driving sustainable growth. As organizations increasingly rely on data-driven decision-making, the need for robust personnel audits that integrate digital skills becomes paramount. This integration enhances the accuracy, efficiency, and strategic value of workforce assessments, enabling organizations to identify talent gaps, optimize resource allocation, and drive performance improvements.

Moreover, in an era characterized by rapid technological advancements, the ability to adapt and evolve is essential for organizational resilience. This research addresses the pressing need for strategies that not only incorporate digital competencies into HCM but also promote continuous learning and adaptability among employees. By optimizing personnel audits through AI and digital tools, organizations can better align their human capital strategies with broader business objectives, ensuring long-term success in an increasingly competitive landscape.

Based on the research conducted, key areas of digital skills integration in HCM (Table 3.13).

**Table 3.13. Key areas of digital skills integration in HCM**

| Key Area | Description |
|---|---|
| Data-Driven Decision Making | Utilizes AI-powered analytics and predictive modeling to support evidence-based HR decisions, optimize recruitment, and manage employee retention. |
| AI-Enhanced Talent Acquisition | Employs AI-driven ATS for streamlined recruitment, candidate screening, and personalized candidate experiences through real-time interactions and data-driven matching. |
| Personalized Learning and Development (L&D) | Integrates adaptive learning systems and skill gap analysis tools to offer personalized training and development aligned with individual and organizational goals. |
| Performance Management and Employee Engagement | Leverages continuous feedback mechanisms and sentiment analysis to track performance in real-time, enhance employee engagement, and foster a culture of continuous improvement. |
| Workforce Planning and Optimization | Uses AI algorithms for strategic workforce planning, demand forecasting, and efficient resource allocation to align with business objectives. |
| Automation of HR Processes | Automates repetitive HR tasks using RPA and enhances employee autonomy through AI-driven self-service portals for managing HR-related activities. |
| Diversity, Equity, and Inclusion (DEI) Initiatives | Applies AI tools for bias detection and diversity analytics to promote equitable HR practices and support data-driven DEI strategies. |
| Change Management and Digital Transformation | Focuses on digital literacy programs and change management strategies to support organizational agility and continuous improvement in digital transformations. |

*Source: developed by the author*

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*The key areas are the following:*

1. *Data-driven decision making.* HR professionals leverage AI-powered analytics tools to collect, analyze, and interpret vast amounts of workforce data. This enables evidence-based decisions related to recruitment, performance management, and employee retention. Tools such as predictive analytics, data mining, and business intelligence platforms allow HR leaders to identify trends, measure employee engagement, and optimize HR strategies based on real-time data. Digital skills are essential for utilizing predictive analytics, which forecasts trends such as employee turnover, productivity levels, and future talent needs, allowing for proactive HR strategies. Predictive models help in risk assessment, succession planning, and identifying high-potential employees for leadership development.

2. *AI-enhanced talent acquisition*. AI-driven Applicant Tracking Systems (ATS) streamline candidate screening, resume parsing, and initial assessments, reducing time-to-hire and improving the quality of hires. AI algorithms can match candidate skills with job requirements more accurately, enhancing the recruitment process's objectivity and efficiency. Digital platforms use AI to personalize candidate interactions, providing real-time updates, chatbots for FAQs, and data-driven job matching. This not only improves the candidate experience but also strengthens the employer brand by ensuring consistent and engaging communication.

3. *Personalized learning and development (L&D).* AI-powered learning management systems (LMS) offer personalized training recommendations based on employee performance data and learning preferences. These systems adapt content delivery to suit individual learning styles, increasing knowledge retention and engagement. Digital tools identify skill gaps within the workforce, enabling targeted development programs that align with both individual and organizational goals. AI-driven platforms can also recommend relevant courses, track learning progress, and assess the effectiveness of training initiatives.

4. *Performance management and employee engagement.* AI facilitates real-time performance tracking and continuous feedback, moving beyond traditional annual reviews to more dynamic, data-driven performance management. Digital platforms enable 360-degree feedback, goal setting, and performance analytics, fostering a culture of continuous improvement. Natural Language Processing (NLP) tools analyze employee feedback from surveys, emails, and other

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communications to gauge engagement levels and identify potential issues. These insights help HR professionals proactively address concerns, improving employee satisfaction and retention.

5. *Workforce planning and optimization.* AI algorithms analyze historical data and market trends to support workforce planning, ensuring the right talent is in place to meet future business needs. This includes scenario planning, demand forecasting, and workforce optimization to align HR strategies with business objectives. Digital skills are vital for optimizing resource management, from automating scheduling to forecasting labor demands based on predictive insights. Advanced tools help allocate resources efficiently, balancing workloads and reducing operational costs.

6. *Automation of HR processes.* RPA automates repetitive administrative tasks such as payroll processing, compliance reporting, and benefits administration, increasing efficiency and reducing errors. This allows HR professionals to focus on strategic initiatives, enhancing overall productivity. AI-driven HR platforms empower employees with self-service options for managing personal information, benefits, and learning resources. These portals improve employee autonomy, reduce administrative burdens, and enhance the overall HR service experience.

7. *Diversity, equity, and inclusion (DEI) initiatives.* AI helps identify and mitigate unconscious bias in recruitment, promotions, and performance evaluations, fostering a more inclusive workplace. Algorithms analyze hiring patterns and performance reviews to detect potential biases, supporting fair and equitable HR practices. Digital tools track and analyze diversity metrics, supporting data-driven DEI strategies and ensuring compliance with equal employment regulations. This data-driven approach helps organizations set measurable DEI goals and track progress over time.

8. *Change management and digital transformation.* Organizations invest in digital upskilling initiatives to ensure HR teams and the broader workforce can effectively use AI-driven tools. Training programs focus on developing technical competencies, data literacy, and digital fluency, preparing employees for the evolving digital landscape. Digital skills enable HR leaders to manage change effectively, guiding organizations through technological transformations and fostering a culture of continuous improvement. This includes change

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management strategies, leadership development, and organizational agility to thrive in dynamic environments.

The integration of digital skills into Human Capital Management, driven by the advancements of Artificial Intelligence, is transforming how organizations manage their workforce. By leveraging AI technologies and fostering digital competencies, businesses can enhance HR efficiency, improve employee experiences, and achieve strategic objectives. In the age of AI, digital skills are not just complementary—they are essential for the future of work.

**3. Optimizing HR auditing through digital skills.** In the rapidly evolving business landscape, Human Resources (HR) auditing has transitioned from traditional, manual processes to dynamic, data-driven methodologies. The integration of digital skills into HR auditing optimizes the accuracy, efficiency, and strategic value of audits, providing organizations with deeper insights into their workforce and compliance practices. This document explores how digital competencies are integrated to enhance HR auditing in the age of technology and data analytics.

Based on the research conducted, areas for integrating digital skills into HR audits were systematized. The key areas are the following:

1. *Data analytics and visualization.* Digital skills in data analytics enable auditors to process and analyze large volumes of HR data using tools like Excel, Power BI, and Tableau. This helps identify trends, anomalies, and compliance gaps that might otherwise go unnoticed. Advanced data modeling techniques, such as regression analysis and correlation matrices, assist in identifying relationships between HR variables, providing a deeper understanding of workforce dynamics. Interactive dashboards provide real-time visualizations of key HR metrics, such as turnover rates, employee engagement, and diversity statistics, facilitating proactive decision-making and continuous monitoring. Dashboards can be customized to highlight key performance indicators (KPIs) relevant to specific audit objectives, enhancing transparency and accountability.

2. *Automation of audit processes.* RPA automates repetitive audit tasks such as data entry, report generation, and compliance checks, reducing human error and increasing audit efficiency. Bots can handle complex calculations, cross-reference data from multiple sources, and generate detailed audit reports in a fraction of the time required by manual processes. Automating audit workflows ensures standardized processes, improves consistency, and accelerates the audit

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cycle, allowing auditors to focus on strategic analysis. Workflow automation tools help manage task assignments, track progress, and ensure timely completion of audit activities.

3. *AI-driven predictive analytics.* AI algorithms analyze historical HR data to predict potential risks, such as compliance violations, employee turnover, or performance issues. Predictive analytics tools can identify early warning signs of fraud, misconduct, or operational inefficiencies, enabling proactive risk mitigation strategies. Machine learning models detect unusual patterns in HR data, flagging potential issues for further investigation and enhancing audit reliability. These models continuously learn from new data inputs, improving their accuracy and effectiveness over time.

4. *Digital document management.* Digital skills are essential for managing electronic HR records securely, ensuring easy access and maintaining audit trails for compliance verification. Document management systems (DMS) enable secure storage, retrieval, and archiving of audit-related documents, supporting regulatory compliance. These systems track changes in documents, helping maintain data integrity and transparency throughout the audit process. Version control ensures that auditors have access to the most up-to-date information, reducing the risk of errors and inconsistencies.

5. *Cloud-based auditing platforms.* Cloud platforms enable auditors to access HR data from anywhere, supporting remote audits and collaboration across global teams. Cloud-based systems offer real-time data synchronization, ensuring that auditors work with the latest information. Cloud solutions handle large datasets efficiently, allowing for real-time data analysis and continuous auditing practices. Cloud platforms also provide scalable storage and computing resources, accommodating the needs of growing organizations.

6. *Cybersecurity and data privacy compliance.* Understanding cybersecurity principles ensures that sensitive employee data is protected during audits, in compliance with regulations like GDPR and HIPAA. Auditors must be proficient in data encryption, secure data transmission, and identity access management (IAM) to safeguard audit information. Implementing encryption, multi-factor authentication, and secure data storage protects audit information from breaches and unauthorized access. Regular security audits and vulnerability assessments help identify and address potential security risks.

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7. *Mobile and remote auditing capabilities.* Digital platforms support mobile access, enabling auditors to collect data, conduct virtual interviews, and submit reports remotely. Mobile auditing tools enhance flexibility, allowing auditors to perform field audits efficiently and in real-time. Tools like Microsoft Teams, Zoom, and Google Workspace facilitate real-time collaboration, document sharing, and communication among audit teams. These tools support virtual meetings, remote audit reviews, and cross-functional collaboration, improving audit efficiency.

The integration of digital skills into HR auditing is a strategic imperative for modern organizations. By leveraging advanced data analytics, automation, AI-driven insights, and secure digital tools, businesses can optimize their auditing processes, ensure regulatory compliance, and drive continuous improvement. In the digital age, proficiency in these technologies is essential for effective HR auditing and strategic human capital management.

***Optimizing personnel auditing through digital skills in the age of artificial intelligence.*** In the age of Artificial Intelligence (AI), personnel auditing has evolved from traditional manual processes to dynamic, data-driven practices. The integration of digital skills into personnel auditing enhances accuracy, efficiency, and strategic insight, enabling organizations to conduct comprehensive audits that align with modern business demands.

*Key areas of digital skills integration in HR auditing in the age of artificial intelligence (Figure 3.3):*

1. *Data analytics and visualization.* Digital skills in data analytics enable auditors to process large datasets using tools like Excel, Power BI, and Tableau, uncovering trends, discrepancies, and patterns in employee performance and HR processes. Advanced statistical techniques, such as regression analysis, cluster analysis, and correlation metrics, help identify key areas requiring attention. Interactive dashboards provide real-time visualizations of audit metrics, such as compliance rates, employee turnover, and performance indicators, facilitating proactive decision-making. These dashboards can be customized to highlight key risk areas, improving visibility and accountability throughout the audit lifecycle.

2. *Automation of audit processes.* RPA automates repetitive audit tasks such as data entry, compliance checks, and report generation, improving efficiency and reducing human error. Automated workflows ensure consistency and standardization across audits, allowing auditors to focus on value-added

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activities. Automating audit workflows ensures consistency, reduces the time required for audits, and enhances the accuracy of audit outcomes. This includes automating document reviews, approval processes, and audit trail generation, which improve the reliability and traceability of audit records.

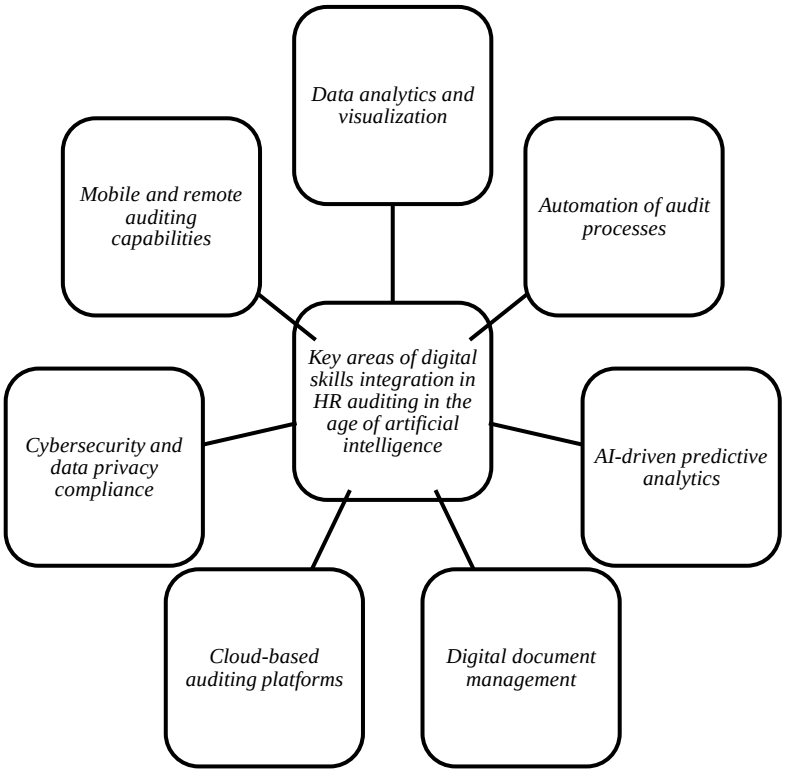


**Figure 3.3. Key areas of digital skills integration in HR auditing in the age of artificial intelligence**

*Source: developed by the author*

3. *AI-driven predictive analytics.* AI algorithms analyze historical data to predict potential compliance risks and workforce issues, enabling auditors to focus on high-risk areas. Predictive models can flag unusual activities, identify potential fraud, and suggest areas requiring deeper investigation. Machine learning models detect unusual patterns in HR data that may indicate fraud, errors, or non-compliance, enhancing the reliability of audit findings. AI continuously learns from data inputs, refining its ability to detect irregularities over time and improving audit accuracy.

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4. *Digital document management.* Digital skills are essential for managing and auditing electronic HR records securely, ensuring quick access to relevant documents during audits. Electronic Document Management Systems (EDMS) support secure storage, retrieval, and version control of audit documentation. Tools that track changes in documents help maintain audit trails, ensuring data integrity and accountability. Version control enhances transparency, allowing auditors to verify document histories and detect unauthorized modifications.

5. *Cloud-based auditing platforms.* Cloud platforms allow auditors to access personnel data from anywhere, supporting remote audits and collaborative auditing practices. Cloud integration facilitates real-time data sharing and enhances the scalability of audit operations across multiple locations. Cloud solutions can handle large volumes of data, making them ideal for audits in large, global organizations. These platforms also offer robust security features, ensuring compliance with data protection regulations while maintaining audit efficiency.

6. *Cybersecurity and data privacy compliance.* Auditors need digital literacy in cybersecurity to ensure sensitive employee data is protected during audits, complying with regulations like GDPR. Understanding encryption protocols, secure data transfer methods, and access control mechanisms is critical for safeguarding audit information. Implementing encryption, secure data storage, and controlled access mechanisms to safeguard audit data. Regular security assessments and penetration testing help identify vulnerabilities and enhance data protection strategies.

7. *Mobile and remote auditing capabilities.* Digital platforms support remote audits, enabling auditors to collect data, conduct virtual interviews, and submit reports via mobile devices. Mobile applications offer real-time data capture, improving audit flexibility and responsiveness. Tools like Microsoft Teams and Zoom facilitate real-time collaboration among audit teams, enhancing efficiency. Virtual whiteboards, shared workspaces, and document co-editing features streamline audit planning and execution.

Integrating digital skills and AI into personnel auditing is a strategic imperative for modern organizations. By leveraging advanced analytics, automation, and secure digital tools, businesses can enhance audit accuracy, improve compliance, and drive continuous improvement. In the age of AI, digital proficiency is not just an advantage—it's essential for effective personnel auditing and strategic HR management.

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***Comparison of digital skills integration in HR auditing and HR auditing with AI.*** The integration of AI into HR auditing represents a paradigm shift from reactive, compliance-focused processes to proactive, predictive, and strategic auditing.

In traditional HR auditing, digital skills primarily focus on basic data analysis and trend identification using conventional tools like Excel and dashboards. However, with AI integration, HR auditing evolves to incorporate advanced predictive analytics, enabling organizations to forecast compliance risks, detect anomalies in real time, and make proactive decisions. This transition significantly enhances the strategic role of audits beyond retrospective reviews.

While traditional digital skills facilitate the automation of repetitive tasks (e.g., data entry, compliance checks), AI-driven automation, especially through Robotic Process Automation (RPA), handles complex auditing processes. AI can perform cognitive tasks, such as anomaly detection and predictive risk assessments, which were previously beyond the scope of basic automation, thereby improving accuracy and efficiency.

Traditional HR auditing relies on periodic risk assessments based on historical data. In contrast, AI-powered auditing supports continuous risk monitoring with real-time insights. AI algorithms identify patterns that could indicate potential compliance issues, fraud, or operational inefficiencies, offering organizations a dynamic and proactive approach to risk management.

Digital document management in conventional HR auditing focuses on secure storage and version control. AI-enhanced auditing systems, however, leverage intelligent data extraction, classification, and automated document analysis. This capability reduces manual effort in reviewing documents and ensures faster, more accurate audits.

Traditional digital auditing tools enable remote audits and data access. However, AI introduces greater agility by dynamically adapting to regulatory changes and emerging risks. AI systems continuously learn from new data inputs, allowing organizations to adjust their audit practices quickly in response to evolving compliance landscapes.

In both traditional and AI-enhanced auditing, data security remains critical. However, AI introduces advanced cybersecurity protocols, including dynamic threat detection, automated risk mitigation, and real-time monitoring of data

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breaches. This enhances the robustness of data privacy compliance efforts compared to standard encryption and secure storage practices in traditional audits.

Traditional auditing tools support remote work, but AI significantly enhances this capability through real-time data collection, virtual collaboration platforms, and mobile auditing tools with embedded AI features. This allows auditors to conduct thorough, real-time audits from anywhere, increasing efficiency and reducing the need for on-site audits.

**Table 3.14. Comparison of digital skills integration in HR auditing and HR auditing with AI**

| Key Areas | HR Auditing Focus | HR Auditing with AI Focus |
|---|---|---|
| Data Analytics and Visualization | Analyzes HR data to identify trends, discrepancies, and compliance issues using traditional data tools. | Leverages AI-powered analytics and advanced data visualization to uncover deeper insights and predictive trends. |
| Automation of Processes | Automates basic audit workflows, data validation, and compliance checks to improve efficiency. | Employs Robotic Process Automation (RPA) to automate complex auditing tasks, enhancing accuracy and consistency. |
| AI-Driven Insights | Utilizes data analysis techniques for risk assessment and anomaly detection, with limited predictive capabilities. | Uses AI for predictive risk assessment, real-time anomaly detection, and advanced forecasting in audit processes. |
| Digital Document Management | Manages electronic HR records securely, maintaining audit trails for compliance verification. | Integrates AI-driven document management systems for intelligent data extraction, classification, and version control. |
| Cloud-Based Platforms | Supports centralized data access and remote auditing capabilities, enhancing audit flexibility. | Utilizes AI-enhanced cloud platforms for real-time data synchronization, scalability, and advanced security features. |
| Cybersecurity and Data Privacy | Ensures data security and compliance with data protection regulations through encryption and secure storage. | Applies AI-based security protocols for dynamic threat detection, automated risk mitigation, and compliance tracking. |
| Mobile and Remote Capabilities | Enables remote audits and virtual collaboration using standard digital tools. | Incorporates AI-enabled mobile auditing tools and virtual platforms for real-time remote audits and data collection. |
| Change Management and Digital Transformation | Focuses on digital literacy and gradual adoption of digital tools to support audit transformation. | Promotes agile change management through AI-driven insights, supporting proactive adaptation to regulatory changes. |

*Source: developed by the author*

While traditional audits promote digital literacy and gradual adoption of technology, AI-driven auditing accelerates digital transformation. AI provides

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insights that guide change management strategies, fostering a culture of continuous improvement and proactive adaptation to technological advancements.

While traditional digital skills improve efficiency and data management, AI enhances decision-making capabilities, risk management, and operational agility. Organizations that embrace AI-driven auditing not only ensure compliance but also gain a competitive advantage through data-driven insights and continuous process improvement.

***Comparison of the benefits of integrating digital skills vs. integrating digital skills with AI in HR auditing and business processes.*** While integrating digital skills into HR auditing and business processes provides significant benefits - such as improved accuracy, efficiency, and compliance - adding AI transforms these benefits exponentially.

**Table 3.15. Comparison of Benefits of Integrating Digital Skills vs Digital Skills and AI in HR Auditing**

| Benefits | Benefits with Digital Skills | Benefits with Digital Skills and AI |
|---|---|---|
| Enhanced Accuracy | Reduces manual errors through automated data processing and validation. | Enhances data accuracy with AI-driven validation and real-time error detection. |
| Increased Efficiency | Automates repetitive tasks, freeing time for strategic audit activities. | Uses AI to automate complex audit processes, increasing speed and consistency. |
| Improved Compliance | Ensures continuous monitoring of compliance with legal and organizational standards. | Employs AI for predictive compliance monitoring and proactive risk mitigation. |
| Data-Driven Insights | Provides insights based on historical data analysis and trend identification. | Generates predictive insights and advanced analytics for strategic planning. |
| Agility and Adaptability | Enables quick adaptation to regulatory changes through digital tools. | Leverages AI for dynamic adjustment to emerging risks and regulatory changes. |
| Cost Reduction | Reduces operational costs by streamlining audit workflows and processes. | Optimizes resource allocation and reduces costs through intelligent automation. |
| Improved Risk Management | Enhances risk identification through data analysis and periodic audits. | Utilizes AI models for continuous risk assessment and real-time anomaly detection. |
| Enhanced Transparency | Improves audit documentation and reporting transparency. | Provides real-time, AI-enhanced audit trails for superior transparency and accountability. |
| Strategic Business Growth | Supports data-driven decision-making aligned with business strategies. | Drives innovation and growth through predictive analytics and AI-driven business insights. |

*Source: developed by the author*

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AI shifts organizations from reactive management to proactive, predictive, and prescriptive strategies. It enhances decision-making, optimizes resource allocation, and provides real-time insights that drive innovation and strategic growth. Organizations leveraging AI alongside digital skills gain a competitive edge by becoming more agile, resilient, and future-ready.

**Conclusion.** The integration of digital skills into Human Capital Management (HCM) and personnel auditing represents a pivotal shift in how organizations manage, evaluate, and optimize their workforce. This transformation is driven by rapid advancements in technology, particularly the rise of Artificial Intelligence (AI), data analytics, and automation. The evolution of personnel auditing - from manual, compliance-focused tasks to dynamic, data-driven processes - highlights the growing importance of digital competencies in enhancing accuracy, efficiency, and strategic decision-making.

Throughout this study, it has become evident that digital skills play a critical role in optimizing various HR functions, including talent acquisition, performance management, learning and development, and employee engagement. The ability to collect, analyze, and interpret large datasets enables HR professionals to make data-driven decisions, forecast workforce trends, and implement targeted strategies that align with organizational goals. Additionally, AI-driven tools enhance the objectivity and comprehensiveness of personnel audits, providing real-time insights that support proactive risk management and continuous improvement.

However, the integration of digital skills is not without its challenges. Organizations face barriers such as resistance to change, skill gaps, inadequate training programs, and concerns about data privacy and security. Addressing these challenges requires a multifaceted approach, including fostering a culture of continuous learning, securing leadership commitment, investing in robust technological infrastructure, and implementing effective change management strategies.

The comparison between traditional digital skills and AI-enhanced capabilities reveals that AI significantly amplifies the benefits of digital transformation. While basic digital skills improve efficiency and data management, AI introduces predictive analytics, intelligent automation, and real-time risk assessment, shifting HR practices from reactive to proactive. This transformation not only improves operational performance but also drives

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innovation, agility, and strategic growth.

In conclusion, the integration of digital skills and AI into HCM and personnel auditing is not just a trend but a necessity for organizations striving to remain competitive in an increasingly digital economy. By embracing these technologies and investing in continuous digital upskilling, organizations can optimize their human capital, enhance decision-making, and achieve sustainable growth in the era of artificial intelligence.

**References:**

1. Becker, B. E., Huselid, M. A., & Ulrich, D. (2001). *The HR scorecard: Linking people, strategy, and performance*. Harvard Business Press.
2. Bessen, J. E. (2019). *AI and jobs: The role of demand*. *NBER Working Paper No. 24235*. National Bureau of Economic Research. https://doi.org/10.3386/w24235
3. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W. W. Norton & Company.
4. Cherepanska, I., Sazonov, A., Melnychuk, P., Melnychuk, D., Kalchuk, S., Pryadko, V., & Yanovsky, V. (2024). Design of an information-computer system for the automated modeling of systems for automatic orientation of production objects in the machine and instrument industries. *Eastern-European Journal of Enterprise Technologies, 3*(2), 6–19. https://doi.org/10.15587/1729-4061.2024.306516
5. Davenport, T. H., & Harris, J. G. (2007). *Competing on analytics: The new science of winning*. Harvard Business School Press.
6. Marler, J. H., & Boudreau, J. W. (2017). An evidence-based review of HR analytics. *The International Journal of Human Resource Management, 28*(1), 3–26. https://doi.org/10.1080/09585192.2016.1244699
7. Melnychuk, D. P. (2007). Kadrovyi audyt yak faktor pidtrymky stratehichnykh rishen u sferi upravlinnia liudskym kapitalom [Personnel audit as a factor in supporting strategic decisions in human capital management]. *Problemy teorii ta metodolohii bukhhalterskoho obliku, kontroliu i analizu: mizhnarodnyi zbirnyk naukovykh prats* [Problems of Theory and Methodology of Accounting, Control and Analysis: International Collection of Scientific Papers], (2) 8, 122–130. Zhytomyr: ZhDTU.
8. Melnychuk, D. P. (2008). Naukovoteoretychni osnovy kadrovoho audytu: krytyka ta shliakhy onovlennia u ploshchyni upravlinnia liudskym kapitalom [Scientific-theoretical foundations of personnel audit: criticism and ways of renewal in the field of human capital management]. *Problemy teorii ta metodolohii bukhhalterskoho obliku, kontroliu i analizu: mizhnarodnyi zbirnyk naukovykh prats* [Problems of Theory and Methodology of Accounting, Control and Analysis: International Collection of Scientific Papers], *(3)*12, 340–349. Zhytomyr: ZhDTU.
9. Minbaeva, D. (2017). Strategic HRM and knowledge transfer: What do we know and where should we go? *The International Journal of Human Resource Management, 28*(1), 35–58. https://doi.org/10.1080/09585192.2016.1246463
10. Ulrich, D. (1997). *Human resource champions: The next agenda for adding value and delivering results*. Harvard Business School Press.
11. Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation*. Harvard Business Review Press.

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# SECTION 4:
# LEADERSHIP AND WELL-BEING IN THE DIGITAL ERA

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# Chapter 4.1. Development of Leadership Competencies of Managers in the Era of Digitalization

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***Abstract****. The digital age has ushered in a new stage of leadership based on a unique combination of leadership competencies. Leadership development is a continuous process that requires constant development from the individual. This study has examined the critical role of leadership in organizational success, particularly focusing on the impact of digitalization and the importance of effective management practices. The article highlights the results of a study of leadership competencies based on the D. Denison model, an assessment of the quality of acquisition and use of leadership competencies by company executives, an evaluation of the skills that characterize the company's management style and the skills that represent the managerial effectiveness of company executives. We conducted an online survey of 22 Plast-Instrument LLC employees in the summer of 2024. A diamond of leadership competencies is constructed based on the data obtained on the leadership competencies of managers. Leadership competencies related to enterprise adaptation (27) score the highest, indicating that Plast-Instrument LLC leaders are most proficient or focused on skills that help the enterprise adapt to changing environments. Leadership competencies related to enterprise coherence (22) is the lowest-scoring category, indicating that leaders may need to be more focused on and effective in maintaining internal consistency, collaboration, or alignment within the organization. The case study of Plast-Instrument LLC highlights the practical implications of leadership development. We surveyed Plast-Instrument LLC employees regarding the quality of acquisition and use of leadership competencies, the skills that characterize the company's management style, and the skills that represent the managerial effectiveness of the company's Director and Deputy Director. Each leader has specific strengths and weaknesses that can be further developed. After assessing the strengths and weaknesses of the company's leaders, areas for improvement were identified and areas for strengthening their leadership skills were developed.*

***Keywords:*** *leadership; competencies; company; managers; digitalization; managerial effectiveness; development; leaders.*

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**1. Leadership competencies of managers and digitalization**. The era of digitalization poses new challenges for organizational leaders that require them to develop new competencies. The transition to the digital economy opens up enormous opportunities but simultaneously creates an equal number of challenges in the process of leadership development (Baczyńska, 2015).

Rapid changes in the digital environment require managers to develop flexibility and the ability to adapt to new and uncertain conditions quickly. Like other employees, managers tend to resist change, especially if it involves a departure from traditional management methods (Cheema, Akram, & Javed, 2015). Fear of the unknown and the desire to change distinguish successful leaders from those stuck in the past. Developing talented professionals with leadership skills is becoming a key challenge for businesses (Chatzoglou, 2017).

Managing an organization and its people requires a manager to take on much responsibility and make complex decisions quickly. The effectiveness of a manager's work depends on the inherent approach to management (Kandampully, & Duddy, 1999). Leadership competencies are a set of knowledge and skills (technical and "soft"), behaviors, and characteristics that enable people to effectively manage and influence others (Maurya, & Sharma, 2017). Leadership is the foundation of responsibility, the ability to see several steps ahead, take risks, and help others

We conducted an online survey of 22 Ukrainian employees who work in the Plast-Instrument LLC in the summer of 2024. We conducted an employee survey on the leadership competencies of the company's director and deputy director. We used a scale from 1 to 10. The competence quotient method was used to obtain the data. The essence of this method is to ask selected experts about other participants. This number of experts is sufficient for further research (Singh and Masuku, 2014). Criteria for assessing the competence of experts are education and level of knowledge in the field of entrepreneurship, total work experience, work experience in the field of entrepreneurship (at least 15 years), experience as an expert in the field of entrepreneurship, and work experience in the position. The hierarchy analysis method was used to determine the expert's competence. All criteria have been evaluated through individual and pairwise comparisons according to the requirements (Saaty, 1992).

**2. The Study of Leadership Competencies according to D. Denison's Model**. The dynamics of technological change in the work environment of

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organizations lead to the formation of leadership competencies related to various aspects of a highly effective organizational culture (Hersey, Blanchard, & Johnson, 2008). Leadership competencies are considered from the external and internal perspective of the enterprise environment through its stability and flexibility.

D. Denison's model of leadership competencies emphasizes the following competencies required of a manager (Smith, Lewis, & Tushman, 2016):

- Leadership competencies related to the adaptation of the enterprise.
- Leadership competencies related to the mission of enterprises.
- Leadership competencies related to the activities of enterprises.
- Leadership competencies related to enterprise cohesion.

D. Denison's model of leadership competencies is as follows (Figure 4.1).

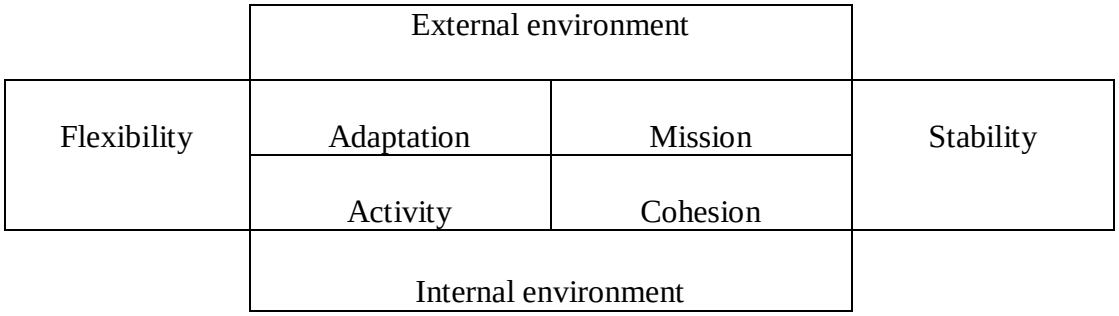


**Figure 4.1. D. Denison's model of leadership competencies**

*Source: (Northouse, 2019)*

Among the leadership competencies that play a unique role among the managerial competencies of the organization, the following leadership competencies are distinguished (Table 4.1).

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**Table 4.1. Leadership competencies of the organization**

| Type of group | Group elements |
|---|---|
| Leadership competencies related to enterprise adaptation | - strategic thinking<br>- dividing the strategy into short-term goals<br>- creating a shared vision<br>- building personal authority |
| Leadership competencies related to the mission of enterprises | - creating a learning organization<br>- making changes and improvements<br>- creating a positive customer experience<br>- making bold decisions |
| Business-related leadership competencies | - building highly effective teams<br>- encouraging staff to be active<br>- development of human resources<br>- creating an effective working environment |
| Leadership competencies related to enterprise coherence | - defining fundamental values<br>- building alliances<br>- organizational coordination<br>- internal corporate cooperation |

*Source: (Northouse, 2019)*

The data obtained are presented in Table 4.2.

**Table 4.2. Assessment of managers' leadership competencies**

| Group elements | Evaluation |
|---|---|
| - strategic thinking<br>- dividing the strategy into short-term goals<br>- creating a shared vision<br>- building personal authority | 7<br>6<br>6<br>8 |
| - creating a learning organization<br>- making changes and improvements<br>- creating a positive customer experience<br>- making bold decisions | 5<br>6<br>7<br>6 |
| - building highly effective teams<br>- encouraging staff to be active<br>- development of human resources<br>- creating an effective working environment | 5<br>6<br>8<br>7 |
| - defining fundamental values<br>- building alliances<br>- organizational coordination<br>- internal corporate cooperation | 6<br>5<br>5<br>6 |

*Source: developed by the authors*

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Let's build a diamond of leadership competencies based on the data on the leadership competencies of managers (Table 4.3). The overall score for each group was obtained.

**Table 4.3. Data on leadership competencies**

| Type of group | Overall assessment |
|---|---|
| Leadership competencies related to enterprise adaptation | 27 |
| Leadership competencies related to the mission of enterprises | 24 |
| Business-related leadership competencies | 26 |
| Leadership competencies related to enterprise coherence | 22 |

*Source: developed by the authors*

Figure 4.2 shows the diamond of managers' leadership competencies. Leadership competencies related to enterprise adaptation (27) scored the highest. The findings indicate that leaders are most skilled or focused on skills that enable the enterprise to adapt to a changing environment, new technologies, innovations, develop flexibility, and manage change. Adaptability is crucial for increasing the efficiency and sustainability of an enterprise in a competitive market.

Leadership competencies related to realizing the enterprise's mission (24) are slightly lower but still significant. The data obtained indicates that leaders have been focused on fulfilling the mission and main goals of the enterprise. The results confirm that managers' long-term goals and values guide their leadership decisions.

Business-related leadership competencies (26) scored almost as high as adaptation-related skills. The findings reflect a well-developed understanding of the operational and strategic aspects of the business. These include financial understanding, decision-making, and strategic planning, which are essential for ensuring profitability and improving the efficiency of the enterprise.

Managers' competencies related to organizational coherence (22) received the lowest score. Such results indicate that managers need to be more focused and effective in maintaining internal coherence and cooperation in the organization. This situation suggests specific problems in ensuring the coordinated work of different parts of the enterprise, which affects organizational efficiency and unity.

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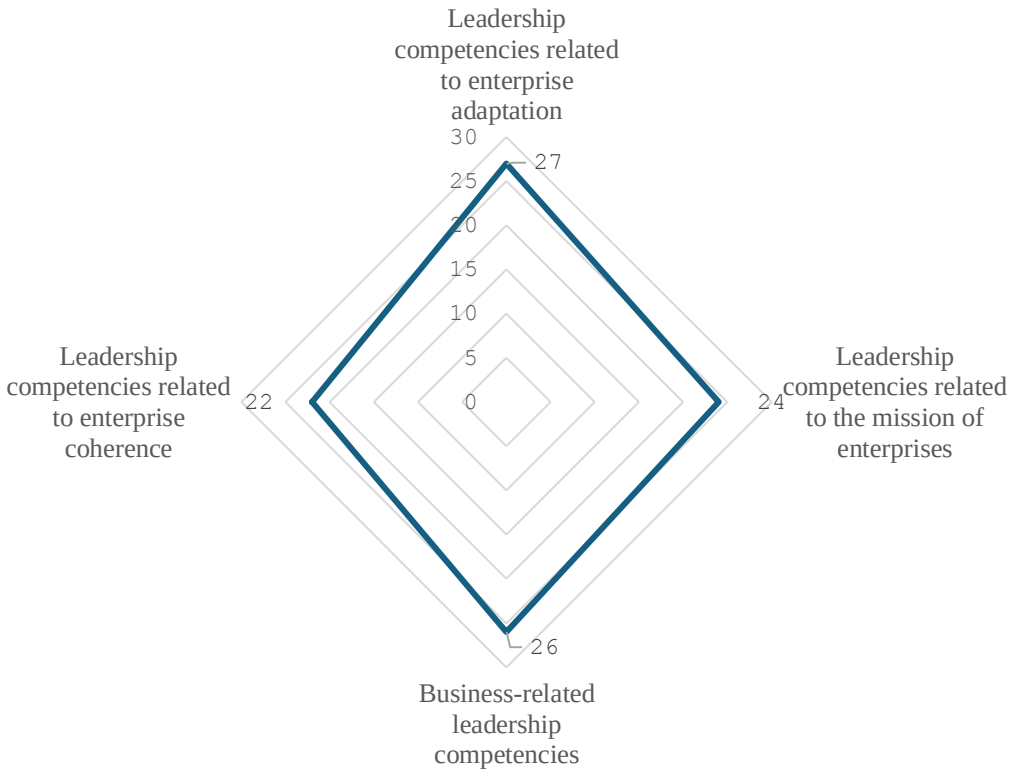


**Figure 4.2. Diamond of managers' leadership competencies**
Source: developed by the authors

The formation of charismatic leaders in the digitalization era is driven by increasing demands in operation and enterprise development. The essential traits of a decisive, charismatic manager that should be developed are consistency, dedication, and confidence. Leaders appreciate the importance of effort and prefer ambitious but realistic and achievable goals. In a digital world, charisma is about personal presence in physical settings and how leaders engage and inspire through virtual platforms (Wu, 2022). Charismatic leaders see great potential in people and ideas, don't dwell on failures, and look at the big picture of business development rather than focusing on the present moment. Managing responsibility and communicating effectively with others is extremely important for managers. Leadership and effective communication are two unique qualities that are key in every area of life.

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Effective communication is crucial to achieving organizational goals. Leaders who can communicate goals and objectives clearly and accurately create commitment among employees and motivate them to take action. Regular communication makes employees feel understood, and an effective leader can see what is needed to improve their team. Digital transformation brings uncertainty and rapid change. Confident leaders can navigate this landscape by embracing new technologies, making decisive choices in complex situations, and inspiring team confidence. A confident leader in the digital era understands the importance of continuous learning and is not afraid to take calculated risks (Fanelli, 2020). Communication is one of a leader's most important tools to resolve conflict. A leader should use methods and strategies that help to resolve conflicts effectively.

Employees increasingly expect reasonable remuneration and development prospects and a respectful, stress-free, open, and collaborative workplace. In today's ever-changing market, the ability to scale a business is crucial for the survival and development of companies. The key to success here is a properly formed team with the necessary skills and a jointly developed strategy and goals (George, 2007).

**3. Assessing the Quality of Leadership Competencies in an Organization**. Assessing the quality of leadership competencies in an organization is essential for several reasons:

– Improving management efficiency and identifying the strengths and weaknesses of managers allows you to create a plan for their development and increase management efficiency.
– Influential leaders foster a positive organizational culture, influencing employee satisfaction, motivation, and productivity.
– Leadership competency assessments help identify training and professional development needs, creating opportunities for career growth and leadership development (Judge, Bono, Ilies, & Gerhardt, 2002).
– Ensuring alignment with the organization's strategy and determining how healthy managers have been aligned with its strategic goals allows them to adjust their actions to achieve the intended results.
– Effective leadership helps to improve team interaction, increasing coordination, collaboration, and overall productivity (Groves, 2006).

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– Competent leaders can better manage organizational change, supporting employees during transformation and ensuring the successful implementation of new initiatives.
– When employees see that their leaders are competent and hands-on, they feel more satisfied with their jobs, which reduces turnover.
– Organizations with influential leaders can adapt more quickly to market changes, develop innovative solutions, and maintain high competitiveness.
– Leadership competency assessments help leaders make informed and strategically sound decisions (Judge, Colbert, & Ilies, 2004).
– Leadership assessments identify potential leaders among employees, which helps with succession planning and the development of future leaders.

In general, assessing the quality of leadership competencies helps an organization maintain high efficiency, promotes employee development, and ensures the achievement of strategic goals.

Such an assessment is an integral part of the development and motivation of managers. It helps them identify their strengths and weaknesses and opportunities for improvement.

The most common reasons for conducting a leadership competency assessment are as follows:

– Leadership competencies improve efficiency, identifying the potential of leaders and unlocking their full potential.
– Leadership competencies contribute to the development of the company as a whole.
– Assessing leadership competencies helps to identify and retain talented leaders.
– Influential leaders contribute to creating a positive climate and team building.

It is important to note that there are many methods, such as assessing leadership and management competencies and their use. The choice of method depends on the objectives of the assessment, available resources, and the organization's culture.

Assessing leadership, management competencies, and their use is essential to developing and motivating managers. It helps them identify their strengths and weaknesses and opportunities for improvement.

Assessing the leadership competencies of the Director and Deputy Director is an essential step in the company's development. It helps to identify leaders'

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strengths, identify areas for improvement, and develop individual development plans.

The following indicators were chosen to understand the quality of acquisition and use of leadership competencies (Llopis, 2014; Mind Tools, 2018):

– The level of team productivity.
– Team cohesion.
– Motivation of employees.
– Team adaptation to changes.
– Team stability and stress resistance.
– Training and development of employees.
– Career development.
– Clarity and clarity of communications.
– Level of feedback.
– Speed of decision-making.
– Quality of decision-making.
– The internal reputation of the manager.
– Achievement of tactical goals.
– Achievement of key indicators.
– Achievement of strategic objectives.

The results of the survey are shown in Figures 4.3-4.4.

The Director of Plast-Instrument LLC demonstrates good results in many aspects, but there are some differences from the Deputy Director:

– The Director is more motivated than the Deputy Director.
– An active approach to staff training and development.
– A high rating of the internal reputation of the manager indicates authority and respect among employees.

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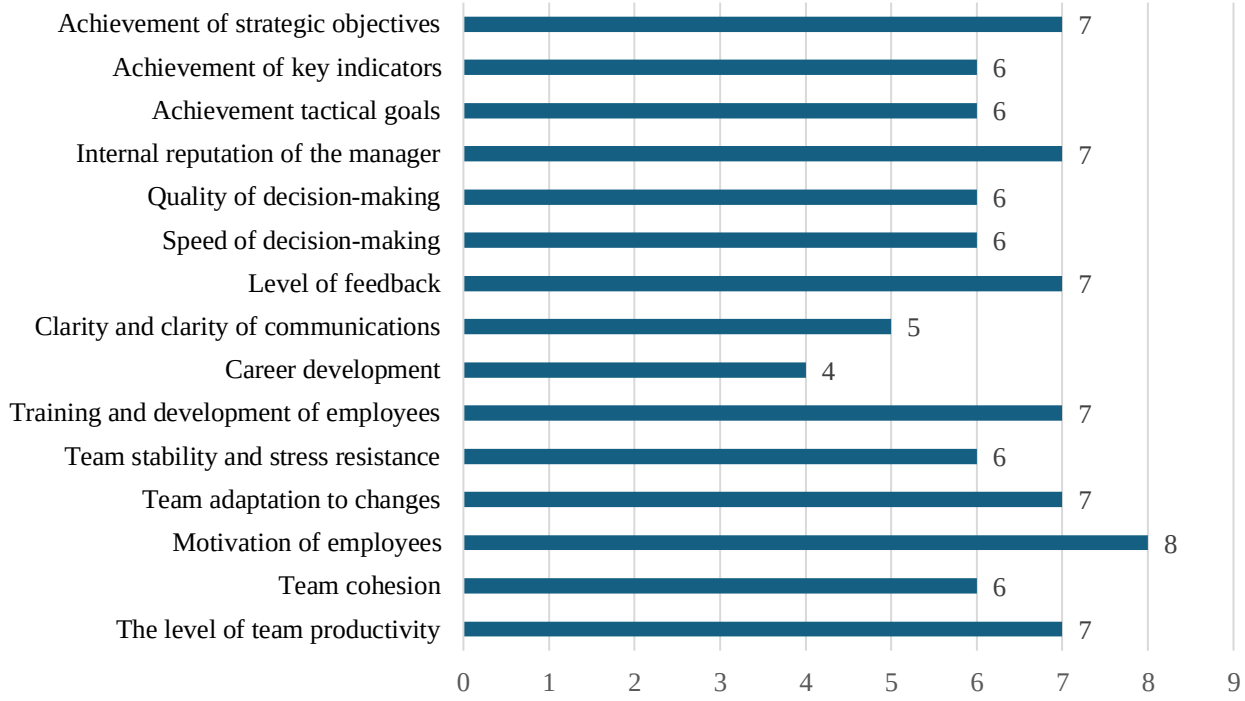


**Figure 4.3. Results of the employee survey on the quality of acquisition and use of leadership competencies by the Director of Plast-Instrument LLC**
*Source: developed by the authors*

Here are the director's weaknesses:

– A lower level of team cohesion than that of the Deputy Director indicates specific problems in team interaction.
– Speed and quality of decision-making. Low scores for speed and quality of decision-making indicate difficulties in the decision-making process.
– Achievement of tactical goals. A low score for achieving tactical goals indicates that tactical goals are not being achieved.

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**Figure 4.4. Results of the employee survey on the quality of acquisition and use of leadership competencies by the Deputy Director of Plast-Instrument LLC**

*Source: developed by the authors*

The deputy director of Plast-Instrument LLC demonstrates high results in the following aspects:

– The high level of team cohesion indicates the ability to unite the team and create a favorable atmosphere.
– A high score for employee motivation indicates the ability to motivate employees to achieve results.
– A high score for team adaptation to changes indicates the flexibility of the team and its ability to adapt to new conditions quickly.
– A high score for the level of feedback indicates openness to feedback and a desire to improve constantly.
– A high score for achieving strategic goals indicates effectiveness in achieving the company's goals.

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Weaknesses of the deputy director may be related to low scores on the following criteria:

– The relatively low stability and stress resistance level indicates the need for a more remarkable ability to remain calm in difficult situations.
– Career development. A low score for career development suggests the need to formulate a clear strategy for the career development of employees or problems with its implementation.

Thus, the Deputy Director demonstrates good results in building team relationships, motivation, and adaptation to change. However, he needs to work on his stress tolerance and develop a career development strategy for his employees.

The Director is a robust and motivating leader who focuses on employee development. However, he should pay attention to team cohesion and decision-making efficiency.

**4. Assessment of Skills that Characterize the Company's Leadership Style**. We also conducted a survey of employees of Plast-Instrument LLC to assess the skills that characterize the leadership style of the company's Director and Deputy Director. To understand the leadership style of managers, the following skills were selected to characterize the leadership style:

– Charisma is the endowment of a person with qualities that inspire high respect for them and unconditional faith in their capabilities, high giftedness, and unique attractiveness. Charismatic leaders inspire and motivate others, creating a positive and productive work environment (Nadler, & Tushman, 1990).
– Communication is transferring information between people or groups through spoken and written messages, body language, and speech patterns. Effective communication is crucial for building relationships in the work environment, resolving conflicts, etc.
– Confidence is a psychological characteristic of a person's faith and beliefs. Confidence is necessary to take risks, make decisions, and overcome challenges. Confidence can enhance charisma and communication skills, allowing people to express themselves confidently (Sternberg, 2007).
– Determination characterizes the level of certainty and resolve needed to achieve goals. Determination is necessary to overcome obstacles and achieve the desired success.

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These skills are interconnected and mutually reinforcing. Charisma can be enhanced by strong communication and confidence, while determination can be fueled by a combination of all three.

The assessment results of the skills characterizing the leadership style are shown in Figures 4.5 and 4.6.

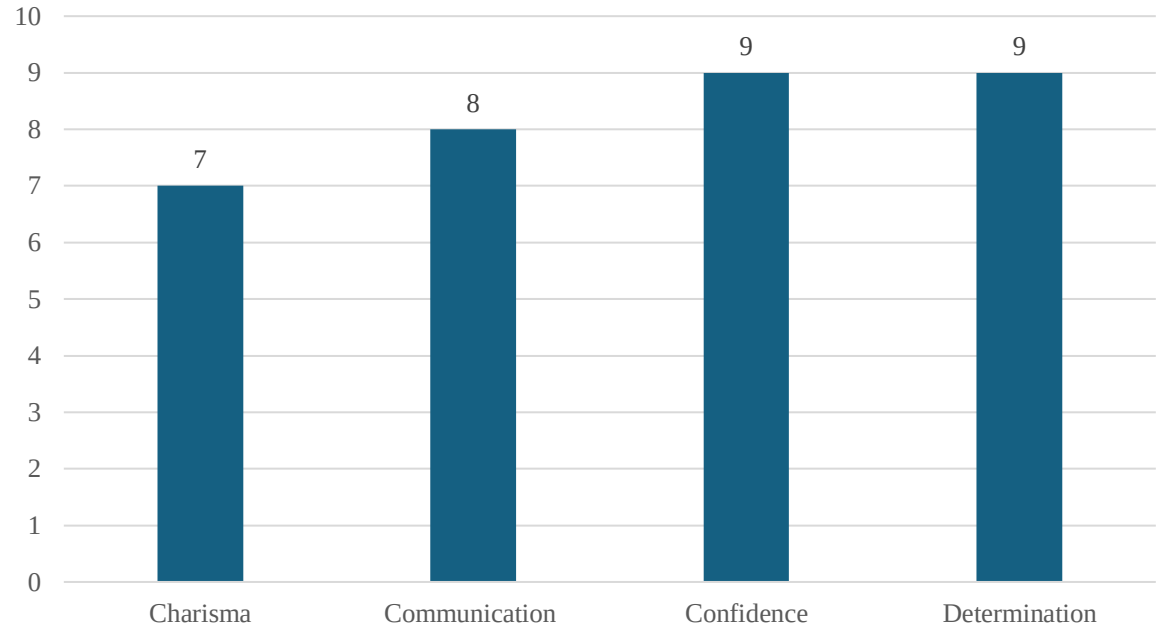


**Figure 4.5. Assessment of qualities characterizing the leadership style by the Director of Plast-Instrument LLC**

*Source: developed by the authors*

Based on the data, we will analyze and conclude the leadership qualities of the Director and Deputy Director based on four criteria: charisma, communication skills, confidence, and determination:

1. The Deputy Director received a score of 8 for charisma, and the Director received a score of 7. The deputy director has a slightly higher level of charisma, which means they can influence others and inspire trust in the team.
2. The Deputy Director received a score of 7 for communication, and the Director received a score of 8. The director has a higher level of

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communication skills, which indicates that he has better communication skills and more effective communication within the team.

3. Both managers received the same high score of 9 for confidence. Both managers have high self-confidence, which is essential for their position, decision-making, and team management.
4. The Deputy Director received a score of 8 for decisiveness, and the Director received a score of 9. The director demonstrates more decisiveness in his actions, which indicates his ability to make quick decisions and act in critical situations.

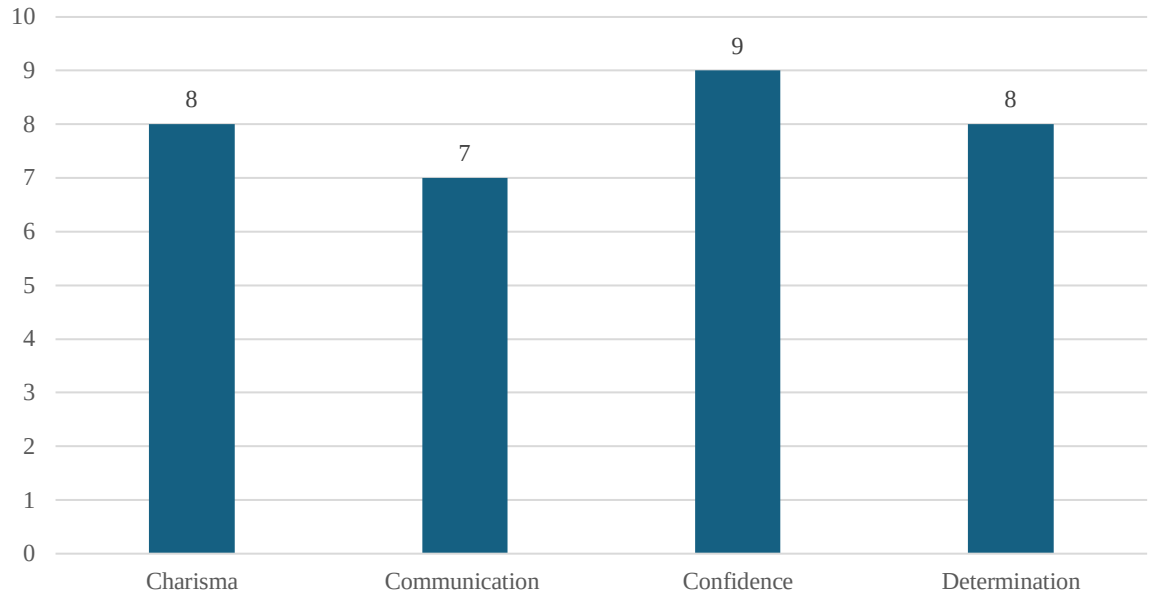


**Figure 4.6. Assessment of qualities characterizing the leadership style by the Deputy Director of Plast-Instrument LLC**

*Source: developed by the authors*

After analyzing the data, the Deputy Director demonstrates better charisma, which should help him increase the motivation and engagement of the team. At the same time, he should improve his communication skills to be more effective in interacting with other team members. The Director has a high level of communication skills and determination, which makes him an effective leader in decision-making and team management. However, he could improve his charisma to increase his influence on the team. Thus, both managers possess

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strengths and should focus on improving individual aspects to enhance their leadership skills.

**5. Assessment of Managerial Performance of the Company Leaders**. We also surveyed employees of Plast-Instrument LLC to assess the management performance of the company's Director and Deputy Director.

Assessing managerial performance involves identifying such competencies:

- Delegation of authority is the conscious distribution of tasks among team members, regardless of the number of employees on the staff. Effective distribution of functions and responsibilities is a prerequisite for business development and scaling (Clark, 2013).
- Strategic actions define the main ways in which an organization will develop. These actions are guided mainly by a strategy, a clearly defined strategic plan that reflects the organization's vision, mission, values, and key performance indicators.
- Implementing management decisions (management decision-making technology) is a rational sequence of operations and procedures (information, logic and thinking, calculation, organizational, etc.) performed by managers, specialists, and technical executives to solve a problem. It includes the development of measures to specify the decision and communicate it to the executors, monitoring its implementation, making necessary adjustments, and evaluating the results obtained as a result of the decision (Walumbwa, Avolio, Gardner, Wernsing, & Peterson, 2008).
- The use of managerial competencies implies the ability of a leader to effectively apply their skills and knowledge in practice to achieve the organization's development goals. It includes elements such as the use of technical, interpersonal, and conceptual skills to solve problems and manage teams effectively.

The results of assessing the management performance of the company's Director and Deputy Director are shown in the figures.

The Director of Plast-Instrument LLC demonstrates the following qualities that characterize managerial performance (Figure 4.7):

- The strengths of the Director are a high level of strategic thinking and determination, manifested in the ability to implement strategic actions, determine the direction of the company's development, make and implement management decisions, and determine the direction of the company's growth.

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– The director's weaknesses are minor deviations from the ideal result in such criteria as delegation of authority and implementation of managerial competencies.

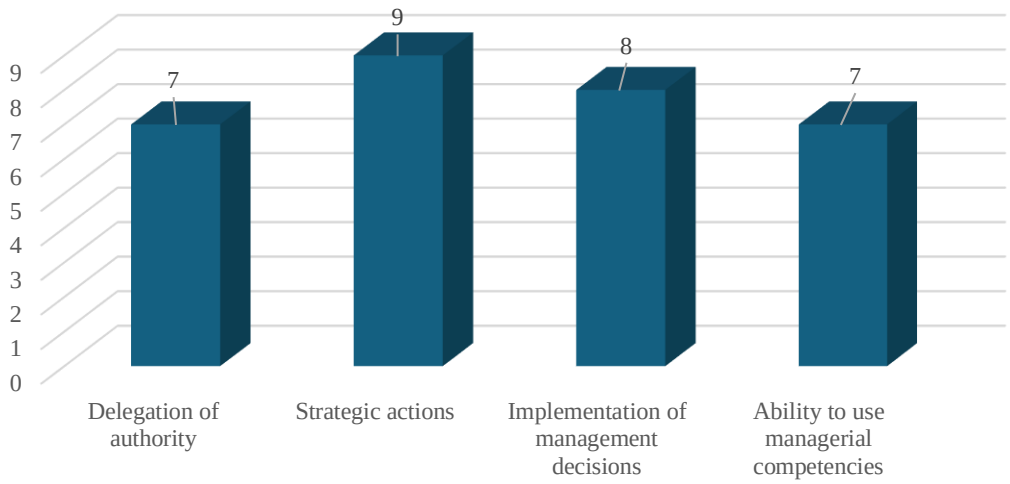


**Figure 4.7. Assessment of managerial performance of the Director of Plast-Instrument LLC**

*Source: developed by the authors*

The Deputy Director demonstrates the following skills that characterize managerial performance (Figure 4.8):

– Strengths include such criteria as the ability to implement managerial competencies and the ability to execute managerial decisions.
– Weaknesses include delegation of authority and strategic actions due to weak strategic thinking, a tendency to operational management, and a lack of focus on long-term goals.

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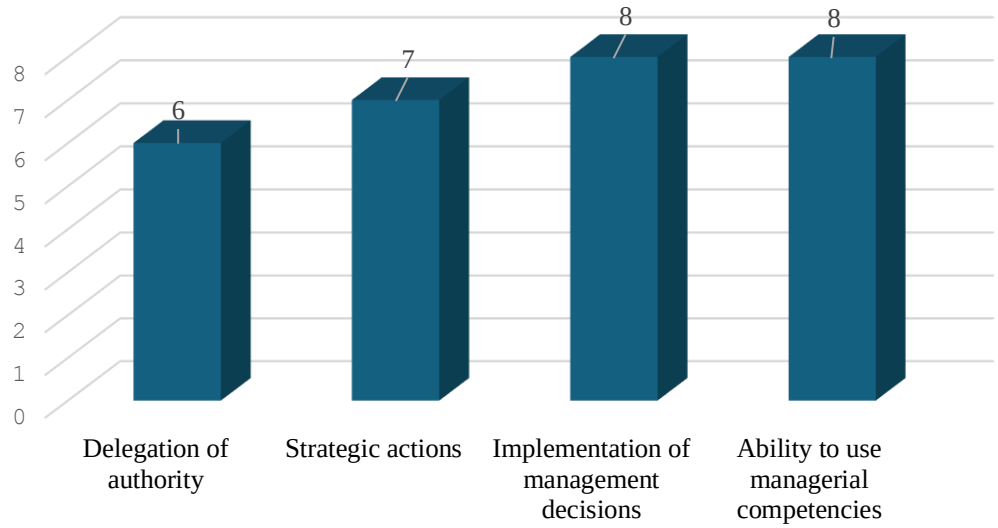


**Figure 4.8. Evaluation of the managerial performance of the Deputy Director of Plast-Instrument LLC**

*Source: developed by the authors*

Both leaders at Plast-Instrument LLC demonstrate high competence in many areas. However, each of them has their strengths and weaknesses.

According to the results, the Director is a strategic leader with high charisma. He should focus on delegating authority and developing managerial competencies in his team for further self-development.

At the same time, the Deputy Director is more focused on current tasks and has good communication skills. He should focus on developing strategic thinking and delegation skills to be more effective.

The digital era has rapidly changed how organizations develop, interact with customers, and compete. As a result, the competencies required of modern leaders have reached a new level of development. As digital technologies constantly evolve, leaders are increasingly required to master new skills. Leaders have to adapt quickly to changes and their consequences for improving the performance of organizations.

We conducted a study of leadership competencies according to D. Denison's model, the assessment of the quality of acquisition and use of leadership competencies by the company's managers, the evaluation of skills that characterize the company's leadership style, and abilities that distinguish the

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managerial performance of the company leaders. The chosen indicators help to determine how effectively managers use their leadership competencies and perform leadership functions.

Leadership competencies related to enterprise adaptation are the strongest among Ukrainian managers surveyed. All this indicates the ability to focus on the principles of flexibility and innovation in the management process. It is essential for the development of an organization in a changing business environment.

As we can see, leadership competencies related to alignment could be better, which indicates problems in creating an environment of internal alignment and cooperation in the organization.

Leadership competencies related to the mission of the enterprise are moderate. This situation is due to the need to improve integration and interaction further to align internal operations with strategic goals.

The findings suggest that Ukrainian managers are well-prepared to lead organizations in the face of change. However, they must improve their skills and develop internal coherence and alignment with the mission.

Studying leadership competencies is essential to increasing an organization's competitiveness and performance in the digital age. Organizations can achieve long-term success by understanding the principles and characteristics of leadership and providing opportunities for leaders to improve their skills.

**Conclusions.** The study of leadership competencies in the era of digitalization has underscored the critical role that adaptive leadership plays in organizational success. The research conducted at Plast-Instrument LLC, based on D. Denison's model, revealed that the most developed leadership competencies among managers are those related to enterprise adaptation. This indicates a strong ability to respond to environmental changes, adopt innovative solutions, and ensure business flexibility in a competitive market.

However, the findings also highlight challenges, particularly in maintaining internal coherence and alignment within the organization. Leadership competencies related to enterprise coherence scored the lowest, suggesting that improving internal collaboration, communication, and coordination should be a priority for organizational leaders.

The assessment of leadership competencies of the Director and Deputy Director revealed distinct strengths and areas for improvement. While the Director demonstrated strong strategic thinking and communication skills, he

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needs to enhance decision-making efficiency and team cohesion. The Deputy Director, on the other hand, excelled in charisma, motivation, and team cohesion but requires further development in stress tolerance and long-term strategic planning.

Furthermore, the research highlighted that effective leadership is strongly linked to communication, confidence, and decisiveness. These qualities significantly impact managerial performance, including decision-making, delegation of authority, and the implementation of strategic actions.

In the digital era, leadership development must focus on fostering adaptability, enhancing collaboration, and promoting innovative thinking. Organizations should invest in leadership training programs that emphasize internal alignment, team-building strategies, and digital competency development to ensure long-term success.

By continually assessing and refining leadership skills, companies can strengthen their competitive advantage, drive innovation, and create a dynamic work environment where leaders can inspire and empower their teams effectively.

**References**:

1. Baczyńska, A.K. (2015). Analytical, Practical, and Emotional Intelligence and Line Manager Competencies. Management and Business Administration. Central Europe, 23(4), 34–54.
2. Cann, O. (2014). Crisis in Leadership Underscores Global Challenges. Available at: https://www.weforum.org/press/2014/11/crisis-in-leadership-underscores-global-challenges/
3. Chatzoglou, P. et al. (2017). The relationship between leadership competencies and successful organizational change. In Vrontis, E., Weber, Y., Tsoukatos, E. (Eds). Global and national business theories and practice: bridging the past with the future: selected paper from 10th Annual Conference of the EuroMed Academy of Business, Rome, EuroMed Press, 347-361.
4. Cheema, S., Akram, A., & Javed, F. (2015). Employee Engagement and Visionary Leadership: Impact on Customer and Employee Satisfaction. Journal of Business Studies Quarterly, 7(2), 139.
5. Clark, P.G. (2013). Toward a transtheoretical model of interprofessional education: Stages, processes, and forces supporting institutional change. Journal of Interprofessional Care, 27(1), 43–49.
6. Fanelli, S. et al. (2020). Managerial competencies in public organizations: the healthcare professionals' perspective. BMC health services research, 20, 1-9.
7. George, B.S.P. (2007). True North: discover your authentic leadership. San Francisco, California: Jossey-Bass/John Wiley & Sons.
8. Groves, K.S. (2006). Leader emotional expressivity, visionary leadership, and organizational change. Leadership & Organization Development Journal, 27(7), 566–583.
9. Hersey, P., Blanchard, K., & Johnson, D. (2008). Management of Organizational Behavior: Leading Human Resources (9th ed.). Upper Saddle River, New Jersey: Pearson Education.
10. Jasim, A. F. A. (2019). Conceptual skills in leading change: A competence approach to public sector leadership (Doctoral dissertation, The British University in Dubai (BUiD)).
11. Judge, T.A., Bono, J.E., Ilies, R., & Gerhardt, M.W. (2002). Personality and leadership: A qualitative and quantitative review. Journal of Applied Psychology, 87(4), 765–780.
12. Judge, T.A., Colbert, A.E., & Ilies, R. (2004). Intelligence and Leadership: A Quantitative Review and Test of Theoretical Propositions. The Journal of Applied Psychology, 89(3), 542–552.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

13. Kandampully, J., & Duddy, R. (1999). Competitive advantage through anticipation, innovation, and relationships. Management Decision, 37(1), 51–56.
14. Llopis, G. (2014). 7 Ways Leaders Maintain Their Composure in Difficult Times. Available at: http://www.forbes.com/sites/glennllopis/2014/01/20/7-ways-leaders-maintain-their-composure-in-diffcult-times/#27618844708d
15. Maurya, C. D., & Sharma, A. K. (2017). The role of managerial skills in the success of an organization. CLEAR International Journal of Research in Commerce & Management, 8(6), 12–14.
16. Mind Tools (2018). How good are your management skills? Available at: https://www.mindtools.com/pages/article/newTMM_28.htm
17. Nadler, D.A., & Tushman, M.L. (1990). Beyond the charismatic leader: Leadership and organizational change. California Management Review, 32(2): 77–97,
18. Northouse, P. G. (2019). Introduction to leadership: Concepts and practice. Sage Publications.
19. Saaty, T. l. (1992). The Hierarchon: A Dictionary of Hierarchies. Pittsburgh, Pennsylvania: RWS Publications.
20. Singh, A. S. & Masuku. M. B. (2014). Sampling techniques and determination of sample size in applied statistics research: an overview. International Journal of Economics, Commerce and Management, 2(1): 1-22
21. Smith, W.K., Lewis, M.W., & Tushman, M.L. (2016). Both/And Leadership. Harvard Business Review, May.
22. Sternberg, R.J. (2007). A Systems Model of Leadership. American Psychologist, 62(1): 34–42.
23. Walumbwa, F.O., Avolio, B.J., Gardner, W.L., Wernsing, T.S., & Peterson, S.J. (2008). Authentic leadership: Development and validation of a theory-based measure. Journal of Management, 34(1), 89-126.
24. Wu, T. (2022). Digital project management: rapid changes define new working environments. Journal of Business Strategy, 43(5), 323- 331.
25. Yukl, G., & Chavez, C. (2002). Influence tactics and leader effectiveness. In: L. Neider and C.A. Schriesheim (eds.), Leadership. Greenwich, Connecticut: New Information Age Publishing.
26. Zaccaro, S.J., Kemp, C., & Bader, P. (2004). Leader Traits and Attributes. In: J. Antonakis, A.T. Cianciolo and R.J. Sternberg (eds.), The Nature of Leadership. Thousand Oaks, California: Sage Publications

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*Monograph dedicated to the 5th anniversary*
*of Scientific Center of Innovative Research's activities*

# Chapter 4.2. Digital Empathy: Challenges and Opportunities in the World of Virtual Communication

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***Abstract.*** *The rapid development of digital technologies, combined with global events such as the COVID-19 pandemic and geopolitical changes, has significantly transformed the nature of interpersonal communication. This section of the monograph focuses on the phenomenon of digital empathy, which is defined as the ability to perceive, interpret, and respond appropriately to emotional signals in a digital environment. The purpose of this study is to explore the key challenges and opportunities associated with digital empathy in the context of virtual communication, as well as to identify practical strategies for enhancing empathetic interactions in digital spaces. The methodology of the research involved a combination of qualitative and quantitative approaches. A comprehensive survey was conducted among residents of selected EU countries and Ukraine to assess perceptions of digital empathy, its importance in professional and personal interactions, and the effectiveness of different digital formats for expressing emotions. Additionally, analytical methods were used to systematize data on digital empathy skills, challenges, and potential risks associated with virtual communication. The results of the study revealed that video communication is perceived as the most effective format for conveying empathy due to the presence of non-verbal cues such as facial expressions and vocal intonation. Voice messages also demonstrated significant potential for emotional expression, while text-based platforms like chats and instant messengers were moderately effective, often leading to misunderstandings due to the absence of intonation and visual signals. The study highlighted key challenges, including the phenomenon of "emotional noise," which encompasses issues such as incomplete information, decreased sensitivity to emotional cues, and information overload. Furthermore, risks such as cyberbullying, emotional burnout, and communication distortion were identified as critical threats to digital empathy. The practical value of this research lies in its recommendations for implementing digital empathy training programs, which are essential for fostering meaningful connections in virtual environments. The study emphasizes the importance of integrating emotional intelligence development, interactive learning methods, and the use of advanced technologies such as AI and VR to enhance empathetic communication. By addressing both the psychological and technological dimensions of digital empathy, the findings offer valuable insights for improving interpersonal relationships, reducing conflicts, and creating emotionally supportive digital spaces in professional, educational, and social contexts.*

***Keywords:*** *digital empathy, virtual communication, emotional intelligence, online interaction, non-verbal cues, digital technologies, emotional noise, cyberbullying, remote work, artificial intelligence.*

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**The evolution of digital empathy.** Over the past two decades, the world of communications has undergone dramatic changes. The rapid development of digital technologies, the pandemic, military conflicts, and the spread of hybrid work formats have significantly transformed our ideas about interpersonal interaction. One of the most relevant phenomena that has emerged in the context of these transformations is digital empathy - the ability to feel, understand, and adequately respond to the emotional signals of the interlocutor in the digital environment.

Digital empathy is formed through a complex of factors that include personal skills, technological capabilities, and the sociocultural context of communication. In the modern world, digital interaction is not limited to text messages - it includes video communication, voice messages, interactive platforms, and even artificial intelligence.

The development of digital empathy is critically important for working in hybrid and remote formats, since without it, the quality of interpersonal communication decreases, the risk of conflicts increases, and the level of interaction between people deteriorates.

Modern digital tools – from video conferencing to text chat – have both positive and negative effects on the ability to express empathy. The lack of physical contact forces people to adapt their communication skills, using new methods to convey emotions.

Digital empathy is the ability of an individual to perceive, interpret and respond adequately to the emotional states of the interlocutor in conditions of digital interaction. This term combines classical ideas about emotional intelligence with the specifics of the use of modern digital technologies.

Digital empathy, the capacity to understand and share the feelings of others through digital communication platforms, has evolved significantly with the advancement of technology. This literature review explores the progression of digital empathy, tracing its development from early online interactions to contemporary applications in social media, telehealth, and artificial intelligence.

In the nascent stages of the internet during the 1990s, digital communication was primarily text-based, occurring through emails, forums, and chat rooms. Researchers like Walther (1996) introduced the Social Information Processing Theory, suggesting that despite the absence of non-verbal cues, individuals could develop meaningful connections over time through text-based communication.

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However, the lack of immediate feedback and non-verbal signals limited the depth of empathetic exchanges.

The emergence of social media platforms in the early 2000s, such as Facebook, Twitter, and Instagram, transformed digital empathy. Studies by Konrath et al. (2011) indicated a decline in face-to-face empathy among young adults, attributing it partly to increased digital communication. Conversely, other researchers argued that social media facilitated new forms of empathy by enabling users to share personal experiences widely, fostering a sense of community and support (Burke & Kraut, 2014).

The integration of digital empathy into telehealth has been a critical area of study, particularly during the COVID-19 pandemic. Telehealth platforms necessitate the development of "webside manner," where healthcare providers convey empathy through video calls and digital messages. Research by Kruse et al. (2020) highlights the importance of verbal tone, facial expressions, and active listening in establishing empathetic patient-provider relationships in virtual settings.

Recent advancements in artificial intelligence (AI) have introduced new dimensions to digital empathy. AI-driven chatbots and virtual assistants are designed to recognize and respond to human emotions. Studies by McStay (2018) discuss the ethical implications and effectiveness of empathetic AI, emphasizing the potential benefits and limitations of machine-mediated empathy in customer service, mental health support, and education.

Despite technological advancements, challenges persist in fostering genuine digital empathy. Issues such as digital burnout, superficial connections, and the potential for miscommunication remain prevalent. Future research is needed to explore how emerging technologies like virtual reality and augmented reality can enhance empathetic experiences.

The evolution of digital empathy reflects the dynamic interplay between technology and human connection. From text-based communication to AI-driven interactions, digital empathy continues to adapt, offering new opportunities and challenges for understanding and supporting others in the digital age.

*The main components of digital empathy are:*

– Perception of emotions: the ability to “read” emotional signals through text messages, the use of emojis, voice intonation in video calls or audio messages.

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– Interpretation of signals: the ability to correctly understand the content and mood of messages, despite the absence of non-verbal elements, such as facial expressions or gestures.
– Response to emotions: the ability to adequately respond to the emotional states of the interlocutor, using verbal (text, voice) and non-verbal digital means (reactions, GIFs, video messages).

**Table 4.4. The main digital communication formats and their impact on empathy**

| Format | Benefits for Empathy | Limitations |
|---|---|---|
| Video calling | Visual cues: facial expressions, gestures, eye contact. | Technical issues (video quality, lag) |
| | Allows for deeper engagement in the conversation. | Lack of full non-verbal context (body language). |
| Voice messaging | Adds intonation and emotional expression | Lack of visual information |
| | Enables better communication of intentions and emotions | May lead to subjective interpretation of tone of voice |
| Chats and social networks | Speed and ease of communication | Lack of intonation and gestures |
| | Using emojis to convey emotions | Possible misinterpretation of content |
| Artificial intelligence (AI) | Analyzes the tone of messages and suggests emotional responses | Lack of human emotion |
| | Used in customer support | Insufficient level of personalization of communication |

*Source: systematized by the author*

A study conducted by Byron and Baldridge (2022) demonstrated that individuals perceive video-based communication as the medium richest in emotional expression. In contrast, text-based platforms, such as chats and instant messaging applications, frequently give rise to misunderstandings due to the absence of vocal intonation and non-verbal cues. Contemporary technological advancements have fundamentally transformed interpersonal interactions. Whereas non-verbal signals - such as facial expressions, gestures, and vocal tone—once played a pivotal role in accurately interpreting the emotions of interlocutors, modern text-based communication channels, including emails and instant messaging services, are often devoid of these critical elements.

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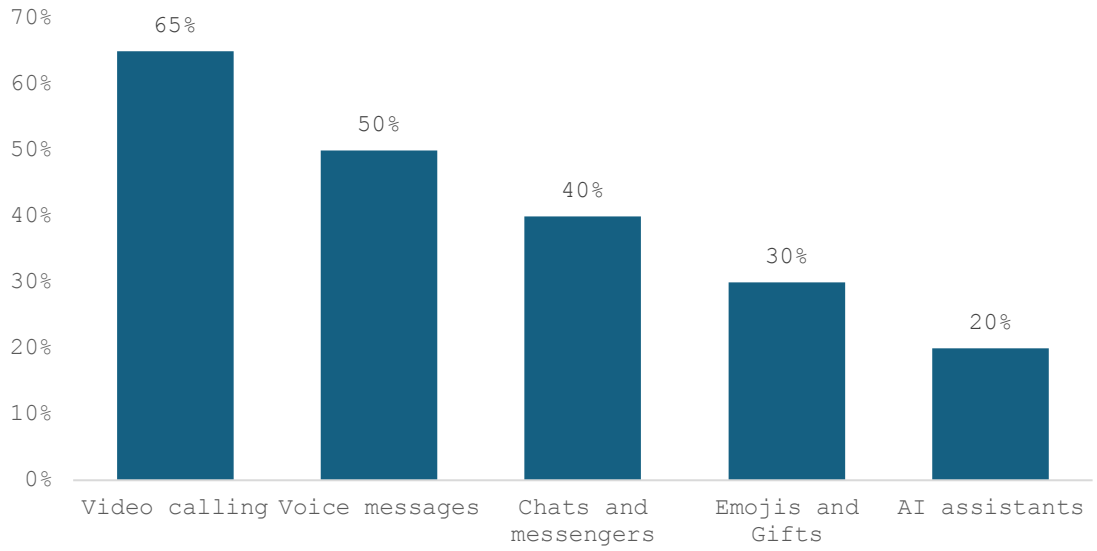


**Figure 4.9. Number of respondents' answers to the question "Effectiveness of digital formats for expressing empathy"**

*Source: systematized by the author based on survey data*

Figure 1 illustrates the perceived effectiveness of various digital communication formats in conveying empathy. According to the study, respondents identified video communication as the most effective medium (65%), attributing its effectiveness to the transmission of non-verbal cues such as facial expressions and vocal intonation. Voice messages were also considered highly effective (50%) due to their ability to convey emotional nuance through tone of voice. In contrast, text-based platforms, including chats and instant messaging applications, were rated as moderately effective (40%) given their lack of auditory and visual emotional indicators. The incorporation of emojis and GIFs (30%) was found to enhance emotional expression in text communication, although to a limited extent. Conversely, AI-driven virtual assistants (20%) are not yet widely perceived as fully capable tools for conveying empathy.

*Key functions of digital empathy:*

*-building trust* - accurate interpretation of emotional cues fosters a sense of support and connection, which is particularly crucial in remote and distributed teams;

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-*reducing conflict* - the ability to correctly interpret and respond to emotional signals reduces the likelihood of misunderstandings and conflicts within digital environments;

-*improving the quality of interaction* - even in the absence of traditional non-verbal cues, demonstrated empathy contributes to a more humanized and engaging communication style

Krueger et al. (2021), in their work "Empathy in Digital Communication: The Role of AI and Virtual Interactions," report that 80% of remote team members experience difficulties in interactions due to a lack of digital empathy. Moreover, 56% of respondents believe that well-structured online communication strategies can effectively compensate for the absence of physical presence.

The past few decades have witnessed a rapid shift towards digital technologies across diverse sectors, including business, education, healthcare, and daily life. Several global events have significantly expedited this transition:

- *The COVID-19 pandemic* - Necessitated the widespread adoption of remote work and online learning environments;

- ***Geopolitical Conflicts*** - created an urgent need for remote support systems, digital initiatives, and online consultation services;

- ***Advancements in Artificial Intelligence*** - the emergence of new communication technologies, such as chatbots, voice assistants, and algorithm-driven tools, has necessitated adaptation to novel forms of interaction.

One of the principal challenges of digital communication is the phenomenon known as "emotional noise," which refers to the loss of subtle non-verbal cues, leading to potential misinterpretation of the interlocutor's emotional state.

*The key aspects of emotional noise are:*

– *Incomplete information* - text-based messages often lack tonal and contextual cues that are essential for accurate emotional interpretation. For instance, the phrase "Okay, let’s do it" can be perceived as neutral, sarcastic, or even confrontational, depending on the context.

– *Decreased sensitivity* - the prevalent use of simplified communication forms, such as brief responses, standardized replies, or excessive reliance on emojis, may diminish sensitivity to deeper emotional engagement over time.

– *Information overload* - the overwhelming volume of messages in professional chats and social media platforms can obscure meaningful emotional

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content, leading to the neglect of critical emotional signals amidst informational clutter.

Kraus and Simon (2021) conducted a study revealing that 73% of individuals frequently misinterpret emotional intent in text messages, particularly when the sender employs minimal wording and omits the use of emotive symbols such as emojis.

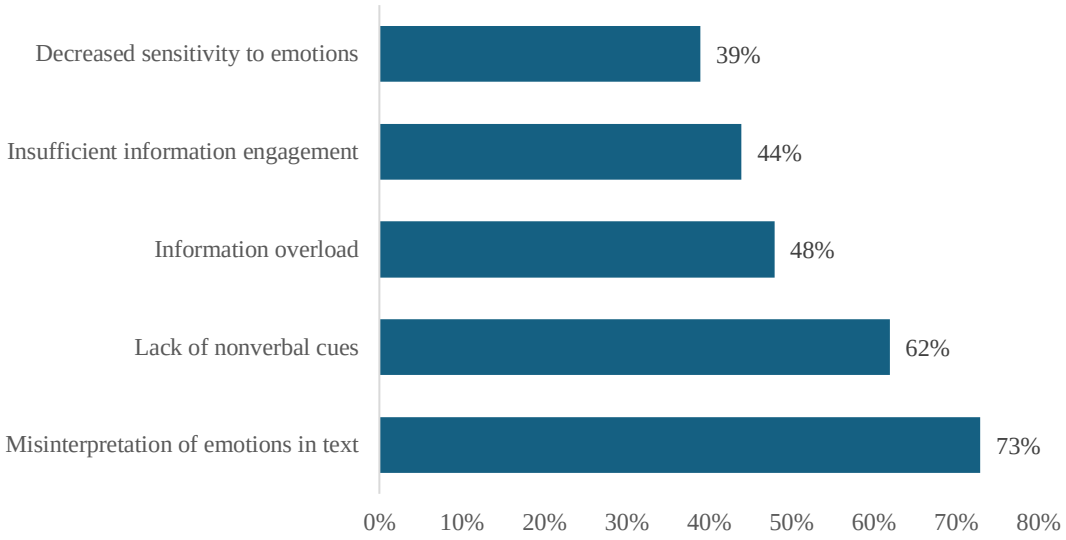


**Figure 4.10. Key Challenges of Digital Communication**

*Source: systematized by the author based on survey data*

Figure 4.10 illustrates the main challenges of digital communication, according to the survey results. It shows that the biggest problem is the lack of nonverbal signals (62%), which significantly complicates the transmission of emotions and the correct interpretation of the interlocutor's intentions.

The development of digital technologies creates unique opportunities for communication, but at the same time brings new challenges related to the psychological, ethical and technological aspects of digital empathy. Despite the fact that digital interaction contributes to the accessibility of communication, it can also increase social isolation, contribute to the spread of aggression and affect the emotional state of people.

On the one hand, digital empathy helps people better understand the emotions of interlocutors in a virtual environment. On the other hand, its

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formation occurs in conditions of numerous risks that can distort or even eliminate emotional interaction.

Digital interaction is accompanied by a number of risks that can negatively affect the emotional sphere of communication and even cause serious psycho-emotional problems.

**Table 4.5. The main threats to digital empathy**

| Factor | Risk Description |
|---|---|
| Anonymity and deindividuation | Many platforms allow users to remain anonymous, which can contribute to the dehumanization of communication and a lack of accountability for their words |
| Cyberbullying | The lack of face-to-face interaction makes it easier for aggressive behavior and online bullying, which can lead to emotional burnout and even depression. |
| Emotional burnout | The constant flow of information and emotional stimuli can lead to overload and reduced emotional sensitivity. |
| Emotional communication distortion | The use of emojis, GIFs, and short text messages often makes it easier to convey emotions, which can lead to a loss of depth in communication. |

*Source: systematized by the author*

A study by Smith & Jones (2021) confirmed that 72% of young people have experienced cyberbullying, and 60% of respondents noted that prolonged exposure to social media contributes to emotional burnout.

Figure 4.11 presents the respondents' answers to the question "What risks of digital interaction have you encountered?"

As can be seen from Figure 4.11, the most serious problem in the digital space is cyberbullying (72%), which causes emotional stress and negatively affects the mental state of users. A significant level of anonymity (68%) contributes to the dehumanization of communication, as people feel less responsible for their words and actions. These results emphasize the importance of developing mechanisms to protect digital empathy and creating an environment where people can interact without fear of emotional or psychological pressure.

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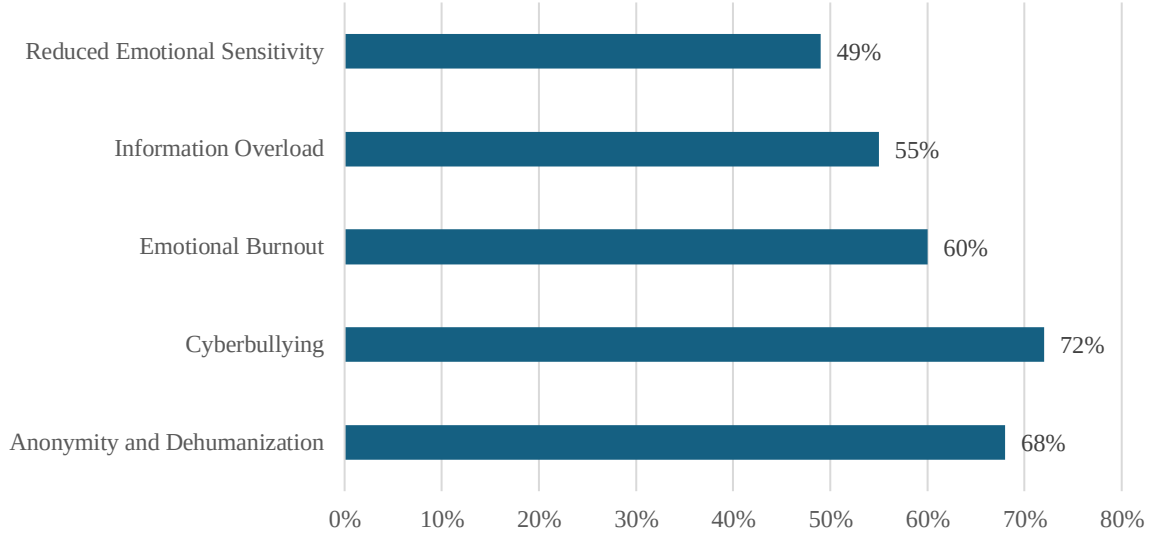


**Figure 4.11. Respondents' answers to the question "What risks of digital interaction have you encountered?"**

*Source: systematized by the author based on survey data*

In addition to the already mentioned areas of development of digital empathy, there are a number of innovative approaches that can make this process more effective and interactive. They include gamification of emotional experience, cross-disciplinary research and experimental platforms that allow creating new methods of analyzing and improving emotional interaction in the digital environment.

**2. Challenges of implementing digital empathy in the world of virtual communication.** Gamification is the use of game mechanics in non-game contexts to increase motivation and learning efficiency. In the field of digital empathy, this approach can promote the development of emotional intelligence skills through interactive scenarios and practical tasks.

Examples of gamification in the development of digital empathy:

-Interactive mobile applications: training programs where users go through levels related to recognizing emotional signals, active listening, and responding to social situations.

-VR simulations: immersion in virtual scenarios where the user must correctly interpret the emotions of characters and respond accordingly.

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-Online role-playing games: special game mechanics that encourage empathetic interaction (for example, social quests that require the player to consider the feelings of virtual characters).

In 2021, EmpathyVR created a program for training digital empathy, where users go through real-life situations of social interaction in a virtual environment. This helps to increase the level of understanding of emotions by 40% among the participants of the experiment.

Effectiveness of different methods in teaching digital empathy presented by Figure 4.12.

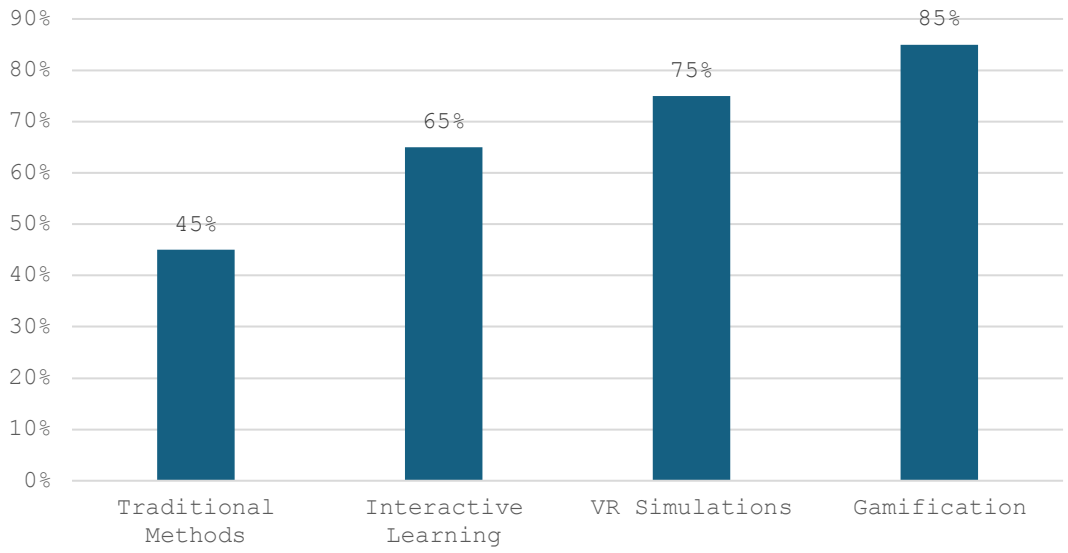


**Figure 4.12. Effectiveness of different methods in teaching digital empathy**
*Source: systematized by the author based on survey data*

As can be seen from the graph, traditional methods of teaching digital empathy have a relatively low efficiency (45%), while the use of VR simulations and gamification increases the level of digital empathy to 75-85%. This is explained by the fact that interactive scenarios allow users to practically master the skills of emotional interaction in a digital environment.

Digital empathy is not only a psychological or technological phenomenon, but an interdisciplinary phenomenon that combines several fields:

-Psychology - analysis of mechanisms of emotional perception in a digital environment.

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-Computer science - development of AI systems that recognize and respond to emotions.

-Ethics - consideration of privacy issues and the use of emotional data.

-UX design - creation of more convenient platforms for empathetic communication.

A team of scientists from the MIT Media Lab has developed an AI system that analyzes the tone of voice and text messages and provides recommendations for improving emotional communication.

Figure 4.13 presents the key disciplines in developing digital empathy. As the chart shows, digital empathy is the result of the interaction of several scientific disciplines. Psychology (35%) provides an understanding of emotional reactions, while computer science (30%) is engaged in the development of technological solutions to support them. At the same time, ethics (15%) regulates issues of privacy and responsible use of data, and UX design (12%) helps to make interaction more natural and comfortable.

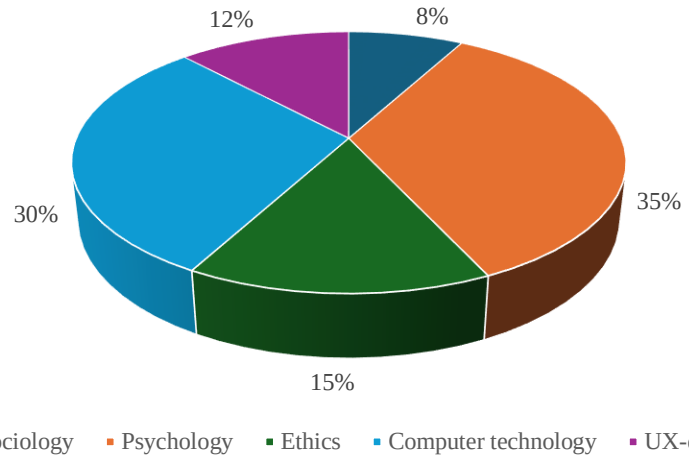


**Figure 4.13. Key disciplines in developing digital empathy**

*Source: systematized by the author based on survey data*

Psychology (35%) and computer science (30%) make the greatest contribution, which is explained by the need to understand emotional processes and develop technological solutions to support them. Ethics (15%), UX design (12%) and sociology (8%) also play an important role in shaping interaction standards and ensuring the convenience of digital communication.

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Digital empathy training programs are essential in fostering meaningful connections in virtual environments, enhancing communication in professional, educational, and social contexts.

Based on the results of the study, key digital empathy skills were systematized (Table 4.6).

**Table 4.6. Key skills for digital empathy**

| Skills | Description |
|---|---|
| Active listening | The ability to fully concentrate, understand, respond, and remember what is being said in digital conversations |
| Emotional awareness | Recognizing and understanding one's own emotions and the emotions of others in virtual interactions |
| Effective digital communication | Crafting clear, concise, and respectful messages across various digital platforms |
| Cultural competency | Understanding and respecting cultural differences to communicate empathetically in diverse environments |
| Conflict resolution | Managing and resolving conflicts in a constructive manner through digital channels |
| Non-verbal communication awareness | Interpreting digital non-verbal cues such as tone, punctuation, and emoji usag |
| Adaptability | Adjusting communication styles to suit different digital platforms and audiences |
| Ethical digital conduct | Upholding ethical standards in online interactions, including privacy, confidentiality, and respectful engagement |
| Feedback Reception and Delivery | Giving and receiving constructive feedback with empathy and professionalism |
| Resilience and Stress Management | Maintaining emotional balance and resilience in high-stress digital environments |

*Source: systematized by the author*

The following recommendations provide a structured approach to designing and implementing effective digital empathy training programs:

*1. Assessment of training needs* - identify specific gaps in digital communication and empathy within the target audience; engage with key stakeholders, including employees, educators, and students, to understand their expectations and challenges; use surveys, interviews, and self-assessment tools to establish a baseline understanding of current empathy levels and digital

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communication skills; analyze external factors such as industry trends, technological advancements, and cultural shifts that may influence digital communication.

*2. Curriculum development* - incorporate training on self-awareness, self-regulation, social awareness, and relationship management; develop realistic digital interaction scenarios to practice empathetic responses in varied contexts (e.g., emails, video calls, social media); include content that addresses cultural sensitivity and global digital communication norms; discuss the ethical implications of digital communication, such as privacy, data security, and respectful online behavior; teach strategies to manage digital stress and maintain emotional well-being in virtual environments.

*3. Interactive learning methods* - simulate digital communication situations where participants can practice empathy; utilize game-based elements to engage participants and reinforce learning outcomes; encourage constructive feedback among participants to reflect on their empathetic communication styles; organize workshops that include group discussions, case studies, and collaborative exercises to deepen understanding; combine online modules with face-to-face sessions to offer a flexible and comprehensive learning experience.

*4. Technology Integration* - implement AI-driven platforms to analyze communication patterns and provide real-time feedback on empathetic responses; create immersive VR scenarios that allow participants to experience situations from different perspectives; leverage common tools like email clients, chat applications, and video conferencing software for hands-on practice; utilize digital analytics to track engagement and participation, providing insights into the effectiveness of training modules; develop mobile-friendly content to facilitate learning anytime, anywhere.

*5. Facilitator Training* - Train facilitators to model empathetic behaviors effectively in digital interactions; provide ongoing learning opportunities for trainers to stay updated with the latest research and digital communication trends; establish communities of practice where facilitators can share experiences, challenges, and strategies for effective digital empathy training; equip leaders with the skills to promote and model digital empathy within their teams and organizations.

*6. Evaluation and Feedback Mechanisms* - measure changes in participants' empathy levels and digital communication skills; collect participant testimonials

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and case studies to evaluate the program's impact; regularly update the training curriculum based on feedback and emerging digital communication trends; conduct follow-up assessments to measure the long-term impact of digital empathy training on participants' behaviors and attitudes; establish KPIs to track progress and outcomes related to empathy and communication effectiveness.

*7. Sustaining Digital Empathy Practices* - establish online forums or groups where participants can continue sharing experiences and best practices; pair participants with mentors who can provide guidance on applying digital empathy in real-world settings; embed digital empathy principles into organizational values, policies, and everyday practices; implement systems to acknowledge and reward empathetic digital communication, reinforcing positive behaviors; create policies that support and promote digital empathy across all levels of the organization.

Implementing digital empathy training programs requires a comprehensive approach that blends theoretical knowledge with practical application. By integrating these recommendations, organizations and educational institutions can cultivate empathetic digital environments, enhancing communication, collaboration, and emotional well-being. A sustained commitment to digital empathy not only improves individual interactions but also fosters a culture of understanding, respect, and inclusivity in the digital age. As digital landscapes continue to evolve, prioritizing empathy will be key to building stronger, more connected communities.

**3. The opportunities for using digital empathy skills in the world of virtual communication.** During September-October 2024, we conducted a survey of residents of selected EU countries and Ukraine on the importance of digital empathy in their lives. 136 people took part in the survey, including 65.9% women and 34.1% men.

The largest group is made up of respondents aged 51-60 (31.6%), which may indicate interest in the topic under study among representatives of this age segment. The categories of 31-40 years (22.1%) and 41-50 years (22.1%) are fairly evenly represented, which makes them significant for the analysis. Younger participants (20-30 years) make up 19.9%, which is somewhat smaller, but still a noticeable group. Responses from people over 60 years old are much less common.

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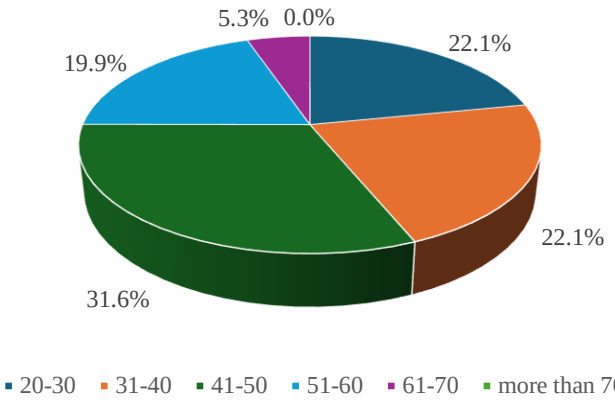


**Figure 4.14. Respondents' answers to the question about age**
*Source: compiled by the author based on survey data*

The results of assessing the self-assessment of digital skills level are presented in Figure 4.15. Most respondents rated their digital skills at an average level (50.7%), indicating some confidence in basic digital competencies. 27.9% have a high level, which is a good indicator of digital literacy. 9.6% demonstrated a very high level, which may be a more technologically savvy group. However, 10.3% have a low level of digital skills, which may indicate the need for additional training or adaptation of digital tools for this category.

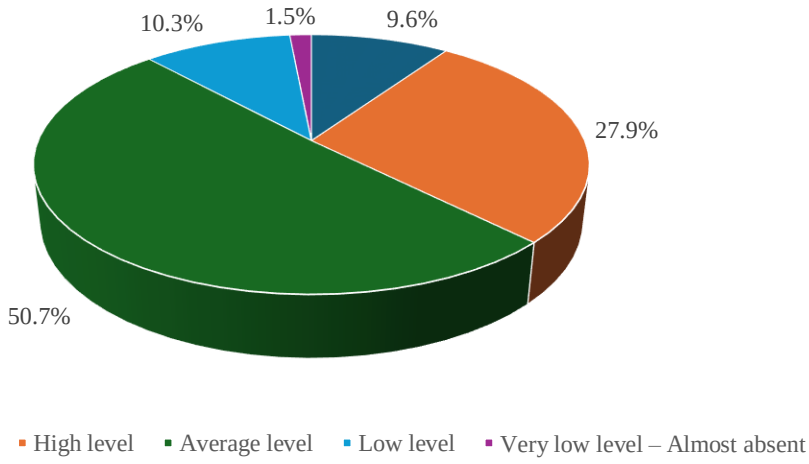


**Figure 4.15. Respondents' answers to the question "How do you rate your level of digital skills?"**
*Source: compiled by the author based on survey data*

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The results of assessing the frequency of use of digital technologies at work are presented in Figure 4.16. The vast majority of respondents (78.7%) use digital technologies every day, which indicates their importance in modern professional activities. A rather small percentage uses them 3-4 times a week (9.6%), and even fewer use them 1-2 times a week or rarely. This means that digital tools have become an integral part of the workflow of the majority of respondents.

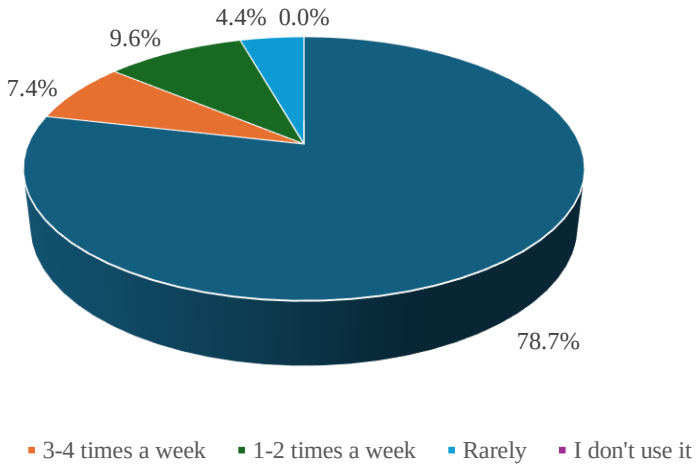


**Figure 4.16. Respondents' answers to the question "How often do you use digital technologies at work?"**

*Source: compiled by the author based on survey data*

The results of assessing the importance of empathy in digital communication are presented in Figure 4.17.

The majority of respondents consider empathy important in digital communication (36% – very important, 42.6% – important, but not always). This confirms the understanding of the significance of emotional intelligence in virtual communication. However, 20.6% remain neutral, which may indicate their orientation towards business-like, less emotionally colored communication. A very small percentage considers empathy unimportant.

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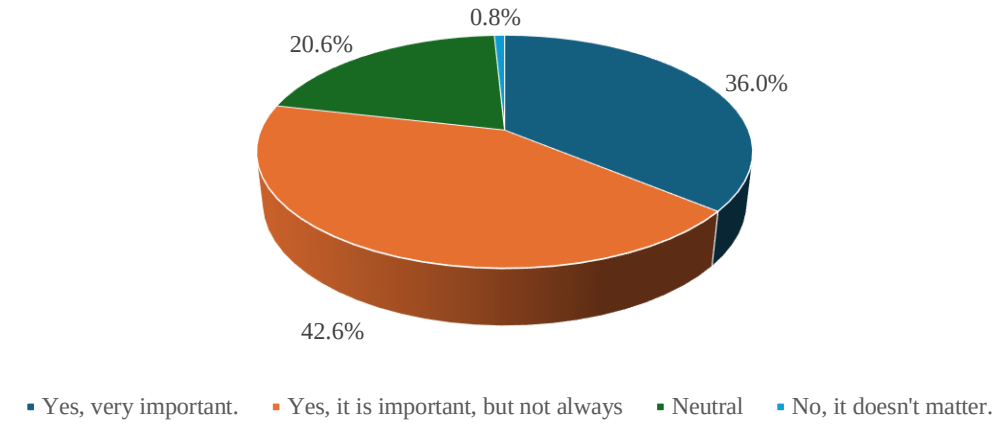


**Figure 4.17. Respondents' answers to the question "Do you think it is important to show empathy when communicating online (via email, instant messengers, video conferences)?"**

*Source: compiled by the author based on survey data*

The results of assessing the difference between in-person communication and digital communication in the context of showing empathy are presented in Figure 4.18.

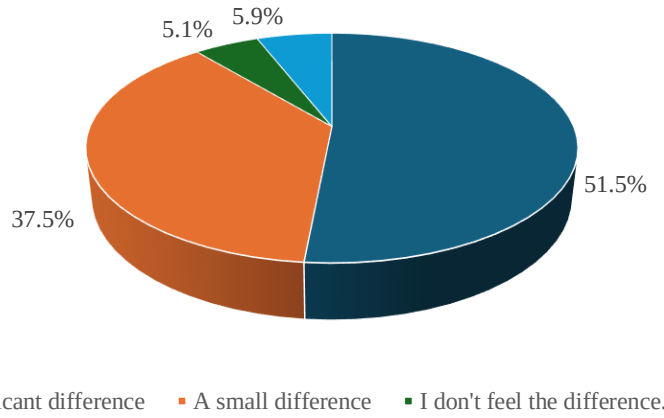


**Figure 4.18. Respondents' answers to the question "Do you feel a difference between personal communication and digital communication in the context of showing empathy?"**

*Source: compiled by the author based on survey data*

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The majority of respondents (over 89%) agree that there is some difference between face-to-face and digital communication when it comes to showing empathy. This may be due to the lack of nonverbal cues (gestures, facial expressions, intonation) in the digital environment, which makes it difficult to convey the emotional color of messages.

The results of the assessment of the possibility of completely replacing personal empathy with digital (virtual) empathy are presented in Figure 4.19.

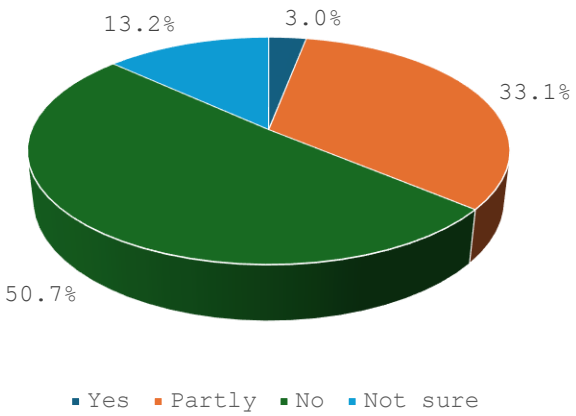


**Figure 4.19. Respondents' answers to the question "Do you think it is possible to completely replace personal empathy with digital (virtual) empathy?"**

*Source: compiled by the author based on survey data*

The majority of respondents (50.7%) believe that personal empathy can be completely replaced by digital (virtual) empathy, and 33.1% believe that it is partially possible. Only 13.2% of respondents disagree with them.

The results of the assessment of the possible impact of improving digital skills on the level of empathy at work are presented in Figure 4.20.

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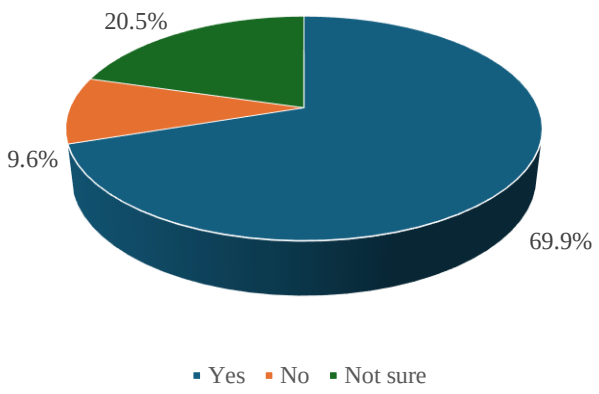


**Figure 4.20. Respondents' answers to the question "Do you think digital empathy is important for interacting with colleagues in your work?"**
*Source: compiled by the author based on survey data*

Two-thirds of respondents (67%) believe that improving digital skills will help develop empathy in online communication. This supports the idea that digital communication skills, including the ability to clearly express thoughts and convey emotions in text or video format, can improve interpersonal interactions. At the same time, 18.4% of respondents believe that digital skills do not affect empathy, which may indicate their belief in the importance of face-to-face contact.

The survey results regarding the digital empathy skills that respondents would like to improve are presented in Figure 4.21.

The greatest interest (41.2%) is in improving ways to express support and understanding. This may indicate a desire for people to learn how to convey emotions more effectively in text or video format. 31.6% of respondents would like to improve the style of written messages, which is important for professional communication. 24.3% would like to develop listening skills in digital communication, which is critical for quality communication.

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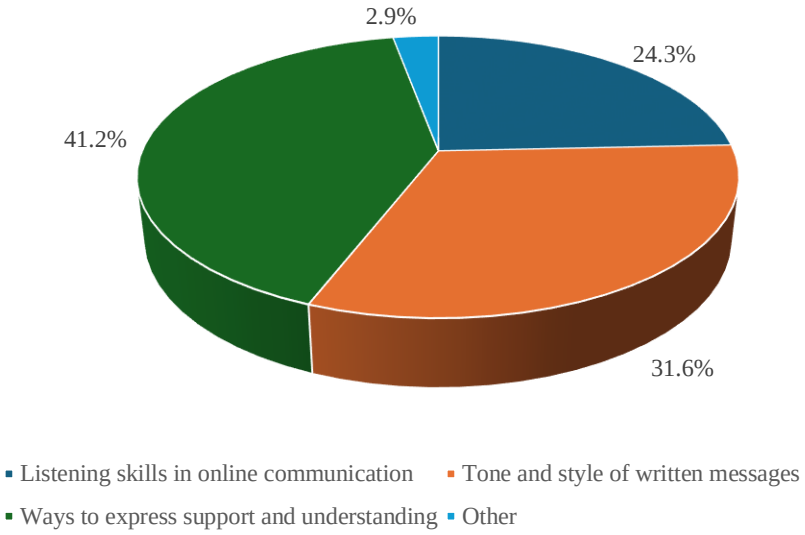


**Figure 4.21. Respondents' answers to the question "What practical skills or tools related to digital empathy would you like to improve?"**

*Source: compiled by the author based on survey data*

The results of the survey regarding respondents' desire to receive training in digital skills and empathy are presented in Figure 4.22.

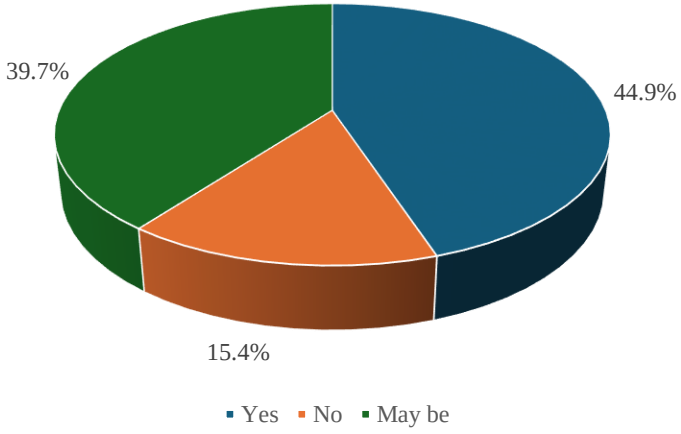


**Figure 4.22. Respondents' answers to the question "Would you like to receive additional education or training in digital skills and empathy to improve your interactions with others?"**

*Source: compiled by the author based on survey data*

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About 45% of respondents are interested in additional training in digital skills and empathy, which indicates the relevance of the topic. Another 39.7% answered “Maybe”, which means that their interest could increase if the benefits of training were clearly formulated. Only 15.4% are not interested, which is a small percentage.

The results of the survey on the impact of insufficient digital empathy on work quality are presented in Figure 4.23.

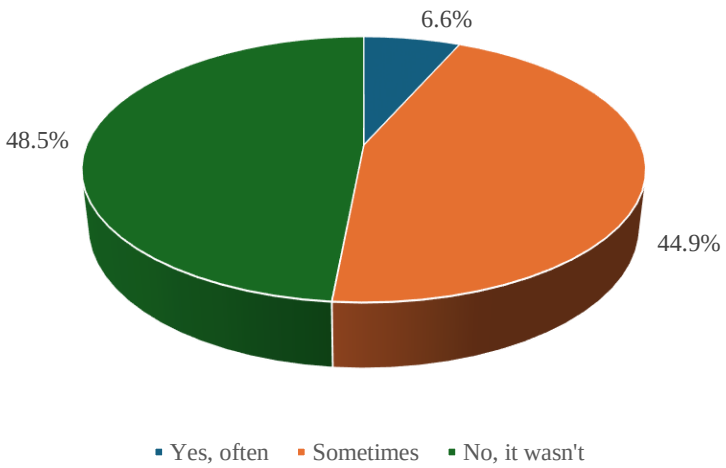


**Figure 4.23. Respondents' answers to the question “Have you had any instances where a lack of digital empathy affected the quality of your work?”**

*Source: compiled by the author based on survey data*

Although almost half of respondents (48.5%) did not experience negative consequences of a lack of digital empathy, 44.9% did experience it from time to time. This indicates the need to develop clearer rules for online communication and training on digital empathy. 6.6% experienced problems regularly, which is a small but significant indicator.

The results of the survey on the impact of digital empathy on the quality of service delivery are presented in Figure 4.24.

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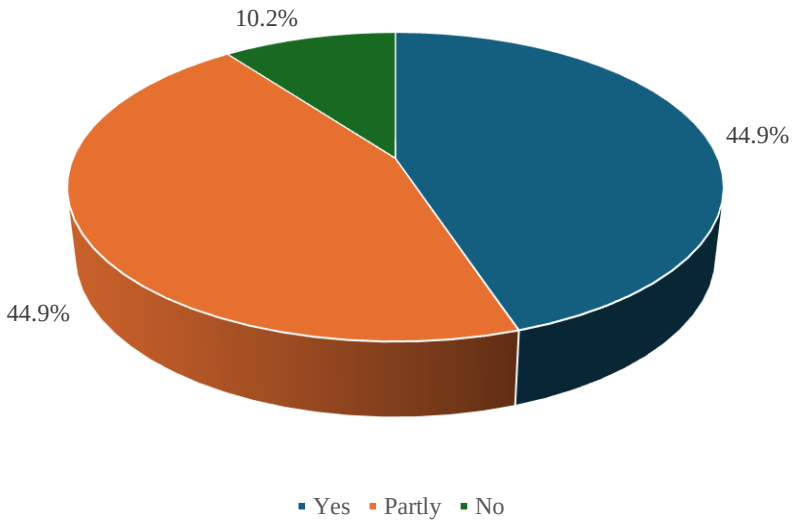


**Figure 4.24. Respondents' answers to the question "Have you felt that digital empathy has a direct impact on the quality of service delivery?"**
*Source: compiled by the author based on survey data*

Almost all respondents (90%) recognize the importance of digital empathy for quality service delivery – almost half consider it a key factor, the other half – a partial one. This confirms that even in the professional sphere of online communication, the emotional aspect should be taken into account.

**Conclusion.** The exploration of digital empathy within the context of virtual communication reveals its pivotal role in enhancing interpersonal interactions in a rapidly evolving technological landscape. The transition to digital environments, driven by factors such as the advancement of technology, global health crises, and the shift towards hybrid work models, has fundamentally altered the ways in which empathy is expressed and perceived. Digital empathy encompasses the ability to recognize, interpret, and respond appropriately to emotional cues in digital settings, bridging the gap created by the absence of traditional non-verbal signals.

The study underscores that video communication emerges as the most effective medium for conveying empathy, attributed to the presence of visual and auditory cues. In contrast, text-based platforms, while convenient, often lead to misunderstandings due to the lack of intonation and facial expressions. The

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incorporation of digital tools like emojis, GIFs, and AI-driven assistants has provided new avenues for emotional expression, albeit with certain limitations.

Moreover, the research highlights significant challenges, including emotional noise, cyberbullying, and emotional burnout, which can hinder effective empathetic communication. The risks associated with digital interaction, such as deindividuation and information overload, further complicate the emotional landscape of virtual environments.

Practical strategies, including the implementation of digital empathy training programs, have proven effective in mitigating these challenges. Training that integrates emotional intelligence, cultural competence, and technological adaptability fosters a deeper understanding and application of empathetic skills in digital contexts. Additionally, innovative approaches like VR simulations and gamified learning environments have demonstrated significant potential in enhancing digital empathy competencies.

Ultimately, the development and reinforcement of digital empathy are essential for fostering trust, reducing conflict, and improving the quality of interactions across professional, educational, and social domains. As digital communication continues to evolve, prioritizing empathy will be critical in building resilient, connected, and emotionally intelligent communities in the digital age.

**References:**

1. Burke, M., & Kraut, R. E. (2014). Growing closer on Facebook: Changes in tie strength through social network site use. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 4187–4196. https://doi.org/10.1145/2556288.2557094
2. Burlakova, I. (2024). The main directions of the development of digital well-being. *4th International Conference on Corporation*, Scientific Center of Innovative Researches OU, Management, 65-67. DOI: 10.36690/ICCM-2024-65-67
3. Burlakova, I. (2024). The impact of emotional intelligence and digital empathy on the financial stability of enterprises. *International Conference on Economics, Accounting and Finance*, Estonia, November 2024, 75-76. Available at: https://conf.scnchub.com/index.php/ICEAF/ICEAF-2024/paper/view/803
4. Burlakova, I., Sheviakov, O., & Kondes, T. (2022). Cognitive flexibility of thinking as a necessary condition for human adaptation to complex life situations. *Relationship between Public Administration and Business Entities Management*, Estonia, November 2022. Available at: https://conf.scnchub.com/index.php/RPABM/RPABM-2022/paper/view/481
5. Burlakova, I., Sheviakov, O., & Kondes, T. (2021). Coaching as a tool for the formation of corporate well-being. Available at: <https://conf.scnchub.com/index.php/ICEAF/ICEAF-2021/paper/view/306
6. Choi J, Shim SH, Kim S. The power of emojis: The impact of a leader's use of positive emojis on members' creativity during computer-mediated communications. PLoS One. 2023 May 18;18(5):e0285368. doi: 10.1371/journal.pone.0285368. PMID: 37200355; PMCID: PMC10194970.
7. Krueger, J., Patel, S., & Lim, Y. (2021). Empathy in digital communication: The role of AI and virtual interactions. *International Journal of Human-Computer Interaction*, *37*(5), 421–437.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

8. Klingensmtih, A. C. (2012). The capacity to delineate and interpret emotion in text messages. https://digitalcommons.liberty.edu/honors/317.
9. Konrath SH, O'Brien EH, Hsing C. Changes in dispositional empathy in American college students over time: a meta-analysis. Pers Soc Psychol Rev. 2011 May;15(2):180-98. doi: 10.1177/1088868310377395. Epub 2010 Aug 5. PMID: 20688954.
10. Liu, L., Niu, S., & Carassai, M. (2017, October). The impacts of using different methods to sense emotion in computer-mediated communication. In *2017 IEEE International Conference on Systems, Man, and Cybernetics (SMC)* (pp. 1214-1219). IEEE.
11. McStay, A. (2018). *Emotional AI: The rise of empathic media*. SAGE Publications.
12. Gualdo, A. M. G., Hunter, S. C., Durkin, K., Arnaiz, P., & Maquilón, J. J. (2015). The emotional impact of cyberbullying: Differences in perceptions and experiences as a function of role. *Computers & Education*, *82*, 228-235. https://doi.org/10.1016/j.compedu.2014.11.013
13. Scott Kruse, C., Karem, P., Shifflett, K., Vegi, L., Ravi, K., & Brooks, M. (2018). Evaluating barriers to adopting telemedicine worldwide: a systematic review. *Journal of telemedicine and telecare*, *24*(1), 4-12.
14. Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research, 23*(1), 3–43. https://doi.org/10.1177/009365096023001001

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*Monograph dedicated to the 5th anniversary*
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# Chapter 4.3. Psychological Fundamentals of Work Protection of Economic and Sports Specialists in the Age of Digitalization

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***Abstract***. *In the age of digitalization, the psychological foundations of occupational health have become increasingly significant for economic and sports specialists. The transition to a digital economy and the growing demands of professional sports necessitate the development of psychological resilience, stress management strategies, and occupational well-being initiatives. This chapter explores the theoretical foundations of occupational health, emphasizing the psychological aspects that influence professional performance in economic and sports fields. The primary aim of this study is to establish a conceptual framework for understanding and improving occupational health among specialists in economic and sports sectors. This study adopts a multi-dimensional approach combining theoretical research, empirical analysis, and case studies. The study involved surveys and structured interviews with 630 economic specialists and sports professionals. The assessment focused on professional stress levels, coping strategies, and the influence of leadership on workplace well-being. Data collected through surveys and case studies were analyzed using statistical tools to identify trends, correlations, and significant predictors of occupational health. The findings of this study highlight the growing importance of psychological resilience and mental well-being in occupational health management. By integrating these elements, organizations can enhance productivity, reduce burnout, and create a sustainable work environment that prioritizes mental well-being. As digital transformation continues to reshape the workforce, organizations must prioritize psychological resilience, stress management, and leadership development to ensure long-term occupational well-being. By fostering a culture of health awareness and proactive intervention, businesses and sports organizations can enhance productivity, employee satisfaction, and overall professional longevity. The insights presented in this chapter serve as a guide for future occupational health strategies, providing a foundation for continued research and policy development in the evolving professional landscape.*

***Keywords:*** *psychological resilience, occupational health, digitalization, economic security, leadership competencies, professional health, stress management, health management, sports specialists, digital transformation.*

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**1. Conceptual model of occupational health of economic professionals.** The study of leadership competencies and their development in the era of digitalization intersects with various domains, including health management, psychological resilience, and education.

Leadership development is strongly tied to psychological capital, which encompasses resilience, self-efficacy, optimism, and hope (Caza, 2010). Psychological capital plays a crucial role in authentic leadership, fostering a leader's ability to inspire and manage effectively. Research suggests that leaders with high psychological capital tend to experience greater well-being and performance outcomes (Culbertson, 2010). Furthermore, effective coping styles have been shown to mediate the relationship between psychological resilience and leadership effectiveness (Christian, 2011).

Resilience is an essential attribute for leaders, particularly in volatile environments characterized by digital transformation. Studies indicate that resilience correlates with higher self-esteem and lower levels of depressive symptoms, reinforcing its significance in leadership development (Chung, 2018). Moreover, an understanding of resilience mechanisms can aid in the creation of training programs that enhance leadership effectiveness.

Health management is an emerging field that significantly impacts organizational leadership. Research highlights that managing staff health should be an integral part of forming an effective organizational culture (Chmeruk, 2016). The well-being of leaders and employees contributes to overall organizational stability and efficiency. A strong emphasis on health management within organizations ensures sustained productivity and reduces workplace stressors (Burlakova, 2014).

Further, the connection between mental health and leadership effectiveness has been widely explored. Studies show that psychological rehabilitation and therapy interventions can aid in maintaining mental resilience among leaders, which in turn, influences their decision-making abilities (Arshava, 2019). Approaches like patient-centered care and integrated primary healthcare systems also play a role in enhancing mental well-being, reducing burnout among leaders (Constand, 2014; Coventry, 2015).

The importance of education and continuous professional development for leaders has been well-documented. Advanced training in psychology, particularly in rehabilitation and leadership coaching, enhances competencies required for

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managing organizations (Bengel, 2018). Moreover, the effectiveness of early interventions based on cognitive-behavioral approaches, such as acceptance and commitment therapy, has been validated in numerous studies (Bohlmeijer, 2011).

Leadership training should also integrate aspects of mental health awareness and stress management, given that untreated psychological distress can lead to treatment-resistant conditions that impact leadership capacity (Bennabi, 2015). Psychological predictors of health-preserving competencies among future specialists suggest that a proactive approach to mental well-being can contribute to sustainable leadership development (Burlakova & Sheviakov, 2021).

The formation of healthy lifestyles and psychological resilience in academic environments is an important determinant of future leadership capabilities. Research highlights the significance of promoting health awareness among students and faculty to foster long-term leadership potential (Kondes, 2019). Similarly, integrating health and leadership development in higher education institutions contributes to a nation's labor potential and workforce resilience (Apanasenko, 2018).

The literature emphasizes the interplay between leadership competencies, psychological resilience, and health management. Leadership training programs should incorporate psychological well-being strategies to develop more resilient and effective leaders. The findings suggest that fostering a health-conscious and psychologically resilient leadership approach is crucial in today's rapidly evolving digital landscape.

At the same time, existing approaches to the study of the phenomenon of professional health do not allow to analyze its structure as a holistic and complexly organized psychological education; operationalize the hierarchical model of professional health professionals.

Thus, there are currently unresolved problems in the field of professional health professionals, in particular the economic sphere of activity, and the unwillingness to highlight the socio-psychological foundations of the processes of its formation and preservation under the influence of global transformations of modern society and the development of the state.

The conceptual model of professional health professionals of the economic sphere model includes determining the level of professional health of each specialist with relevant conclusions and recommendations; preparation of SWOT-analysis of health; development for managers and specialists of the

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economic sphere of programs for the prevention of chronic fatigue syndrome, emotional burnout syndrome and professional deformation; counseling on individual health improvement programs, as well as developing and conducting corporate health-motivational mini-projects.

To operationalize the proposed model at the stage of the study, it involved 630 specialists of the economic sphere (bank employees, financial analysts, economist enterprises, investment projects and programs managers, managers) with different experience and professional experience (the average age of the subjects was 31.5 years). The professional group of working with internal clients (administrators, assistants, managers) was 240 people: 130 men and 110 women; A professional team working with external clients (sales managers, customer service managers, consultants) - 220 people: 124 men and 96 women; and in the professional group of executives (at different levels - from the head of the department to the general manager of a medium-sized business) - there were 170 participants - 92 men and 78 women.

It is determined that managers are more focused on the past and present, and those who work with internal clients - for the future ($p \leq 0,01$). We believe that this can be explained: in most cases, leaders have a rich life experience, a successful career that they remember with pride; in this their position implies an active participation in the life of their organization, decision-making; the future worries them to a lesser extent than other professionals who can only predict a successful career in the future. Regarding the high level of personality-situational anti-capability in the field of economic affairs, especially those who work with external clients ($p \leq 0,01$), we consider it logical: specialists who work with people are aware of their possible reactions, actions, actions and can foresee them. Specialists working with external clients must contact every day with a lot of new people, due to which their experience of communication is more diverse and larger.

It is revealed that specialists working with internal clients are more inclined to solve difficult situations through strategic planning and emocional support search, and those who work with external clients - through proactive and reflective overcoming ($p \leq 0.01$). We believe that professionals who work with external clients are often in contact with new people, they must deal with conflict situations, work in a constantly changing environment, and if possible, they seek to estimate potential risks and potential problems; and specialists working with

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internal customers often plan their future and seek support from more experienced and relevant individuals.

A few gender differences have been identified: men have higher rates at all three levels of occupational health than women ($p \leq 0.05$), except for health status (by degree of predisposition to diseases). It can be assumed that men are more likely to take leadership positions than women and have time and resources to maintain their health; Men pay less attention to manifestations of diseases and various ailments, therefore, in the questionnaire, self-esteem high marks about health and other indicators of professional health.

It is established that men have a more pronounced temporal orientation "Future", and women - "Transcendental future" ($p \leq 0.05$); women have a more pronounced tendency to emotional immersion in today's events, and in men - to structuring current events and planning future events ($p \leq 0.05$). In our opinion, this corresponds to certain facts and gender stereotypes: men are more focused and able to structure events that occur, and women are more inclined to religious ceremonies, more often turn to astrologers, horoscopes, search for certain "signs" given by the universe, etc. Men have a more pronounced spatial and temporal anti-smoking capacity than women ($p \leq 0.05$). Men have a greater tendency to strategic planning, reflection and preventive overcoming than women ($p \leq 0.05$). Perhaps this is in line with the public opinion: men are better strategists who can assess all risks in advance and take the necessary preventive measures, and women prefer to act in a situation.

It was found that the indicators of professional health are positively interrelated with the temporal prospects of the future and the subjective perception of the present time. This corresponds to the understanding of the prospect of the Future (according to F. Zimbardo), and due to the fact that professionals who feel active participants, the creators of their lives in the present, pay attention to strengthening their health.

It has been shown that for professionally healthy at all levels of specialists, high indicators of all three aspects of anticipatory ability are characteristic: they are well anticipating changes in space, time and communications with others, avoiding stressors and using the available opportunities in a timely manner.

It was found that pro-active behavior indicators are more positively correlated ($p \leq 0,01$) with indicators of all three levels of occupational health, except for indicators of "Search tool support" and "Search for emotional support".

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Search support from the outside, in turn, is inherent in infantile, self-sufficient specialists. In other aspects, the findings are consistent with numerous studies of proactive behavior.

It is found out that positive and rather high self-esteem of the experts of the economic sphere will be my physical and mental health is rather an indicator of their subjective well-being than the objective state of health. The lack or lack of competence in the field of management of their health is a potential limitation in the activities of specialists in the economic sphere. Moreover, self-preservation of health implies not only the awareness of the need to constantly fight for it, but also the confidence in their capabilities on this path. The latter means that the specialist must be able to "decipher" his mental state and influence it, know his most powerful and weak individual-typological features, be able to impartially, adequately assess the level of his physical and mental capabilities. Self-esteem, adequate self-esteem, ability to control your psyche and keep it under control are also important, which helps the specialist to protect himself from professional stress and contributes to the preservation of his professional health.

**2. System program-purpose project of formation and preservation of professional health of specialists of economic sphere.** The system program-target project of formation and preservation of professional health of the specialists of the economic sphere is proposed and the results of the formation stage of the research are presented.

Within the framework of the system program-specific project of the formation and preservation of professional health of the specialists of the economic sphere, the "Model of Strategic Prevention of Professional Health of Specialists in the Economic Sphere" was proposed, which consisted of 5 stages: diagnosis, capacity, planning, implementation and evaluation.

The diagnosis included the process of collecting and analyzing information about the needs and resources of specialists in the economic sphere in order to get an idea of the scale and context of the problem of professional health. This information should be collected using both quantitative and qualitative methods, and include archival statistics. The assessment informs about planning and decision-making on prevention, the basics of developing the model and the need for changes in the selection of health-care programs, policies on professional health professionals in the economic sphere.

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After completing the diagnosis of professional health professionals of the economic sphere, measures are required to develop and implement an integrated plan for solving socio-psychological problems of specialists at the level of the entire organization. This applies to such aspects as: corporate development and rallying of specialists; development of high organizational culture and "healthy" atmosphere in the team; professional and administrative support; effective leadership, adequate to the level (stage) of organizational development of the company and personnel; standards of formal and informal behavior in the organization; corporate loyalty and career growth of specialists; fair company career policy, no discrimination based on nationality / race, gender, age; clear and transparent (fair) system of fines and incentives; clarity of official duties and legitimacy of power.

The main tasks of socio-psychological support for the formation and preservation of professional health professionals of the economic sphere: psycho-emotional unloading; psychocorrection of personality deformations acquired as a result of burnout; learning "healthy coping" - constructive models of behavior of resistance; development of managerial skills (expansion of repertoire of managerial actions and strategies): increase of communicative competence, sensitivity (empathy) and communicative skills; development of relaxation skills, self-regulation and self-control; formation of positive and active living installations; development of creative potential; activation of the motivation of self-actualization and personal growth; planning personal and professional careers; Individual counseling on healthy lifestyles; creating an adaptive professional environment.

Within the framework of the programmatic and target-oriented project, a model is proposed for the formation of socio-psychological foundations for the formation and preservation of professional health professionals of the economic sphere.

The main directions of the process of social and psychological support of professional health of the specialists of the economic sphere are singled out: increasing the competence in the field of health, strengthening the reserve capacity of specialists and developing healthy behavior skills; prevention of dysfunction, or reduction of sources of professional stress. In practice, the implementation of these areas provided for the use of the following types of social

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and psychological support to ensure the effective professional activity of specialists in the economic sphere:

1. Psychological education - assistance in mastering the psychological knowledge necessary for self-improvement, improving the psychological competence in the field of health (lectures, special literature, video and audio materials, etc.).

2. Psychological diagnostics - the study of individual psychological peculiarities of the specialists of the economic sphere, on the basis of which assistance in individualization of professional activity, increase its efficiency, as well as self-knowledge.

3. Psychological prevention - prevention of the emergence and development of destructive mental states in the professional activities of specialists in the economic sphere ("burnout", internal conflicts, etc.).

4. Psychological counseling - analysis of specific situations that arise in the process of professional activity and help in choosing the most appropriate solution.

5. Psychological training - a specially developed complex of psycho-technicians, exercises and games that help in the development of the necessary qualities and skills, which allows not only to acquire new knowledge, but also to develop skills and habits of a healthy lifestyle.

6. Psychological correction - assistance in correcting or correcting existing negative mental states or personality traits, distorting the professional health of specialists in the economic sphere.

It has been shown that preventive activities aimed at the formation and preservation of professional health professionals of the economic sphere should be carried out at three levels: the specialist, the production group and the organization as a whole, since the action of preventive programs should be directed not only to a separate specialist in the economic sphere, but also to groups, as well as the organization as a whole, in order to provide social support in the process of changing relationships and style of life.

The system programmatic target project included comprehensive health improvement programs that contained a combination of leading aspects of the formation of the professional health of future professionals in the economic sphere. In particular, for the students at the universities of the economic profile of vocational training, a training workshop on the optimization of lifestyle "Self-

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management of health" was developed. Applicants of higher economic education have become participants in seminars and seminars based on a formula for healthy self-preservation. Each session consisted of three modules: 1) diagnostics of the basic components of professional health, methods of control and self-regulation; 2) stress; support for the body and the psyche, overcoming the syndrome of chronic fatigue and emotional burnout; 3) practical self-management.

In the Institute of Master's and Postgraduate Education at the University of Banking, the NBU, since May 2011, facultative classes "Business and Health" were offered to undergraduate students (specialties in finance and credit, banking, accounting and auditing). A coaching format was chosen for conducting classes, which was based on the idea that higher education graduates already have the key knowledge and skills necessary to maintain their occupational health status.

The content of the elective has aroused interest and practical value, and since September 2013, the selective discipline "Professional Health Management" was introduced, the purpose of which was to train graduates to be not only consumers and purchasers of health, but their creator, through conscious actions of the formation of social and an economic motive for the preservation and strengthening of their health. Another important point is the choice of a systematic approach to health, which allows individuals to control not so much the hidden symptoms of the disease, how to be able to assess the reserves of health reserves and be able to adapt to existing loads and conditions. At the trainings of higher education students, using exclusive information on professional health, the newest original diagnostic, adjusting and health-improving technologies, learned to independently develop comprehensive health improvement programs considering personal health, target-based prophylactic complexes for the locomotor system, vision, psycho-emotional states.

The ideology of the proposed health-saving programs contributed to the active and interested in mastering the methods of maintaining work capacity and resource status in the workplace, taking health-improving massage and self-massage, and auto-training. The self-monitoring module for objective and subjective health indicators provided an effective algorithm for the assimilation and subsequent use of positive healthy thinking - positive healthy emotions - positive healthy behaviors - positive healthy skills.

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The analysis of the results of the diagnosis of the level of subjective control (according to J. Rotter) showed that the ratio of introversion and extraversion from respondents approached to a balanced one. This is one of the indicators of an adequate attitude to the problem of formation of professional health and responsibility for its preservation. Regarding personal qualities such as neuroticism and psychosis, they decreased by 42% and 55% respectively. Self-confidence increased 1.5-2 times, and in some cases 3 times. Respondents noted an increase in motivation for the formation of professional health, a willingness to intensify the acquired skills of managing their psycho-emotional and physical condition, professional self-preservation. Implementation of health practices on health management gives a positive dynamic of results. Future experts in the economic sphere become more energetic and fuller of enthusiasm, it becomes easier for them to cope with stress and internal tension. The moral climate in the team improves, the relationship in it; the number of occupations is significantly reduced.

Note that the analysis of the diagnostic testing of personnel and monitoring their activities during the working day allowed to conclude that more than 80% of specialists in the economic sphere organized the work process from the standpoint of healthcare-saving approach. On the basis of the analysis of data of medical examination and psycho-physiological examination of specialists of the economic sphere, there is a positive dynamic of reduction of diseases, increase of productivity of activity; the cost of medical care is significantly reduced.

This becomes a particularly significant trend in the current conditions of development of the Ukrainian economy, which requires the effective implementation of the latest educational and recreational technologies, the success of which, in turn, is largely determined by the willingness of business space participants to operate in a continuous innovation regime, engagement in flexible, prompt response to the changing needs of modern societies.

It should be noted that health management in the workplace is more effective than traditional activities such as visiting fitness centers, swimming pools or expanded health insurance. The peculiarity of organizational health programs lies in the fact that all the knowledge and skills acquired can be used by specialists on their own and do not require significant additional costs.

In general, the implementation of the system program-target project for the formation and preservation of professional health professionals of the economic

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sphere has allowed: to increase the loyalty of specialists of the economic profile to organizations; to make more effective corporate governance; improve the company's image; build motivation for health and healthy lifestyles; to discover the hidden potential of each specialist; increase productivity; Improve the psycho-emotional climate of the team; to optimize the level of self-actualization of employees; to form a group of like-minded people, oriented on mutual understanding and interaction, which has a significant impact on the quality of life and professional health of specialists in the economic sphere.

Theoretical and methodological analysis and generalization of scientific approaches to the problem of studying the professional health of the individual are carried out. The main directions of professional health research, which are mostly pragmatic in nature, consist in the development and implementation of programs to strengthen it, and to eliminate the negative effects of stress in the workplace.

It is shown that the programs of strengthening the professional health of the specialists of the economic sphere are aimed at achieving the goals of the prevention of the phenomenon of "burnout"; increase of productivity of activity due to improvement of physical and mental condition of specialists, improvement of moral and psychological climate in a team and others like that. In both foreign and domestic practice, the diversity of approaches to strengthening professional health professionals in the economic sphere is to develop health management programs, stress management and includes information and diagnostic and rehabilitation and prevention modules. It should be noted that a significant place in the programs of health management occupy medical issues. Socio-psychological aspects of professional health professionals in the economic sphere are only partially considered in programs of stress management and in programs for improving wellness. The articulates the need to develop a conceptual model of professional health professionals of the economic sphere, which will solve issues related to its formation and preservation at different stages of the professionalization of these specialists.

It was determined that the professional health of specialists of the economic sphere is an integral characteristic of the functional state of the organism in terms of physical and mental parameters: an assessment of the ability to work, resistance to the adverse factors that accompany this activity. The main indicator of professional health professionals is ability to work, which reflects the indicated

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capabilities of a specialist and is defined as the maximum possible effectiveness of his professional activity, is determined by the functional state of the organism and takes into account its physiological value and consists of three groups of factors: physical status, psychological status and socio-psychological characteristic.

The indicators of professional health of the specialists of the economic sphere are: emotional stability, self-confidence, adequacy of behavior (adaptability, social activity), responsiveness, moral health (honesty, adherence to high moral principles), full life (social well-being, professional and personal success), sociability etc.

The basic principles of formation and preservation of professional health of specialists of the economic sphere, which integrate complex interpersonal relationships and are a measure of harmonization of social needs of the society and the possibilities of a specialist in the conditions of professional activity, are singled out. It is determined that the professional health of specialists of the economic sphere depends on their ability to restore the disrupted state of functioning in accordance with the regulation of the volume and type of professional activity; their professional health combines elements of psychosocial continuity of "generations" of professional groups, an integrated assessment of their life and work ability, especially in the context of fulfilling common tasks; professional health is determined by the motivation for professional activity and, in this sense, acts as a measure of social well-being.

The set of individual psychological characteristics of the personality and characteristics of the professional environment influencing the professional health of specialists of the economic sphere, which include: value orientations (high significance of physical and mental health, family life, interesting work and materially secured life), behavioral manifestations (adequate behavior, high level of energy, ambition and involvement in work, low level of hostility to others), stress factors of the professional environment (excessive preference coping strategies (search for social support, social contact, aggressive actions) and ways to relieve stress (communication with friends, sense of humor, active rest), coping strategies , physical education, etc.).

A conceptual model for the formation and preservation of professional health of the specialists of the economic sphere is proposed, which presents the main provisions of the theoretical-methodological, methodical and applied

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nature, which reveal: methodological principles, structural-functional model, stages (with definition for each stage of its goals , content, methodological support); programs for ensuring the processes of formation and preservation of professional health specialists of the economic sphere at different stages of their professionalization.

The construction of a conceptual model for the formation and preservation of professional health professionals of the economic sphere pursued the achievement of interrelated goals, which consisted in increasing their professional competence in the field of professional health, development of healthy behavior skills; increase of stress resistance, including through training of professionally oriented trainings and health improvement programs. The conceptual model of the formation and preservation of professional health professionals of the economic sphere provided: at the initial stage of the development of professional consciousness - the acquisition of an optimal set of knowledge, skills, skills that contribute to the formation and maintenance of professional health as a professional-quality quality effective expert in the economic sphere; support of high motivation for work in the economic specialty; formation of the ability to rational spending of forces on educational activity and, subsequently, rational spending of forces in the process of future professional activity; at the second stage - the formation and formation of professional consciousness in a specialist in the economic sphere with experience of up to 10 years - a high level of interpersonal communicative relations with management and colleagues in the team, socio-psychological compatibility, the success of the activities performed (timeliness and error-free professional actions, the ability not to create preconditions for yourself and for others for obstacles in professional activity; carrying out professional activity without threats to health); at the third stage - the formation and improvement of professional consciousness among specialists of the economic sphere with a work experience of 10-20 years - ensuring the reliability of professional activity (error-free performance of professional duties during the required time and under the given conditions of activity); ensuring labor safety (exclusion of accidents and occupational diseases); at the fourth stage - improvement of professional consciousness among specialists of the economic sphere with experience of more than 20 years - increasing the stress resistance to negative factors of the professional environment; continuing professional longevity.

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**3. Temporality of experience at the end of sosial development (in the context of designing a system of sport for the highest achievements).** In Ukraine still there is no the strategy of the modern system of sports, the higher achievements, the features of its development and implementation are not obvious. This strategy is needed, because at the Olympics in Rio de Janeiro (2016) 205 Ukrainians won 2 gold medals, and small countries such as: Hungary - 8, Croatia - 5, Uzbekistan - 4, Kazakhstan - 3 gold medals. The National University of Physical Education and Sports has a gallery of photo portraits of famous university students who have become Olympic champions. If you compare how many gold medals were won by them on average at each Summer Olympics over the years of the USSR, and then over the years of Ukraine's independence, the numbers will be impressive: accordingly 6.4 and 1.3 (!) Conditional gold medals. Ukraine won the same (1 gold) at the last Olympic Winter Games in Pyongchang (for comparison: the Netherlands, a country with a population of 17 million, which, like Ukraine, brought 33 athletes to the Olympic Games, won 8 gold medals).

The scientific problem is to substantiate the place of experience in the content of the strategy of the development of Olympic sport, as a step in its development. The strategy should be generalized, taking into account the socio-economic conditions of Ukraine, as an experience of countries similar in scope to Hungary and Croatia, as well as the existing important domestic positive experience that carries leading experts in the field of sport. But the practice of attracting and transferring the experience of specialists in this area has not been studied, and at all, it is not obvious to understand the need for its application.

Analysis of the philosophical and socio-cultural context of the use of the experience of training the athletes of the highest level of skill in the tasks of temporality (its transfer to the future) into the new, desired system of sports in Ukraine, which is being created.

The system, activity and subjective approaches in the context of philosophical and socio-cultural comprehension of the transfer and use of the experience of experts from among the leading trainers of Ukraine in the content of work on the design and further implementation of the new, modern strategy of development of Olympic sports are used in the work.

F.V. J. Schelling successfully described the situation of resistance to the new way: "If a system that completely changes or even overthrows the dominant views

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not only in everyday life, but also in most sciences, it meets, despite the fact that in it fulfilled the most rigorous proof of its principles, the constant resistance, even those who are able to follow the course of evidence and understand their obviousness, all this can be explained only by one - the inability to distract from the dominance of partial problems that our imagination ... readily extracts from the wealth of all slidnyh data and thus causing us embarrassment and excitement. It is impossible to argue the convincing evidence, there is also nothing credible and obvious that could be opposed to the proposed principles, but the fear of incredible consequences that inevitably seem to be inevitable, leads to despair and forces us to retreat from the same mind with all the difficulties that will necessarily entail the application of these principles" (Bushuev, 2021). And further important: "... The best test of any system is not only that it easily solves problems that previously seemed unsolvable, but also (it's scary-auth.) That it is putting forward entirely new , previously nobody was posed a problem, and, generating everything that was considered true, creates the truth of a new generation".

Attempts to put an end to reforms in the conservative part of the government actually exist. But there is also the need for a philosophical understanding of the difficult study and application of experience, its use during the social design of the system of sports training.

The term temporality is used as a synonym for time. The specificity of the category of temporality lies in the fact that it linguistically interprets the fundamental ontological and ideological category of time. The ontological time represents the dynamics of the world, all of its components undergoing permanent irreversible changes. This fundamental feature reflects the language. The vertex grammatical semantics of the linguistic sign, through which the system of language is implemented, is predicate, has in the structure a single ontological content component - temporality (Apanasenko, 2018). It is established, that the flow of time is divided by man into separate, indirectly perceived segments associated with the concepts of beginning and end, duration and short duration, speed and slowness, etc.

In our study, temporality was used in the context of identifying, evaluating and generalizing the individual experiences of its carriers in designing a new system of sport for higher achievements in Ukraine. Here the designer's action unfolds in the temporal space, and the duration of the action is the moment of its

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beginning (A), duration (B) and completion (C). The moment of the beginning, duration, and termination of action expresses the interval of time (Apanasenko, 2018). At the same time, the philosophical category of time expresses the time sequence of events that occur in the objective reality or are thought to be such as may occur.

To philosophical texts, in our opinion, temporality is relevant precisely because the temporality category is universal, generally grammatical, inter-level. And its denotate - ontological time - appears to be the basic, fundamental, ontological component in the construction and functioning of grammatical and general-language systems. Consequently, temporality is a general grammatical inter-level category, which is based on the semantics of efficiency, expressed in the verb, and reflects the internal, external and correlative aspects of the duration of action, grammatically interpreting the ontological time from the past to the future (Apanasenko, 2018).

H.-G. Gadamer asks how are knowledge and action related? And he gives the following answer: "(It is necessary) to learn to think the activity-historical consciousness so that, when realizing the work of action, immediacy and high dignity of the created are not reduced again all to the same reflexive reality - to think, therefore, such a reality in which the omnipotence of reflection has their limits. It was at this point that criticism focused on Hegel, and here the principle of reflexive philosophy really proved its superiority over all its critics. " And further: "The real disadvantage of the previous theory of experience ... lies in the fact that it is entirely oriented to science and therefore releases from (field) attention the internal historicity of experience" (Kondes, 2019). We agree with this thesis and consider it is necessary in the subject of experience to see a particular person.

Experience is the experience of human finiteness (the limits of what a person can). Experienced in the proper sense of the word, one who remembers this finitude, one who knows that time and future are not subject to him. An experienced person knows the limits of all foresight and the unreliability of all our plans. Experience achieves in it its higher truth, the highest value. If each phase of the whole process of obtaining experience was characterized by the fact that the person who acquires experience also found a new openness for a new experience, then this primarily refers to the idea of a perfect experience. Experience does not pass into the higher form of knowledge (according to Hegel),

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but right here the experience is for the first time in its entirety and is in fact present (Kondes, 2019).

Turning to the analysis of research carried out in recent years, we pay attention to a rather narrow circle of publications devoted to the problem of studying and applying experience in the tasks of its use in the design of social systems.

We take into account that the critical philosophy and the theory of education must be based on the critical theory of society, which conceptually analyzes the peculiarities of the real capitalist societies and their relations of domination and subjection (oppression), contradictions and perspectives for progressive social changes and transformative practices that they themselves create projects of a more complete, free life in a democratic society. The criticality of the theory means the way of seeing and understanding, building the categories that make the connection, reflection and participation in the theory of theory, the emergence of the theory of social practice. Critical theory is interdisciplinary, with the participation of analytical criticism from various academic sciences and trans disciplinary constructions of various branches of knowledge for the production of an objective multi-perspective view of the future society. Critical theory is the boundary of intersection, interaction and mediation, combining various aspects of social life in an integrated project of normative-historical thinking. Its meta-theories thus themselves contain models of a more holistic formation that unites different themes that are a dialectical integrity, but does not divide the material into narrowly disciplined knowledge. It is this kind of synthetic strategy for reforming the sport of higher achievements.

Account of experience, the account of "individual characteristics of consumers of collective concepts" and "social contexts of the use of concepts" is absolutely necessary, for example, in the decision-making process. It becomes especially apparent if we compare this process with its result - a decision taken on reform, in which the ambiguity and uncertainty should disappear. The decision of its essence is some result of the reasoning, and therefore it is always concluded. It should be clear,precise so as to exclude discrepancies. However, the decision-making process itself allows ambiguity, ambiguity, multiplicity of ways of realization.

Being used in the design of critical thinking is oriented to the analysis of "natural" considerations, not trying to fit them into the structure of formal logic.

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Procedures of reasoning, as already noted, are analyzed in the "anthropological" context, taking into account the peculiarities of the contemplative and acting subject, which is characterized by a certain will, target settings, educational and professional level, etc.

Convincing technologies are tools for motivating change in behavior using the logic of applying strategies. Socially oriented convincing technologies are based on three common components: competition, social comparison and cooperation. Research has shown that public opinion-based persuasive interventions lead to negative outcomes of demographic behavior, but lack knowledge of how interventions can motivate or motivate behavior.

Turning directly to the specifics of sport, we note that the practice of effective management of a regional educational institution sports profile is possible when integrating the special-professional and regulatory framework of the management of the institution with the system approach and the relevant organizational and pedagogical conditions. One of the important conditions, in his opinion, is the readiness of the head for effective work aimed at: creating a flexible and democratic management structure; maintenance of the logic, content and pace of innovative development of training practice in sport as a multi-profile and differentiated system; development of interpersonal, professional and sports interactions on the basis of subject-subject relations. Ensuring effective management in an institution requires the formation of a team of professionals, able to prepare a sports reserve for national teams, to ensure the growth of sports and professional skills of athletes. Solving this problem requires the creation in the sports organization of its own program of action and its implementation (Bushuev, 2021).

It is obvious that the development and implementation of the project of the desired system of training athletes of a higher level of skill, from the region to the general state level, requires a high level of competence of specialist designers. The pedagogical competence of specialists in the sphere of physical culture and sports is an integral part of his professional competence, which manifests itself in readiness and ability to perform pedagogical activities in the conditions of a single sports-educational process, which requires the availability of certain professional-personal qualities, knowledge, skills, and competences in pedagogical and sporting spheres.

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The essence of the pedagogical competence of the specialist in the sphere of sport, which is required in the development of a strategy of reforms, is revealed through the following tasks facing him:

- constant replenishment of their psychological and pedagogical knowledge and their adaptation to physical culture and sports, knowledge of the construction of the sports and educational process as an object of design, knowledge and skills to apply in the sports and educational process of modern psychological and pedagogical technologies; research, systematic description and explanation of the problems arising in the field of sports, from the standpoint of science (epistemological function);

- Planning and construction of the sports and educational process in accordance with modern requirements, selection and composition of educational material, planning of their actions and actions of pupils of all ages and level of athletic skill, designing of sports and educational process in the conditions of modernization of educational and sports-sports spheres (constructive function) ;

- inclusion of pupils in different types of sports activities, creation, if necessary, teams and organization of its joint activity, establishment of pedagogically appropriate relations with pupils, colleagues, the public (fans, sports clubs), as well as mass media (organizational and communicative function);

- application in the pedagogical activity of modern scientific approaches, critical thinking, skills of heuristic search and methods of scientific and pedagogical research, including analysis of own experience and experience of their colleagues (research function);

- comprehension of the fundamentals of its activity, during which the assessment and revaluation of abilities, errors and opportunities of pupils and oneself, the development of reflection in the course, and the construction of the "I-concept" in subjects of the sports process (reflexive function) are carried out (Chmeruk, 2016).

The article (Kondes, 2019) provides an example of the identification and synthesis of individual experiences in the interests of improving medical practice, from which it is evident that the authors were satisfied in this case with a survey of only 10 people that we took into account as a conditional limit.

In the first study aimed at updating and describing the experience of leading experts in sports, a survey was conducted by 18 Honored Coaches of Ukraine on

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various sports that work in the Pridneprovsk State Academy of Physical Culture and Sports and the Kharkiv State Academy of Physical Culture. The survey was conducted according to the author's questionnaire, which includes a number of open and closed questions.

Answers to the closed questions of questionnaire №1, obtained by interviewing experts, are summarized in Table. 4.7.

**Table 4.7. Responses of the Honored Coaches of Ukraine to the part of the closed ones questionnaire questions (n = 18)**

| № | Questionnaire question | Agree | Difficult to answer | Disagree |
|---|---|---|---|---|
| 1. | Do you agree with the statement that reform of sport in Ukraine is needed to create a truly effective sports training system? | 18 (100%) | - | - |
| 2. | Do you agree with the statement that as the transition from the initial training to the stage of maximum realization of individual opportunities increases as personal responsibility, as well as the ability of the athlete to influence the competitive? | 18 (100%) | - | - |
| 3. | Do you agree with the statement that sports activity, which manifests itself in personal responsibility, the ability to improvise, in making the right decisions during the competition, largely determines the final sporting result? | 18 (100%) | - | - |
| 4. | Do you agree that one of the main results of an effective system of sports training should be the formation of a responsible and independent person of the athlete, which can be said that it has formed a sporting activity? | 10 (55,6%) | 6 (33,3%) | 2 (11,1%) |

*Source: developed by the authors*

As can be seen from Table. 4.7, the first three questions were answered 100% "Agree". In this way, the Honored Coaches of Ukraine, selected as experts, have expressed their agreement that the reform of sport in Ukraine should create an effective system of training athletes. In addition, they unanimously agreed that the sports activity formed, which manifests itself in the individual responsibility of the athlete, his ability to improvise and make the right decisions during the competition undeniably affects and largely determines the final sporting result in the competitions.

As for the last question, the answers to it were distributed as follows: Agrees - 55.6%, Difficult to answer - 33.3% and Disagree - 11.1%. We will interpret the answers received in this way. For trainers who are accustomed to the fact that the result of the system of training athletes is an exclusively competitive result, which is judged by their professional activity, the very formulation of this question was

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unusual. Although only 55.6% agreed, previous answers to questions 1-3 indicate that most of them understand the important role of an athlete directly in achieving a high sporting result.

In the next survey, a survey of 9 Honored Coaches of Ukraine, working in the Pridneprovsk State Academy of Physical Culture and Sports. It was conducted on the author's questionnaire with the help of questions, which, apart from the actual content, described the respondents according to the type of sport and work experience.

The second part of the answers to the closed questions of questionnaire number 2, which were obtained through a survey of experts, summarized in the table. 4.8.

**Table 4.8. Responses of the Honored Coaches of Ukraine to the part of the closed ones questionnaire questions (n = 9)**

| № | Questionnaire question | Agree | Difficult to answer | Disagree |
|---|---|---|---|---|
| 1. | Do you agree that besides the coach, the athlete himself is responsible for the competitive result? | 9 (100%) | - | - |
| 2. | Do you agree that it is incorrect to consider an athlete in the preparation for higher achievements and at subsequent stages only as the object of management? | 9 (100%) | - | - |
| 3. | Do you agree that from the stage of initial training to the stages of maximum realization of individual capabilities and the preservation of higher sportsmanship, the role of the athlete in achieving a high competitive outcome is constantly increasing? | 9 (100%) | - | - |
| 4. | Do you agree that in many ways, for example, in sports games and martial arts, an athlete who has learned to make the right decisions in the light of the situation is decisive? | 7 (77,8%) | 1 (11,1%) | 1 (11,1%) |
| 5. | Do you agree that the professional position and actions of the coach largely determine the peculiarities of becoming an athlete as a subject of sports activities? | 8 (88,9%) | - | 1 (11,1%) |
| 6. | Do you agree that, having seen the desire to express an opinion on the preparation, perhaps already at the stage of specialized basic training and on the following, the trainer should support the athlete, thereby contributing to his becoming a subject of sports activities? | 7 (77,8%) | 1 (11,1%) | 1 (11,1%) |
| 7. | Do you agree that one of the main effects of sports training should be the formation of a responsible and independent person, which can be said that it has formed a phenomenon of sports activities? | 7 (77,8%) | 1 (11,1%) | 1 (11,1%) |
| 8. | Do you agree that coaches should be prepared to be able to contribute to the formation of an athlete as a sports subject and to successfully interact with him? | 9 (100%) | - | - |

*Source: developed by the authors*

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As can be seen, for the first three questions, and also for the eighth question, 100% of the answers were "Agreed". In this way, the Honored Coaches of Ukraine, selected as experts, expressed their agreement that the system of training should create conditions for the formation of the subject of sports activities. And coaches should be trained to be able to contribute to the formation of an athlete, as a sports subject, and to successfully interact with him. That is, do not control "force", but understand and take into account that as the athlete's skill grows, he must play an increasingly important role in the competitions, in achieving a high sporting result.

Even those questions of the questionnaire, namely No. 4-7, which did not cause unanimity in the responses, confirmed the legality of their statement to the experts and the obvious importance for improving the training system of athletes. After all, and obviously, support by expert agreement in the range of from 77.8% to 88.9% clearly indicates the importance of these posed issues.

The questions of the questionnaire were extremely important: "Given the role of the trainer and the athlete as the subjects of sports activities, estimate the contribution of the coach and the athlete to the received sports result at the various stages of preparation". Given its weight, we put the content of the responses in a separate table (respondents' answers are given in Table 4.9).

**Table 4.9. Assessment by the Honored Coaches of Ukraine of the contribution of the trainer and an athlete in a sports result at different stages of training (n = 9)**

| Stage of preparation | The subject | % | The subject | % |
|---|---|---|---|---|
| Specialized basic | coach | 75,6 | sportsman | 24,4 |
| Preparations for higher achievements | coach | 63,9 | sportsman | 36,1 |
| Maximum realization of individual possibilities | coach | 53,3 | sportsman | 46,7 |
| Preservation of the highest sporting skills | coach | 47,8 | sportsman | 52,2 |

*Source: developed by the authors*

In the general philosophical part, for the first time in the design of the system of sports, analyzed and generalized work on the essence of the phenomenon of experience and the difficulties of its transfer (from the bearers of experience to practice, which objectively needs to be reformed).

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In the experimental part the data is shown in Table. 4.9, as well as those included in Table Table. 1 and 2, have an indisputable scientific novelty. For the first time, with a high objectivity, the role (in%) of each of the participants in the process of sports training in achieving a competitive outcome at different stages of training is established. It is shown that at the stage of specialized basic training the role of the trainer is estimated at an average arithmetic of 75.6%, and the role of the athlete is 24.4%. At the stage of preparation for the highest achievements, the role of the coach is estimated at 63.9%, and the role of the athlete has increased significantly and estimated - 36.1%. At the stage of maximum realization of individual opportunities, the role of the coach is estimated at 53.3%, and the role of the athlete has increased even to 46.7%. Finally, at the stage of maintaining the highest sporting skill, it is estimated as follows: the coach is 47.8%, and the athlete is more than the coach, namely 52.2%.

**Conclusions.** The socio-psychological specificity of the research of professional health specialists of the economic sphere was revealed, which was to determine the socio-psychological factors of their professional health, such as: determining the place of professional health in the system of values of specialists; study of the structure of stress factors in their professional activities; Identification of the relationship of individual psychological characteristics and specifics of professional health professionals; Identify the main strategies and ways to overcome stress situations in professional activities; formation of professional qualities that will support the support of professional health professionals of the economic sphere; achievement of the optimal ratio of energy (personal) costs and achieved results in the course of professional training ("effectiveness / resources"). The optimization of this process was seen in the need to take into account the typology of competence of a specialist in the economic sphere, namely: learning to know (vocational and methodological competence); learning to live together (social and communicative competence); learning to do (competence in the activity aspect, implementation of plans in life); learning to be (competence in the personal aspect).

The system program-target project for the formation and preservation of professional health professionals of the economic sphere at various stages of their professionalization based on the strategies of the system approach, the social cognitive theory, the model of behavioral potential and the constructivist socio-psychological approach during its realization is developed and implemented.

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System program-target project for the formation and preservation of professional health of specialists of the economic sphere allowed to solve the problem of increasing the professional and creative activity of specialists; contributed to the development of the socio-psychological competence of specialists in the formation and preservation of their professional health; to influence group self-awareness in the direction of maintaining and maintaining professional health; effective use of various forms of moral encouragement; the formation of a favorable socio-psychological climate, etc.

The main components of the effective implementation of the project are the formation of professional health, taking into account active social and psychological methods of training and assistance; carrying out of measures in the direction of professional self-realization of specialists of the economic sphere, in particular, vocational guidance competitions; creation and development of services of psychological support and assistance to the specialists of the economic sphere; motivation and stimulation of the specialists of the economic sphere for productive work; implementation of preventive and motivational training aimed at developing the competence of specialists in the field of professional health formation, raising the level of professional self-awareness; assimilation of effective forms of work (self-disclosure, self-expression, self-knowledge, empathy, development of sanogeneous thinking and reflection, the need for relaxation); the formation of effective skills for maintaining health in the workplace and setting up a healthy lifestyle.

In the prospect of research, we see the definition of the characteristics of professional health professionals of other fields of activity, as well as the study of the process of becoming a professional health at different age stages of life personality (maturity, late maturity, in old age). The in-depth study and the problem of attracting and training psychologists, teachers, and managers to participate in the process of formation and preservation of professional health of the individual in various spheres of his activity is in need of in-depth study. It is urgent to further develop socio-psychological trainings and correctional systems that will promote the prevention of negative manifestations associated with professional destructions of specialists, as well as their professional health.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

## References:

1. Apanasenko, L. G. (2018). Health of the nation and labor potential of Ukraine. *Scientific notes of the Institute of Economics, Management and Business Law*, 2, 69-121.
2.Kondes, T. V.(2019).On the issue of the formation of healthy lifestyles for students and teachers of the Institute of Economics, Management and Economic Law. *Scientific notes of the Institute of Economics, Management and Business Law*, 3,176-178.
3.Burlakova, I.(2014). Role and place of health management in the system security personnel of business entities : *Economics and management: problems of science and practice: Collection of scientific articles*, 2,Verlag SWG imex GmbH. 237.
4.Chmeruk, G.(2016). Health management of staff as a fundamentally new approach in formation of the organizational culture of the enterprise : *Trends in the development of national and world science: Collection of scientific articles*,2, Verlag SWG imex GmbH. 242.
5.Bushuev, Yu. V. (2021). On medical problems of physical education in high schools. *Collection of scientific works of the NMAPE employees. P. L. Shupik*, 10, 1225-1229.
6.Arshava, I.F. (2019). Age aspect of psychological rehabilitation potential of patients with depressive disorders and its influence on the process of rehabilitation. *Science and education a new dimension. Series : Pedagogy and Psychology*. Vol. VII (77), Issue: 188. Budapest : Society for Cultural and Scientific Progress in Central and Eastern Europe, 77 – 79.
7.Bengel, J. (2018) Education, advanced and further training in the field psychology in rehabilitation . *Rehabilitation (Stuttg)*. Vol. 53(2), 124 – 130.
8.Bennabi D. (2015). Risk factors for treatment resistance in unipolar depression. *A systematic review . J. Affect. Disord*. Vol. 171, 137 – 141.
9.Bohlmeijer, E. (2011). Efficacy of an early intervention based on acceptance and commitment therapy for adults with depressive symptomatology: Evaluation in a randomized controlled trial. *Behav Res Ther.* Vol. 49(1), 62 – 67.
10.Caza, A. (2010). Psychological capital and authentic leadership. *Asia-Pacific Journal of Business Administration.* Vol. 2, №.1, 53 – 70.
11.Christian, A. (2011) Coping style as a mediator of the relationship between depressive symptoms and deliberate self-harm. *Crisis.* Vol. 32, № 5, 272 – 279.
12.Chung, J. (2018). Relationships among resilience, self-esteem, and depressive symptoms in Chinese adolescents. *J. Health Psychol.* Vol. 19, 13 – 59.
13.Constand, M.K. (2014). Scoping review of patient-centered care approaches in healthcare. *BMC Health Serv Res.* Vol. 14, 271–272.
14.Coventry, P. (2015). Integrated primary care for patients with mental and physical multimorbidity: cluster randomised controlled trial of collaborative care for patients with depression comorbid with diabetes or cardiovascular disease. BMJ. Vol. 350, 637–638.
15.Culbertson, S. (2010). Feeling good and doing great: The relationship between psychological capital and well-being. *Journal of Occupational Health Psychology*. Vol.15. № 4, 421 – 433.
16.Burlakova, I, Sheviakov, O. (2021). Psychologycal predictors of the formation of health-preserving competentmess of future specialists. *Public administration and Law Review.* 4(8), 74-79.

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# SECTION 5:
# GLOBAL PERSPECTIVES ON DIGITAL SKILLS AND EDUCATION

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*Monograph dedicated to the 5th anniversary*
*of Scientific Center of Innovative Research's activities*

# Chapter 5.1. Digitalizing Economic Education in Poland: Challenges, Innovations, and Opportunities

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***Abstract.*** *This study explores the digitalization of economic education in Poland, emphasizing its evolution, current state, challenges, innovations, and opportunities. The study outlines the transformative impact of digital technologies on traditional educational models and highlights the growing necessity for digital competencies in economic education. The primary purpose of this research is to analyze the key trends, challenges, and innovations in the digitalization process, while identifying opportunities that can enhance the effectiveness and accessibility of economic education in Poland. The research methodology is based on a comprehensive analysis of the evolution of digital economic education, supported by qualitative data derived from case studies, educational policy reviews, and an assessment of digital tools implemented in various educational institutions. The study also employs a comparative approach to evaluate the adoption of digital technologies across different periods and educational levels. The results reveal a dynamic progression in the digitalization of economic education, from the initial integration of Information and Communication Technology (ICT) in the 1990s to the current widespread use of advanced technologies like Artificial Intelligence (AI), big data analytics, and immersive tools such as Virtual Reality (VR) and Augmented Reality (AR). The research highlights significant innovations, including personalized learning platforms, simulation software, and digital assessment methods that have enhanced both teaching methodologies and student engagement. Despite these advancements, the study identifies persistent challenges such as the digital divide, limited digital competencies among educators, curriculum adaptation issues, and cybersecurity concerns. The practical value of this research lies in its comprehensive analysis, which offers strategic recommendations for policymakers, educators, and educational institutions. It provides insights into optimizing digital tools for economic education, fostering inclusive learning environments, and preparing students for the demands of the digital economy. The findings contribute to the development of resilient, future-oriented educational frameworks that support continuous learning and digital literacy in Poland's economic education landscape.*

***Keywords:*** *digitalization; economic education; digital skills; Poland; e-learning; information and communication technology; artificial intelligence; virtual reality; educational technology; curriculum innovation; personalized learning.*

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**1. The Evolution of Digitalizing Economic Education in Poland.** In the era of rapid technological advancement, the digitalization of education has emerged as a transformative force reshaping traditional learning paradigms across the globe. In Poland, this shift holds particular significance within the realm of economic education, where the integration of digital tools and methodologies has the potential to enhance both the accessibility and quality of learning experiences. As economies become increasingly interconnected and knowledge-driven, equipping students with the digital competencies necessary to navigate complex economic landscapes is not merely an educational objective but a national imperative.

The development of digitalizing economic education in Poland has been a dynamic process influenced by global technological trends, national educational reforms, and socio-economic transformations. This section traces the evolution of digital economic education from its early stages to the current state, highlighting key milestones, policies, and technological advancements.

*Early Stages: The Introduction of ICT in Education (1990s - Early 2000s).* The foundation for digital economic education in Poland was laid in the late 1990s with the introduction of Information and Communication Technology (ICT) into the educational system. During this period, Poland was transitioning from a centrally planned economy to a market-oriented one, necessitating significant reforms in both economic policy and education. The government recognized the importance of ICT in fostering economic literacy and competitiveness.

Initial efforts focused on equipping schools with basic computer infrastructure and providing introductory courses on computer literacy. Programs such as "Internet in Every School" aimed to increase connectivity, though the pace of implementation varied significantly across regions. Economic education remained largely traditional, relying heavily on textbooks and lecture-based teaching, with limited integration of digital tools. However, these early initiatives set the stage for future advancements by familiarizing educators and students with basic digital competencies and creating awareness of the potential of technology in education.

*Growth Phase: Integration of E-Learning Platforms (Mid-2000s - 2010s).* The mid-2000s marked a significant shift with the integration of e-learning platforms into economic education. The widespread adoption of the internet and

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the increasing availability of affordable digital devices facilitated this transformation. Educational institutions began to experiment with online courses, virtual classrooms, and multimedia resources to enhance the teaching of economic concepts.

Government programs, such as the "Polish Digital School" initiative launched in 2012, played a crucial role in promoting digital education. This program aimed to improve digital infrastructure, provide training for teachers, and develop digital teaching materials. It focused on enhancing students' digital competencies through interactive content, collaborative projects, and the use of online resources. Additionally, universities and vocational schools started offering blended learning models, combining face-to-face instruction with online modules, to make economic education more flexible and accessible.

Innovative projects like "e-Podręczniki" (e-Textbooks) provided free, interactive digital textbooks that supported the national curriculum, including economic subjects. These resources allowed students to engage with dynamic content, such as videos, quizzes, and simulations, which enriched the learning experience and promoted active participation.

*Acceleration: The Impact of the COVID-19 Pandemic (2020 - 2021)***.** The COVID-19 pandemic served as a catalyst for the rapid digitalization of economic education in Poland. The sudden shift to remote learning exposed both strengths and weaknesses in the existing digital infrastructure and pedagogical approaches. While some schools adapted quickly, leveraging advanced e-learning platforms like Microsoft Teams, Zoom, and Google Classroom, others struggled due to inadequate technological resources, lack of digital skills among educators, and socio-economic disparities among students.

Despite these challenges, the pandemic accelerated the adoption of digital tools and methodologies. Teachers explored innovative approaches, such as flipped classrooms, where students engaged with lecture materials at home and participated in interactive discussions during online classes. Blended learning models became more prevalent, combining synchronous (live) and asynchronous (pre-recorded) content to offer flexibility and accommodate different learning styles.

The pandemic also highlighted the importance of digital assessment tools. Educators increasingly used online quizzes, automated grading systems, and data analytics to track student performance and provide timely feedback. Moreover,

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collaboration tools like Padlet, Mentimeter, and Kahoot became popular for fostering student engagement and interactive learning.

*Current Trends and Future Directions (2022 - Present).* In the post-pandemic era, digital economic education in Poland continues to evolve, driven by advancements in technology and a growing recognition of the need for digital competence in the global economy. Current trends include the integration of Artificial Intelligence (AI) and machine learning to personalize learning experiences, the use of blockchain for secure credentialing, and the incorporation of augmented reality (AR) and virtual reality (VR) to create immersive learning environments.

AI-powered educational platforms are enabling personalized learning paths, where algorithms analyze student data to adapt content to individual needs and learning paces. This approach enhances student engagement and improves learning outcomes. Additionally, blockchain technology is being explored for secure, verifiable academic credentials, reducing administrative burdens and ensuring the authenticity of educational records.

The "Polish Education Development Strategy 2030" emphasizes the importance of digital transformation in education. These policies aim to address digital inequalities, promote STEM (Science, Technology, Engineering, and Mathematics) education, and support lifelong learning initiatives. Investments are being made in upgrading digital infrastructure, enhancing teacher training programs, and developing new curricula that integrate digital literacy with economic education.

Collaborative partnerships between educational institutions, technology companies, and government agencies are fostering the development of innovative digital resources and pedagogical practices. Initiatives like "Future Classroom Labs" and "Digital Innovation Hubs" are providing educators with access to cutting-edge technologies and training to integrate them effectively into their teaching practices.

The evolution of digitalizing economic education in Poland reflects a broader global trend towards the integration of technology in education. From the initial introduction of ICT in the 1990s to the current era of AI-driven personalized learning, Poland has made significant strides in leveraging digital tools to enhance economic education. While challenges remain, particularly in ensuring equitable access, continuous teacher training, and the effective use of

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emerging technologies, the future of digital economic education in Poland holds great promise.

**Table 5.1. Evolution of digital education in Poland**

| Period | Key Features |
|---|---|
| 1990s - Early 2000s | Introduction of ICT in education, basic computer literacy, government programs like 'Internet in Every School', familiarization with digital tools. |
| Mid-2000s - 2010s | Integration of e-learning platforms (Moodle, Google Classroom), 'Polish Digital School' initiative, e-Textbooks, blended learning models. |
| 2020 - 2021 | Rapid digitalization due to COVID-19, adoption of remote learning tools (Microsoft Teams, Zoom), flipped classrooms, digital assessment tools. |
| 2022 - Present | Advanced digitalization with AI and blockchain, personalized learning, AR/VR in education, 'Polish Education Development Strategy 2030', strategic partnerships. |

*Sources: developed by author*

Ongoing innovations, supported by robust policy frameworks and strategic partnerships, are key to preparing students for success in the digital economy and fostering a resilient, future-ready education system.

**2. Current state of digitalization in economic education in Poland**. The digitalization of economic education in Poland has advanced significantly in recent years, influenced by technological innovations, educational reforms, and the accelerated adoption of digital tools during the COVID-19 pandemic. This section explores the current landscape, highlighting key trends, technologies, and challenges shaping the digital economy education environment.

*Technological integration in classrooms*. Polish educational institutions have increasingly embraced digital technologies, with widespread use of e-learning platforms such as Microsoft Teams, Moodle, and Google Classroom. These platforms facilitate interactive learning, enabling students to engage with multimedia content, participate in virtual discussions, and access course materials remotely. The integration of Learning Management Systems (LMS) has streamlined course administration, assessment, and student tracking.

Advanced technologies like Artificial Intelligence (AI) and data analytics are being incorporated to personalize learning experiences. AI-driven tools help tailor educational content to individual student needs, promoting adaptive learning pathways. Additionally, virtual reality (VR) and augmented reality (AR) are gaining traction, providing immersive simulations that enhance students'

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understanding of complex economic concepts, such as market dynamics, supply and demand mechanics, and financial systems.

Economic education at the university level is leveraging sophisticated simulation software that models real-world economic environments. These tools allow students to engage in virtual trading floors, run simulated businesses, and analyze macroeconomic scenarios. Furthermore, online collaborative tools are enabling group projects and cross-border academic collaborations, broadening the scope of economic education beyond national boundaries.

*Curriculum development and digital competencies*. Economic education curricula are being updated to include digital competencies essential for the modern workforce. Courses now emphasize data literacy, critical thinking, and digital communication skills. Students learn to analyze economic data using software tools like Excel, SPSS, Stata, and data visualization platforms such as Tableau and Power BI, preparing them for data-driven decision-making roles in finance, marketing, and policy analysis.

*Specific areas of economic education that have seen significant digital transformation include:*

- *Macroeconomics and Microeconomics* - incorporation of interactive models and dynamic graphs to illustrate economic theories in real-time.
- *Financial Economics* - use of trading simulators and fintech applications to teach investment strategies, portfolio management, and risk assessment.
- *Behavioral Economics* - digital experiments and online surveys to study decision-making processes and consumer behavior.
- *International Economics* - virtual exchange programs and online collaborations with international institutions to provide a global perspective.

Financial literacy programs have also been enhanced through digital tools. Interactive applications and online simulations allow students to practice budgeting, investing, and managing virtual portfolios, fostering real-world financial skills. Platforms like Khan Academy, Coursera, and edX offer supplementary resources for students to deepen their understanding of economic principles.

*Teacher training and professional development.* A critical component of the current digitalization landscape is the professional development of educators. Training programs focus on enhancing digital literacy, pedagogical skills for online teaching, and the effective integration of technology into lesson plans.

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Initiatives such as the "Polish Digital School" and continuous professional development workshops support teachers in adapting to the evolving educational environment.

Despite progress, challenges remain. Some educators still face difficulties in fully utilizing digital tools due to varying levels of technical proficiency. To address this, blended learning models are being promoted, combining traditional teaching with digital methods to ease the transition and improve instructional quality.

*Teacher training now includes modules on:*

- *Digital Pedagogy* - best practices for online and hybrid teaching environments.
- *Assessment in digital classrooms* - developing fair and effective online assessment strategies.
- *Cybersecurity Awareness* - Educating teachers on protecting digital information and maintaining student data privacy.

*Policy framework and government initiatives*. The Polish government has implemented strategic policies to support digital education. The "Polish Education Development Strategy 2030" outlines goals for expanding digital infrastructure, reducing the digital divide, and promoting equal access to quality education. Investments in high-speed internet, digital devices for schools, and e-learning resources are key components of this strategy.

Public-private partnerships have also played a role in advancing digital education. Collaborations between educational institutions, tech companies, and government agencies have led to the development of innovative digital tools, online courses, and teacher training programs. The "Digital Poland" program aims to create an inclusive digital society, with a focus on integrating ICT into education to prepare students for the demands of the digital economy.

**3. Challenges in digitalizing economic education.** Numerous studies highlight the multifaceted challenges that hinder the effective digitalization of economic education. According to Nowak and Wójcik (2020), a significant barrier is the uneven access to digital infrastructure across urban and rural areas in Poland, leading to disparities in educational quality. This digital divide is not limited to physical access to devices and internet connectivity but extends to the quality and speed of these connections, which can significantly impact the effectiveness of online learning platforms.

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Additionally, research by Kowalski (2019) emphasizes the lack of digital literacy among both educators and students, which hampers the integration of advanced digital tools into the curriculum. This deficiency is rooted in inadequate teacher training programs that often fail to equip educators with the necessary skills to effectively utilize digital technologies. The absence of continuous professional development opportunities exacerbates this issue, leaving many educators unprepared for the dynamic demands of digital education.

The resistance to change among traditional educators, as noted by Zieliński (2021), also poses psychological and cultural barriers to adopting new teaching methodologies. This resistance is often fueled by a fear of the unknown, concerns about job security, and a preference for conventional pedagogical approaches. Furthermore, the lack of standardized digital education policies and guidelines creates inconsistencies in implementation across different educational institutions, leading to fragmented learning experiences for students.

The digitalization of economic education in Poland has brought about significant opportunities for enhancing teaching and learning processes. However, this transformation also presents numerous challenges that need to be addressed to ensure its effectiveness and sustainability.

These challenges span technological, pedagogical, infrastructural, and socio-economic dimensions (Figure 5.1).

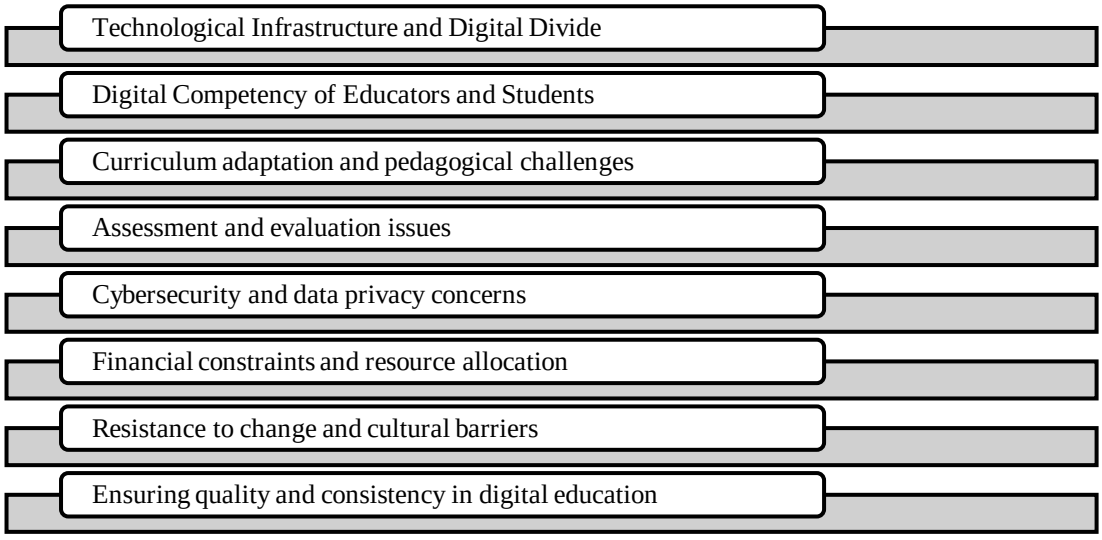


**Figure 5.1. The key challenges in digitalizing economic education in Poland**
*Sources: developed by author*

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*Technological infrastructure and digital divide*. One of the primary challenges is the unequal access to technological infrastructure across different regions in Poland. While urban areas generally benefit from high-speed internet and modern digital devices, rural and economically disadvantaged regions often face limited connectivity and outdated equipment. This digital divide leads to disparities in educational opportunities, hindering students' ability to engage effectively with digital learning resources.

For example, in rural areas of Podlaskie and Lubelskie Voivodeships, schools often lack sufficient high-speed internet, making it difficult for students to participate in real-time online classes or access resource-intensive digital platforms. Additionally, schools in these areas struggle to afford updated hardware like interactive whiteboards, tablets, or advanced computer labs, creating a stark contrast with institutions in urban centers like Warsaw or Kraków.

Moreover, the rapid pace of technological advancements requires continuous upgrades to infrastructure, including hardware, software, and network systems. Schools often struggle with budget constraints that limit their ability to keep up with these demands, resulting in outdated technology that cannot support advanced digital tools such as economic simulation software or big data analytics platforms.

*Digital competency of educators and students*. The varying levels of digital literacy among educators and students pose another significant challenge. Many teachers, especially those accustomed to traditional teaching methods, may lack the necessary skills to effectively integrate digital tools into their pedagogy. This gap not only affects the quality of instruction but also limits the potential of technology to enhance learning outcomes.

For instance, in economic subjects like financial accounting or macroeconomic modeling, educators often struggle to utilize data visualization tools (e.g., Tableau, Power BI) or economic simulation software (e.g., STATA, EViews). Teachers may default to traditional lecture methods instead of interactive, data-driven teaching approaches that foster analytical thinking.

Professional development programs are available, such as workshops provided by the "Polish Digital School" initiative, but they are not always accessible or comprehensive enough to meet the diverse needs of educators. Additionally, students from different socio-economic backgrounds exhibit varying degrees of digital proficiency, which can create inequalities in learning

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experiences and outcomes. Students in urban private schools often have advanced digital skills due to early exposure, while those in rural public schools may lack basic computer literacy.

*Curriculum adaptation and pedagogical challenges*. Adapting the economic education curriculum to incorporate digital tools and methodologies is a complex process. Traditional curricula are often rigid, with a strong focus on theoretical knowledge rather than practical, technology-driven skills. Integrating digital competencies requires a fundamental shift in teaching approaches, emphasizing interactive, student-centered learning environments.

For example, subjects like behavioral economics can greatly benefit from digital experiments and online simulations that analyze decision-making patterns. However, many Polish schools lack structured programs that integrate these tools effectively into the curriculum. Similarly, lessons on international trade could incorporate real-time data from global financial markets, yet most schools rely on static textbook examples.

Teachers face challenges in redesigning lesson plans to include digital resources, simulations, and real-time data analysis tools. There is also a need for curriculum frameworks that support interdisciplinary learning, combining economic theories with digital literacy, data analytics, and critical thinking skills. This is particularly important in areas like fintech education, where students need to understand both economic principles and emerging digital finance technologies.

*Assessment and evaluation issues*. Digital education introduces new complexities in assessing student performance. Traditional assessment methods, such as written exams and standardized tests, may not accurately reflect students' understanding and application of economic concepts in a digital context. Online assessments also raise concerns about academic integrity, with increased risks of cheating and plagiarism.

For instance, evaluating students' understanding of macroeconomic forecasting models is challenging through traditional exams. Instead, project-based assessments where students create data-driven economic reports using real-world datasets could provide better insights into their skills. However, such methods are not widely adopted, and teachers often lack the training to implement these alternative assessment strategies effectively.

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Developing effective digital assessment strategies requires innovative approaches, such as project-based evaluations, digital portfolios, and formative assessments that leverage data analytics to track student progress. However, implementing these methods consistently across educational institutions remains a challenge.

*Cybersecurity and data privacy concerns*. The increased reliance on digital platforms for economic education raises critical issues related to cybersecurity and data privacy. Educational institutions collect and store vast amounts of sensitive student data, making them potential targets for cyberattacks. Ensuring the security of digital learning environments requires robust cybersecurity measures, regular system updates, and comprehensive data protection policies.

For example, in 2020, several Polish educational platforms experienced data breaches, exposing vulnerabilities in the system. Many schools lacked basic cybersecurity protocols, such as two-factor authentication or encrypted databases, which are essential for protecting sensitive information.

Moreover, there is a need to educate both educators and students about digital safety practices, including secure password management, recognizing phishing attempts, and understanding data privacy rights. The lack of standardized guidelines and protocols for data security in many schools exacerbates these risks.

*Financial constraints and resource allocation*. Implementing digital education initiatives often involves significant financial investments in technology, infrastructure, training, and content development. Many schools, particularly in underfunded regions, face budgetary limitations that hinder their ability to fully embrace digitalization.

For instance, while top-tier universities like the University of Warsaw or SGH Warsaw School of Economics have access to advanced economic software and digital tools, smaller institutions and vocational schools often rely on outdated resources. The cost of licensing software like Bloomberg terminals, essential for teaching financial economics, can be prohibitively expensive for many schools.

Securing sustainable funding for digital education is a persistent challenge. While government programs and public-private partnerships can provide support, the allocation of resources is often uneven, with some schools benefiting more

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than others. Ensuring equitable distribution of funding and resources is essential for reducing disparities in digital education access and quality.

*Resistance to change and cultural barriers*. Resistance to change is a common challenge in the digitalization of education. Educators, students, and even parents may be skeptical about the effectiveness of digital learning compared to traditional classroom instruction. This skepticism can stem from a lack of familiarity with digital tools, fear of technology replacing human interaction, or concerns about screen time and its impact on student well-being.

For example, some senior economics teachers express doubts about using online trading simulations, believing that traditional textbook approaches provide more "serious" academic rigor. Students, too, may resist new learning formats, particularly if they are unfamiliar with self-directed, technology-driven environments.

Overcoming these cultural barriers requires a shift in mindset, supported by evidence-based practices that demonstrate the benefits of digital education. Continuous professional development, success stories from digital classrooms, and involving stakeholders in the digital transition process can help build trust and acceptance.

*Ensuring quality and consistency in digital education*. Maintaining high standards of quality and consistency in digital economic education is challenging, particularly when educational institutions adopt different technologies and teaching approaches. The absence of standardized guidelines for digital curriculum design, teaching methodologies, and assessment practices can lead to inconsistent learning experiences for students.

For instance, while some schools implement comprehensive e-learning programs with interactive content, others rely solely on PDF handouts and recorded lectures. This inconsistency affects the depth and breadth of economic knowledge students acquire.

Quality assurance mechanisms, including accreditation processes, regular evaluations, and feedback systems, are essential to monitor and improve digital education programs. Collaboration between educational institutions, government bodies, and technology providers can also support the development of best practices and quality benchmarks.

Based on the results of the study, challenges in digital economic education In Poland were systematized and presented in Table 5.2.

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**Table 5.2. Challenges in digital economic education in Poland**

| Challenge | Disciplines Affected | Ways to Overcome |
|---|---|---|
| Technological Infrastructure and Digital Divide | General Economic Studies, Financial Economics | Invest in high-speed internet for rural areas, provide updated hardware, and government funding programs. |
| Digital Competency of Educators and Students | Financial Accounting, Macroeconomic Modeling | Offer comprehensive digital literacy training for educators and students; integrate digital tools gradually. |
| Curriculum Adaptation and Pedagogical Challenges | Behavioral Economics, International Trade | Revise curriculum frameworks to include digital tools; provide teacher support for lesson plan redesign. |
| Assessment and Evaluation Issues | Macroeconomic Forecasting, Economic Data Analysis | Adopt project-based and data-driven assessments; train educators on digital evaluation tools. |
| Cybersecurity and Data Privacy Concerns | All Economic Disciplines with Online Platforms | Implement robust cybersecurity protocols; educate on data privacy practices and secure systems. |
| Financial Constraints and Resource Allocation | Financial Economics, Digital Finance | Ensure equitable funding; promote public-private partnerships to support digital education resources. |
| Resistance to Change and Cultural Barriers | Online Trading Simulations, Digital Economics | Conduct awareness programs; showcase successful digital learning models to build trust. |
| Ensuring Quality and Consistency in Digital Education | E-learning Programs, Digital Curriculum Design | Develop standardized guidelines; establish accreditation processes and regular quality checks. |

*Sources: developed by author*

The digitalization of economic education in Poland presents both opportunities and challenges. Addressing these challenges requires a comprehensive and collaborative approach involving policymakers, educators, students, and the private sector. By investing in technological infrastructure, enhancing digital competencies, adapting curricula, and ensuring data security, Poland can create a resilient and inclusive digital education ecosystem. Continuous evaluation and adaptation will be key to navigating the evolving landscape of digital economic education and preparing students for success in the digital economy.

**4. Innovations in digital economic education**. Despite these challenges, there have been noteworthy innovations aimed at enhancing economic education through digital means. The implementation of e-learning platforms, such as Moodle and Google Classroom, has facilitated interactive and flexible learning environments (Lewandowski, 2022). These platforms support a range of

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multimedia resources, enabling educators to create engaging content that caters to diverse learning styles.

Gamification and simulation-based learning, as discussed by Piotrowska and Majewski (2020), have proven effective in engaging students and improving their understanding of complex economic concepts. Economic simulations, such as virtual stock markets and business strategy games, provide students with hands-on experiences that foster critical thinking and decision-making skills. Moreover, the integration of augmented reality (AR) and virtual reality (VR) technologies offers immersive learning experiences that enhance conceptual understanding and retention.

Furthermore, the incorporation of big data analytics and AI-driven educational tools, as highlighted by Kamiński (2023), is revolutionizing personalized learning and assessment methods. These technologies enable the analysis of student performance data to identify learning gaps, predict outcomes, and tailor instructional strategies to individual needs. Adaptive learning systems, powered by AI, provide real-time feedback and customized learning paths, promoting self-directed learning and academic growth.

The digitalization of economic education in Poland has fostered numerous innovations that have transformed traditional teaching methods, improved access to learning resources, and enhanced the overall quality of education. These innovations span across curriculum design, instructional technologies, assessment methods, and professional development for educators (Figure 5.2).

***Integration of advanced learning technologies***. One of the most significant innovations is the integration of advanced learning technologies into economic education. Polish universities and secondary schools have adopted cutting-edge tools such as:

– *Simulation software and virtual labs* - platforms like STATA, MATLAB, and EViews are used for econometric modeling and data analysis. These tools allow students to conduct complex statistical analyses, forecast economic trends, and simulate financial scenarios. For instance, students at the Warsaw School of Economics participate in virtual trading sessions that replicate real-world financial markets, providing hands-on experience with stock market operations, risk management, and derivatives trading. In *financial economics*, students use trading simulations to analyze the impact of monetary policy changes on financial markets.

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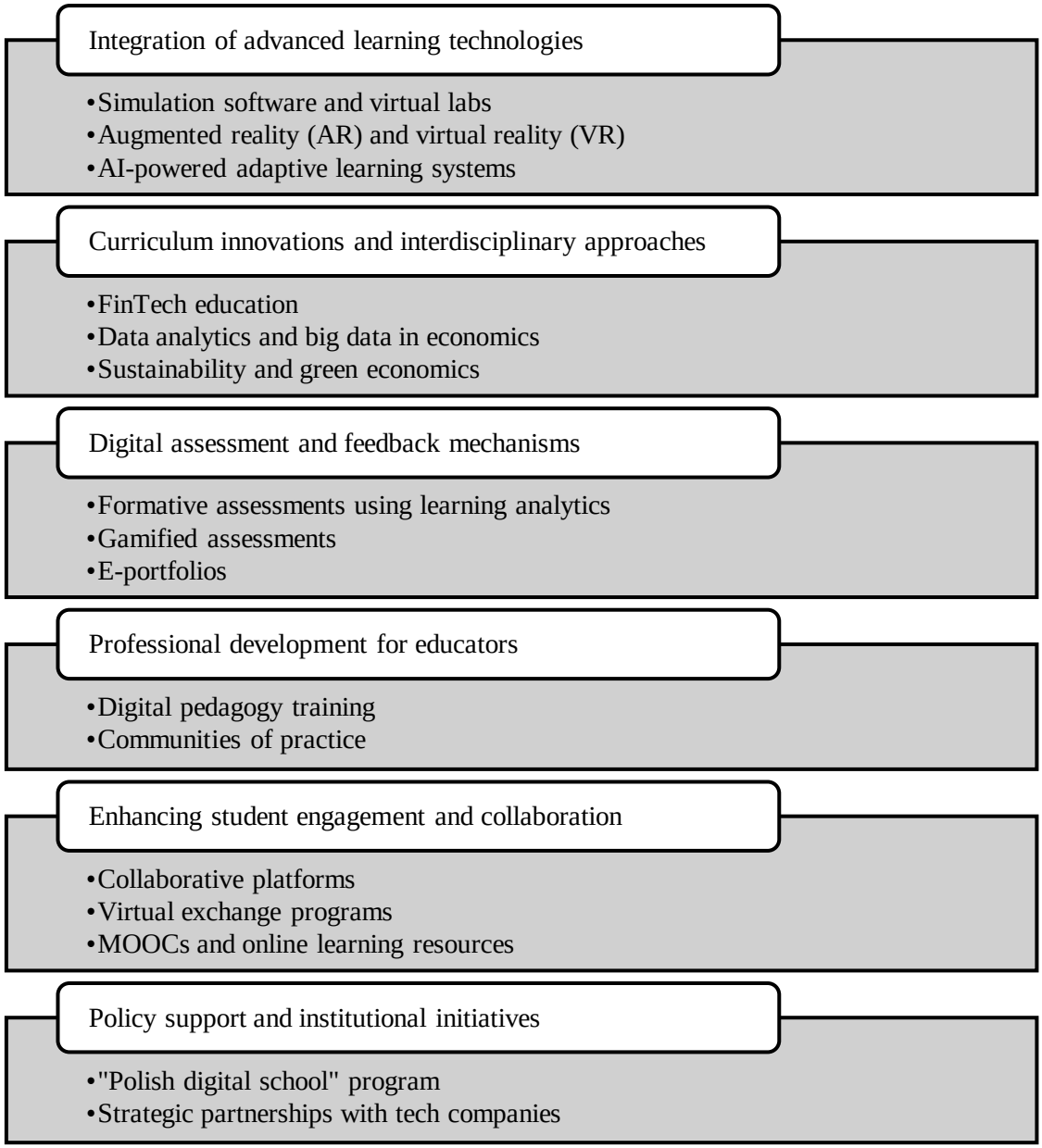


**Figure 5.2. The key innovations in digital economic education in Poland**

*Sources: developed by author*

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– *Augmented reality (AR) and virtual reality (VR)* - these technologies create immersive learning experiences, enabling students to explore economic environments in a virtual space. In *behavioral economics* courses, VR simulations replicate consumer markets, allowing students to observe how different variables influence consumer behavior. In *urban economics*, AR is used to visualize the economic development of city infrastructures and transportation networks.

– *AI-powered adaptive learning systems* - Artificial Intelligence is used to personalize learning experiences. AI-driven platforms analyze student performance data to identify strengths and weaknesses, adapting the curriculum to meet individual learning needs. For example, in *macroeconomics* courses, AI tools can detect when a student struggles with concepts like GDP calculation or fiscal policy, offering customized exercises and additional resources to reinforce learning. In *development economics*, AI helps track progress in understanding economic growth models across different regions.

***Curriculum innovations and interdisciplinary approaches***. Curriculum development has also seen significant innovations, with an emphasis on interdisciplinary learning and real-world applications:

– *FinTech education* - as financial technology evolves rapidly, Polish universities have introduced specialized courses covering blockchain, cryptocurrencies, and digital banking. The University of Warsaw offers modules on blockchain technology's impact on financial markets, including smart contracts and decentralized finance (DeFi). In *international finance* classes, students engage in case studies of companies utilizing blockchain, analyzing the economic implications of these technologies.

– *Data analytics and big data in economics* - courses now include training in data visualization tools like Tableau and Power BI. Students learn to collect, process, and analyze large datasets to uncover economic trends, such as inflation patterns or labor market shifts. In *labor economics*, students use big data to evaluate employment trends and wage disparities. In *public economics*, big data tools are used to assess tax policies' effectiveness.

– *Sustainability and green economics* - digital tools are used to model environmental-economic interactions. In *environmental economics* courses, students use simulation software to assess the economic impact of environmental policies, such as carbon taxes or renewable energy subsidies. For example,

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students might model the cost-benefit analysis of transitioning to green energy in Poland, considering both environmental benefits and economic trade-offs.

***Digital assessment and feedback mechanisms***. Innovations in assessment methods have improved the evaluation of student learning outcomes:

– *Formative assessments using learning analytics* - digital platforms track student engagement and performance in real-time. Teachers use this data to provide timely feedback, identify learning gaps, and adjust instructional strategies. In *microeconomics* classes, for example, online quizzes with instant feedback help students understand supply and demand shifts through interactive graphs and case studies.

– *Gamified assessments* - incorporating game mechanics into assessments makes learning more engaging. In *game theory* courses, students participate in competitive simulations where they manage virtual economies, make strategic decisions, and respond to economic crises. These activities not only test theoretical knowledge but also develop critical thinking and problem-solving skills.

– *E-portfolios* - students create digital portfolios showcasing their projects, research, and analytical reports. This approach is particularly effective in *international trade* courses, where students compile analyses of trade agreements, economic development reports, and global market trends. In *health economics*, e-portfolios are used to document case studies on healthcare policy impacts.

***Professional development for educators***. Recognizing the need for skilled educators in digital environments, Poland has implemented comprehensive professional development programs:

– *Digital pedagogy training* - programs focus on equipping teachers with the skills to integrate technology effectively. Training covers tools for creating interactive content, managing virtual classrooms, and using analytics to monitor student progress. For example, educators in *applied economics* receive training on flipped classroom models, where students review lecture materials online and engage in collaborative problem-solving activities during class time.

– *Communities of practice* - online platforms and forums allow educators to share best practices, resources, and innovative teaching strategies. The "Polish Teachers' Network for Digital Education" supports professional learning communities where teachers exchange ideas on using technology to enhance

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economic instruction. In *development economics*, educators share resources for integrating global economic data into teaching modules.

***Enhancing student engagement and collaboration.*** Digital tools have revolutionized how students collaborate and engage with learning materials:

– *Collaborative platforms* - tools like Miro, Trello, and Google Workspace support project-based learning. In *entrepreneurship* courses, students work in virtual teams to develop business plans, conduct market research, and create financial models. In *managerial economics*, students use collaborative tools to solve real-world business problems.

– *Virtual exchange programs* - digital technologies enable international collaborations. Polish students participate in virtual exchange programs with universities abroad, discussing global economic issues, sharing cultural perspectives, and collaborating on joint research projects. In *international economics***,** students analyze the economic impact of global trade policies in partnership with peers from other countries.

– *MOOCs and online learning resources* - Massive Open Online Courses (MOOCs) from platforms like Coursera and edX are integrated into economic curricula, offering access to global expertise. Students studying *development economics* can take online courses from top institutions like MIT or Stanford, supplementing their formal education with cutting-edge research and diverse viewpoints.

***Policy support and institutional initiatives***. Government policies and institutional initiatives have played a crucial role in fostering digital innovations:

– *"Polish digital school" program* - this initiative has provided funding for digital infrastructure, teacher training, and the development of e-learning resources. It has been instrumental in equipping schools with modern technology, improving internet connectivity, and supporting the integration of digital tools into the curriculum, especially in *public economics* and *education policy* courses.

– *Strategic partnerships with tech companies* - collaborations with companies like Microsoft and Google have facilitated the integration of advanced technologies in classrooms. These partnerships provide schools with access to cloud-based tools, professional development resources, and innovative educational technologies. For example, Microsoft's partnership with Polish universities includes training programs on data analytics and cloud computing for *financial economics* and *data-driven policy analysis* applications.

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According to the results of the study, the key types of innovations in the field of digital technologies that can be implemented in economic education in Poland have been systematized (Table 5.3).

**Table 5.3. The key types of innovations in the field of digital technologies for economic education in Poland**

| Type of Innovation | Discipline | Description of Possible Use |
|---|---|---|
| Simulation Software and Virtual Labs | Financial Economics | Used to analyze financial markets, simulate trading scenarios, and practice investment strategies. |
| Augmented Reality (AR) and Virtual Reality (VR) | Behavioral Economics, Urban Economics | Simulates consumer behavior and visualizes economic development in urban settings. |
| AI-Powered Adaptive Learning Systems | Macroeconomics, Development Economics | Personalizes learning paths by identifying student weaknesses and recommending tailored content. |
| FinTech Education | International Finance | Explores blockchain, digital banking, and cryptocurrencies through case studies. |
| Data Analytics and Big Data in Economics | Labor Economics, Public Economics | Analyzes large datasets to uncover employment trends, tax policy impacts, and economic patterns. |
| Sustainability and Green Economics | Environmental Economics | Models the economic impact of environmental policies like carbon taxes and green energy transitions. |
| Formative Assessments Using Learning Analytics | Microeconomics | Tracks student engagement and performance to provide real-time feedback and adapt teaching methods. |
| Gamified Assessments | Game Theory | Incorporates game mechanics to simulate economic decisions and strategic management in virtual economies. |
| E-Portfolios | International Trade, Health Economics | Documents students' projects, research, and case studies to showcase learning outcomes and growth. |
| Digital Pedagogy Training | Applied Economics | Trains educators to effectively integrate technology and manage virtual classrooms. |
| Communities of Practice | Development Economics | Shares best practices and innovative teaching strategies among educators through online communities. |
| Collaborative Platforms | Entrepreneurship, Managerial Economics | Facilitates project-based learning, allowing students to collaborate on business plans and market research. |

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| Type of Innovation | Discipline | Description of Possible Use |
|---|---|---|
| Virtual Exchange Programs | International Economics | Enables international student collaborations on global economic issues and joint research projects. |
| MOOCs and Online Learning Resources | Development Economics | Provides access to global expertise through online courses from top institutions. |
| Polish Digital School Program | Public Economics, Education Policy | Supports digital infrastructure, teacher training, and the development of e-learning resources. |
| Strategic Partnerships with Tech Companies | Financial Economics, Data-Driven Policy Analysis | Provides access to advanced technology, data analytics tools, and professional development programs. |

*Sources: developed by author*

Innovations in digital economic education in Poland are reshaping the learning landscape, making education more interactive, accessible, and aligned with the demands of the digital economy. By embracing advanced technologies, interdisciplinary curricula, and innovative assessment methods, Poland is preparing its students to thrive in a rapidly evolving global environment. Continuous investment in teacher development, infrastructure, and policy support will be essential to sustain and expand these innovations in the future.

**5. Opportunities Presented by Digitalization**. The digital transformation of economic education offers numerous opportunities that extend beyond the classroom. According to a report by the Polish Ministry of Education (2021), digitalization can significantly enhance access to quality education, particularly for students in remote or underserved regions. This increased accessibility promotes educational equity and social inclusion, bridging gaps between different socio-economic groups.

Digital tools also foster the development of critical digital competencies that are essential in the modern labor market. As highlighted by Grabowski (2022), skills such as data literacy, analytical thinking, and digital communication are increasingly valued by employers across various industries. The integration of real-world economic data and analytical tools into the curriculum prepares students for data-driven decision-making and problem-solving in professional settings.

Moreover, digitalization supports lifelong learning and continuous professional development, which are crucial in the rapidly evolving economic

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landscape. Online courses, webinars, and MOOCs (Massive Open Online Courses) provide flexible learning opportunities for individuals seeking to upskill or reskill in response to changing job market demands. Collaborative technologies also facilitate global learning networks, enabling students and educators to engage with peers and experts from around the world, fostering cross-cultural understanding and knowledge exchange.

The digitalization of economic education in Poland offers numerous opportunities that can significantly enhance both teaching and learning experiences. This transformation not only improves accessibility and efficiency but also enables the development of new competencies essential for the modern economy. This section explores the key opportunities presented by digitalization, with detailed examples and specific applications in various areas of economic education.

– *Enhanced accessibility and flexibility*. Digitalization removes geographical barriers, providing students from remote or underserved areas access to high-quality economic education. Online courses, webinars, and e-learning platforms allow students to learn at their own pace and schedule, promoting lifelong learning.

– *Personalized learning experiences*. Adaptive learning technologies powered by artificial intelligence (AI) can tailor educational content to individual learning styles and paces. This personalization helps students grasp complex economic concepts more effectively.

– *Development of digital competencies*. Integrating digital tools into economic education fosters essential digital skills, such as data analysis, coding, and digital communication. These competencies are increasingly valuable in the job market.

– *Improved collaboration and networking*. Digital tools enable seamless collaboration among students, educators, and professionals worldwide. Virtual classrooms, online forums, and collaborative platforms foster peer-to-peer learning and global networking.

– *Real-time data and practical application*. Access to real-time economic data allows students to apply theoretical knowledge to current events and market conditions. This practical approach bridges the gap between academic learning and real-world application.

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– *Cost-effectiveness and resource efficiency*. Digital resources reduce the need for physical materials and travel, making education more cost-effective. E-books, online databases, and virtual libraries provide extensive learning materials at a lower cost.

– *Continuous professional development for educators*. Digital platforms offer continuous learning opportunities for educators, enabling them to stay updated with the latest teaching methodologies and economic research.

– *Greater inclusivity and diversity*. Digital education promotes inclusivity by accommodating diverse learning needs and cultural backgrounds. Accessible learning tools support students with disabilities and different language proficiencies.

According to the results of the study, the key types of opportunities in the field of digital technologies that can be implemented in economic education in Poland have been systematized (Table 5.4).

**Table 5.4. The key types of opportunities in the field of digital technologies for economic education in Poland have been systematized (Table 4).**

| Type of Opportunity | Discipline Name | Description |
|---|---|---|
| Enhanced Accessibility and Flexibility | Public Economics, Development Economics | Provides students from remote areas access to quality education through online courses and virtual workshops. |
| Personalized Learning Experiences | Microeconomics, Financial Economics | AI-driven platforms offer customized exercises and simulations tailored to individual learning progress. |
| Development of Digital Competencies | Data Economics, Behavioral Economics | Courses integrate tools like R, Python, and Tableau to teach data analysis and digital communication skills. |
| Improved Collaboration and Networking | International Economics, Entrepreneurship | Enables global collaborations through virtual exchange programs and digital mentorship for entrepreneurs. |
| Real-Time Data and Practical Application | Macroeconomics, Financial Markets | Allows students to analyze real-time economic data and simulate stock market activities. |
| Cost-Effectiveness and Resource Efficiency | Economic History, Environmental Economics | Reduces costs through the use of e-books, online databases, and virtual labs for simulations. |
| Continuous Professional Development for Educators | Applied Economics, Policy Analysis | Offers online professional development courses and webinars for educators to stay updated with new methodologies. |
| Greater Inclusivity and Diversity | Labor Economics, Gender Economics | Promotes inclusivity with multilingual support and global discussions, accommodating diverse learning needs. |

*Sources: developed by author*

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The digitalization of economic education in Poland presents transformative opportunities that enhance learning outcomes, foster global collaboration, and prepare students for the demands of the digital economy. By leveraging technology, educational institutions can create more inclusive, flexible, and dynamic learning environments. Continued investment in digital infrastructure, teacher training, and innovative pedagogical approaches will be key to maximizing these opportunities and ensuring that economic education remains relevant and impactful in the digital age.

**Conclusion**. The digitalization of economic education in Poland represents a transformative journey shaped by technological advancements, educational reforms, and evolving socio-economic landscapes. From the early integration of Information and Communication Technology (ICT) in the 1990s to the current era marked by Artificial Intelligence (AI), big data analytics, and immersive technologies like Virtual Reality (VR) and Augmented Reality (AR), Poland has made significant strides in reshaping its educational paradigm. This evolution reflects not just a shift in tools and methodologies but a fundamental rethinking of how economic knowledge is imparted and acquired.

The current state of digital economic education in Poland showcases a dynamic environment where e-learning platforms, simulation software, and interactive digital resources have become integral to the curriculum. The rapid digital transformation catalyzed by the COVID-19 pandemic highlighted both the potential and the challenges of digital education, emphasizing the need for robust infrastructure, comprehensive teacher training, and equitable access to technology.

Challenges such as the digital divide, varying levels of digital literacy among educators and students, curriculum adaptation issues, and cybersecurity concerns remain significant. Addressing these challenges requires a multifaceted approach that includes government initiatives, public-private partnerships, and continuous professional development for educators. Strategic programs like the "Polish Digital School" and collaborations with technology companies have played pivotal roles in mitigating some of these challenges, fostering an ecosystem conducive to digital learning.

Despite these hurdles, the opportunities presented by digitalization are vast. Enhanced accessibility, personalized learning experiences, the development of

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critical digital competencies, and the ability to leverage real-time data for practical applications are just a few of the benefits. Digital tools not only bridge geographical and socio-economic gaps but also prepare students for the demands of the global digital economy, fostering skills such as critical thinking, data analysis, and cross-cultural collaboration.

Innovations in digital economic education—ranging from FinTech modules and big data analytics to gamified assessments and AI-driven adaptive learning systems—are redefining traditional pedagogical models. These innovations not only enhance student engagement and learning outcomes but also equip future economists with the skills necessary to thrive in an increasingly complex and interconnected world.

In conclusion, the digitalization of economic education in Poland is a dynamic and ongoing process that holds immense potential for shaping the future of education. By embracing technological advancements, addressing existing challenges, and leveraging emerging opportunities, Poland can build a resilient, inclusive, and forward-looking educational system. Continuous investment in digital infrastructure, policy support, and innovative teaching practices will be crucial to sustaining this transformation and ensuring that economic education remains relevant, effective, and accessible to all learners in the digital age.

**References:**

1. Grabowski, P. (2022). *Digital competencies in modern economic education: Trends and challenges*. Warsaw: Polish Economic Review.
2. Kamiński, J. (2023). *The role of AI and big data in personalized economic education*. Journal of Educational Technology, 15(3), 45-60.
3. Kolisnichenko, P. (2024). ADVANCING ECONOMIC EDUCATION IN POLAND: CHALLENGES, INNOVATIONS, AND FUTURE PERSPECTIVES. *Pedagogy and Education Management Review*, (4(18), 47–59. https://doi.org/10.36690/2733-2039-2024-47-59.
4. Kowalski, M. (2019). *Barriers to digital transformation in Polish education*. Kraków: Academic Press.
5. Lewandowski, A. (2022). *E-learning platforms and their impact on student engagement in Poland*. Polish Journal of Educational Research, 14(2), 67-82.
6. Nowak, T., & Wójcik, K. (2020). *Digital divide and its implications for economic education in Poland*. European Journal of Educational Studies, 12(4), 123-138.
7. Piotrowska, M., & Majewski, P. (2020). *Gamification in economic education: A case study from Poland*. Journal of Interactive Learning Environments, 18(1), 89-104.
8. Polish Ministry of Education. (2021). *Report on the impact of digitalization on economic education in Poland*. Warsaw: Ministry Publications.
9. Zieliński, L. (2021). *Resistance to digitalization in traditional educational environments*. Gdańsk: Baltic Educational Press.

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*Monograph dedicated to the 5th anniversary*
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# Chapter 5.2. Integrating Digital Skills into the Unique Challenges and Opportunities of Education in India

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***Abstract.*** *This chapter explores the integration of digital skills into the educational landscape of India, examining the unique challenges and opportunities that arise within this dynamic context. The introduction outlines the transformative journey of digital skills development in India, tracing its evolution from basic computer literacy in the 1990s to the advanced competencies required in today's rapidly digitizing world. The primary aim of this research is to analyze the pivotal role of digital skills in shaping India's socio-economic growth, with a specific focus on how these competencies are being embedded into educational systems to prepare a future-ready workforce. The research methodology employed in this study includes a comprehensive review and analytical synthesis of educational reforms, government policies, industry initiatives, and the socio-cultural factors influencing digital skill adoption. This qualitative approach allows for an in-depth exploration of historical developments, current practices, and emerging trends in digital education. Additionally, case studies of key government programs and public-private partnerships are used to highlight practical implementations and their outcomes across different regions of India. The results of the research indicate a significant transformation in India's digital skill landscape, driven by factors such as economic liberalization, the IT boom, globalization, and the Digital India initiative. The findings reveal that while substantial progress has been made in enhancing digital literacy and creating a digitally skilled workforce, challenges such as the digital divide, skill mismatches, and disparities in access to quality education persist. The research also identifies the rapid adoption of advanced technologies—such as artificial intelligence, blockchain, and the Internet of Things—as critical drivers of new digital competencies required in both urban and rural settings. The practical value of this research lies in its ability to inform policymakers, educators, and industry leaders about effective strategies for integrating digital skills into educational curricula and professional development programs. It offers actionable insights on bridging the digital divide, aligning educational outcomes with industry demands, and fostering an ecosystem that supports continuous learning and innovation. Directions for further research include the need for longitudinal studies to assess the long-term impact of current digital initiatives, as well as comparative analyses to understand best practices from other digitally advanced nations. This will help refine India's digital education strategies and ensure sustainable growth in the digital economy.*

***Keywords:*** *digital skills; education; India; digital literacy; technological transformation; e-governance; digital divide; skill development; innovation; continuous learning.*

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**1. Early Stages: The 1990s - The Birth of the IT Era.** India's digital transformation has been a dynamic journey, reflecting the country's rapid economic growth and technological advancement. The evolution of digital skills in India is closely linked to the expansion of the IT sector, government initiatives, and the growing demand for a digitally skilled workforce. This document explores the key phases in the development of digital skills in India, highlighting the factors that have influenced this evolution.

The liberalization of the Indian economy in 1991 marked the beginning of significant changes in the technology landscape. The rise of the IT industry, with companies like Infosys, Wipro, and TCS leading the way, created a demand for basic computer literacy and programming skills. Educational institutions began incorporating computer science into their curricula, and private training centers like NIIT and Aptech emerged to fill the skills gap.

During this phase, digital literacy primarily focused on fundamental computer operations such as using operating systems (Windows, MS-DOS), word processing, spreadsheets, and basic programming languages like BASIC and COBOL. The emphasis was on equipping individuals with the ability to handle basic computing tasks, laying the groundwork for more specialized skills in the future.

The 1990s marked a transformative period in India's history, as the country embarked on a journey of economic liberalization and technological advancement. This era laid the foundational framework for the growth of the Information Technology (IT) sector, which in turn catalyzed the evolution of digital skills across the nation. The early stages of this digital revolution were characterized by the emergence of IT companies, changes in educational curricula, and the gradual integration of computers into everyday life.

***Economic liberalization and the rise of the IT industry***. The economic reforms initiated in 1991 under the leadership of Prime Minister P.V. Narasimha Rao and Finance Minister Dr. Manmohan Singh marked the beginning of India's integration into the global economy. These reforms reduced trade barriers, encouraged foreign investments, and fostered a competitive business environment. As a result, multinational companies began to establish a presence in India, creating a surge in demand for IT-enabled services.

This period witnessed the emergence of Indian IT giants such as Infosys, Wipro, Tata Consultancy Services (TCS), and HCL Technologies. These

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companies became pioneers in software development, IT consulting, and business process outsourcing, creating numerous job opportunities that required basic to intermediate digital skills.

***The advent of computer education***. Recognizing the growing importance of digital literacy, educational institutions across India started incorporating computer science into their curricula. This shift was not just limited to elite schools but gradually permeated into public education systems, vocational training centers, and community programs, reflecting a nationwide push towards embracing technology.

*Integration in school curricula***.** Primary and secondary schools began offering basic computer courses as part of their standard curriculum. These courses focused on:

– *Fundamentals of computing*. Detailed lessons on the history of computers, understanding computer hardware components (CPU, RAM, storage devices), and operating systems, with hands-on experience using MS-DOS, Windows 3.1, and later Windows 95.

– *Programming basics***.** Introduction to algorithmic thinking and coding through languages like BASIC, FORTRAN, and COBOL, fostering problem-solving skills and logical reasoning among students.

– *Office productivity tools*. Practical training in word processing, spreadsheets (Lotus 1-2-3, Microsoft Excel), databases (dBASE), and presentation software, enabling students to perform basic data management and document creation tasks.

*Role of private training institutes*. Private educational organizations like NIIT, Aptech, and SSI Ltd. became instrumental in supplementing formal education. They provided specialized, industry-oriented courses that covered:

– *Software development***.** Advanced programming languages (C, C++, Visual Basic), software engineering principles, and project management.

– *Networking*. Basics of computer networking, LAN/WAN configurations, and introduction to internet protocols, setting the stage for future IT infrastructure development.

– *Professional certifications***.** Courses aligned with international certification programs from Microsoft, Cisco, and Oracle, which became highly valued credentials in the job market.

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*Government and NGO involvement*. To bridge the digital divide, government initiatives and non-governmental organizations (NGOs) played a crucial role:

– *Computer literacy and awareness program (CLAP).* Launched in several states to introduce basic computer skills to rural populations.

– *Community learning centers.* Established in collaboration with NGOs to provide free or subsidized computer education in underprivileged areas.

*Technological evolution in classrooms.* The 1990s also saw the introduction of multimedia tools in education. CD-ROMs, educational software, and interactive tutorials began replacing traditional chalk-and-talk methods, making learning more engaging and effective. Schools experimented with computer labs, where students could apply theoretical knowledge through practical sessions.

Recognizing the growing importance of digital literacy, educational institutions across India started incorporating computer science into their curricula. Schools and colleges introduced basic computer courses covering:

– *Fundamentals of computing*. Introduction to computer hardware, operating systems (primarily MS-DOS and early versions of Windows), and basic software applications.

– *Programming basics*. Exposure to programming languages like BASIC, FORTRAN, and COBOL, which laid the groundwork for more advanced coding skills.

– *Office productivity tools*. Training in word processing, spreadsheets (Lotus 1-2-3, Microsoft Excel), and presentation software.

Private training institutes such as NIIT and Aptech played a pivotal role during this time. They offered specialized courses in computer programming, networking, and software development, making digital education accessible to a broader audience beyond traditional academic settings.

***Government initiatives and policy support***. The Indian government played a pivotal role in shaping the IT landscape during the 1990s, recognizing the sector's immense potential to drive economic growth, create employment opportunities, and position India as a global technology leader. A series of strategic initiatives, policies, and collaborations were introduced to foster digital literacy, encourage IT adoption, and support infrastructure development:

– *Software technology parks of India (STPI).* Established in 1991, the STPI was a cornerstone initiative designed to promote software exports and provide

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world-class infrastructure to IT companies. STPIs offered tax incentives, high-speed data communication facilities, and regulatory support, creating a business-friendly environment that attracted both domestic and international tech companies. These parks became incubators for startups and a launchpad for India's major IT firms.

– *National task force on IT and software development.* Formed in 1998, this task force was instrumental in formulating comprehensive strategies to accelerate IT growth. It recommended policy reforms, the creation of IT-friendly business regulations, and initiatives to improve the quality of technical education. The task force emphasized the need for a skilled workforce, leading to the establishment of specialized IT training programs and partnerships between academic institutions and the tech industry.

– *IT education in public schools.* Understanding the critical role of early education in building digital competencies, state governments began integrating computer literacy programs into public school curricula. These programs included basic computer operation, familiarization with office productivity tools, and introductory coding classes. The government also facilitated teacher training programs to ensure educators were equipped to deliver effective digital education.

– *E-governance initiatives.* The government launched early e-governance projects to digitize administrative processes, enhance public service delivery, and improve transparency. Initiatives like the National Informatics Centre (NIC) played a key role in developing government IT infrastructure, fostering a culture of digital proficiency within public administration.

– *Public-private partnerships (PPPS).* Recognizing the need for collaboration, the government actively engaged with private sector players to expand digital literacy programs, set up IT training centers, and promote technological innovations. These partnerships facilitated knowledge transfer, improved access to cutting-edge technologies, and created job opportunities in the burgeoning IT sector.

– *Policy reforms and regulatory support.* The government introduced regulatory frameworks to streamline IT operations, including intellectual property rights protection, data security policies, and simplified procedures for setting up IT businesses. These reforms created a stable and predictable environment that encouraged investment and innovation.

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– *Rural digital literacy programs*. To bridge the urban-rural digital divide, the government launched initiatives aimed at promoting computer literacy in rural areas. Programs like the Community Information Centres (CICs) provided rural populations with access to computers, the internet, and digital training, fostering inclusive growth and reducing regional disparities.

Through these concerted efforts, the Indian government not only laid the foundation for the IT industry's exponential growth but also nurtured a generation of digitally skilled professionals, setting the stage for India's emergence as a global technology powerhouse.

The Indian government recognized the potential of the IT sector as a driver of economic growth and employment. Several initiatives were launched to promote digital literacy and IT adoption:

- *Software technology parks of India (STPI)*. Established in 1991 to provide infrastructure, tax incentives, and support for software export companies.
- *National task force on IT and software development*. Formed in 1998 to draft policies aimed at accelerating IT growth and digital skill development.
- *IT education in public schools*. State governments began introducing computer literacy programs in public schools, especially in urban areas.

**The emergence of IT parks and urban digital hubs**. The 1990s witnessed the rapid development of IT parks and urban digital hubs across India, which played a pivotal role in accelerating the growth of the IT sector. Cities like Bangalore, Hyderabad, Pune, and Chennai transformed into major technology hubs, driven by a combination of favorable government policies, strategic investments, and the availability of a skilled workforce.

IT parks such as Electronic City in Bangalore, HITEC City in Hyderabad, and Rajiv Gandhi Infotech Park in Pune were established during this period. These parks provided state-of-the-art infrastructure, including high-speed internet connectivity, reliable power supply, and modern office spaces designed to meet the specific needs of technology companies. The government offered tax incentives, simplified regulatory frameworks, and financial subsidies to attract both domestic and foreign investors.

Bangalore emerged as the flagship IT hub, earning the nickname "Silicon Valley of India." The city’s growth was fueled by the presence of top engineering institutions, a cosmopolitan workforce, and proactive state policies. Major IT firms like Infosys, Wipro, and TCS established their headquarters here, while

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multinational corporations such as IBM, Intel, and Microsoft set up large development centers, creating a vibrant ecosystem of innovation and entrepreneurship.

Hyderabad's HITEC City (Hyderabad Information Technology and Engineering Consultancy City) became a model for integrated IT infrastructure development. Spearheaded by visionary leaders like N. Chandrababu Naidu, HITEC City attracted global IT giants, fostered partnerships with academic institutions, and provided incubation facilities for startups. This strategic development turned Hyderabad into a leading destination for software development, IT consulting, and business process outsourcing.

The growth of IT parks catalyzed urbanization, transforming previously underdeveloped areas into bustling economic zones. This rapid development led to improved public infrastructure, including better transportation networks, housing, healthcare, and educational institutions, which further supported the growing IT workforce.

IT parks facilitated collaboration between academia, industry, and government, fostering an environment conducive to innovation. Universities and technical institutes established close ties with IT companies, leading to industry-relevant curriculum development, internships, and joint research projects. This synergy not only enhanced the employability of graduates but also fueled technological advancements.

While the emergence of IT parks brought significant economic benefits, it also posed challenges such as urban congestion, environmental concerns, and socio-economic disparities. The concentration of IT hubs in specific urban areas led to uneven regional development, highlighting the need for balanced growth strategies and investments in digital infrastructure across smaller cities and rural areas.

Overall, the establishment of IT parks and urban digital hubs in the 1990s laid the groundwork for India's IT revolution, positioning the country as a global technology powerhouse and creating a thriving ecosystem that continues to evolve and expand today.

Cities like Bangalore, Hyderabad, Pune, and Chennai emerged as major IT hubs due to their favorable business environments, availability of skilled labor, and supportive government policies. The establishment of IT parks and

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technology clusters facilitated collaboration between academia, industry, and government, fostering an ecosystem conducive to digital skill development.

***The role of media and public perception***. The role of media and public perception in shaping the digital landscape of India during the 1990s was profound. As the country embraced the IT revolution, traditional and emerging media outlets became crucial channels for disseminating information, shaping aspirations, and creating a cultural narrative around technology.

Television, newspapers, and magazines played a significant role in popularizing the IT boom. Shows dedicated to science and technology, such as "Turning Point" and "The World This Week," showcased the latest advancements and the potential of digital technologies. National newspapers and tech magazines like *Dataquest* and *PC Quest* regularly featured stories on successful IT entrepreneurs, the growth of tech companies, and the transformative power of computers and the internet. These narratives helped demystify technology and made IT careers desirable among the youth.

The 1990s saw the emergence of specialized technology journalism in India. Journalists and tech enthusiasts began covering industry trends, product launches, and policy developments in detail. This coverage not only informed the public but also provided critical analysis of the IT sector's impact on the economy and society, fostering a deeper understanding of digital technologies.

Both government and private organizations leveraged media campaigns to promote digital literacy. Public service announcements on Doordarshan highlighted the importance of computer education, while corporate advertisements from companies like NIIT and Aptech emphasized the value of IT skills for career growth. These campaigns reached millions of households, encouraging parents to invest in computer education for their children.

Indian cinema also reflected and influenced the changing perception of technology. Movies began to depict IT professionals as modern, successful individuals, contributing to the glamorization of tech careers. Films showcasing futuristic gadgets, computer hacking, and the internet captured the imagination of young audiences, further fueling interest in digital technologies.

The media played a pivotal role in turning tech entrepreneurs into national icons. Visionaries like N.R. Narayana Murthy (Infosys), Azim Premji (Wipro), and Shiv Nadar (HCL) were regularly featured in the press, their success stories inspiring countless young Indians to pursue careers in IT and entrepreneurship.

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Despite its positive influence, media representation during the early stages often focused predominantly on urban success stories, overlooking the digital divide in rural areas. This created a perception that technology was primarily an urban phenomenon, highlighting the need for more inclusive narratives in subsequent years.

The media's role during the 1990s was instrumental in shaping public perception of digital skills and careers in IT. By highlighting success stories, promoting digital literacy, and creating aspirational role models, the media helped embed technology into the cultural fabric of India, paving the way for a digitally empowered society.

The growing popularity of computers and the internet was also influenced by media portrayal and public perception. Television programs, newspapers, and magazines highlighted the potential of IT careers, inspiring a generation of young Indians to pursue education and training in this field.

**Table 5.5. Evolution of Digital Skills in India**

| Aspect | Key Points |
|---|---|
| Economic Liberalization and the Rise of the IT Industry | Reforms in 1991, emergence of IT giants like Infosys, Wipro, TCS, demand for IT services |
| The Advent of Computer Education | Integration of computer science in curricula, private training institutes like NIIT, Aptech |
| Government Initiatives and Policy Support | Policies like STPI, National Task Force, e-governance initiatives, public-private partnerships |
| The Emergence of IT Parks and Urban Digital Hubs | Development of IT hubs in Bangalore, Hyderabad, Pune, Chennai; urbanization, innovation hubs |
| The Role of Media and Public Perception | Influence of media, tech journalism, digital literacy campaigns, creation of tech role models |
| Challenges During the Early Stages | Limited infrastructure, high costs, skill gaps, digital divide, resistance to technology adoption |

*Sources: developed by authors*

The 1990s laid the groundwork for India's digital future. The liberalization of the economy, the rise of the IT industry, and the introduction of computer education created a strong foundation for the subsequent growth of digital skills. This era not only transformed India's economic landscape but also inspired a cultural shift towards embracing technology, setting the stage for the digital revolution that would follow in the decades to come.

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**2. The 2000s: the IT boom and globalization**. The 2000s marked a period of extraordinary growth for India's Information Technology (IT) sector, characterized by rapid globalization, technological advancements, and the rise of outsourcing. This era not only positioned India as a global IT powerhouse but also significantly influenced the evolution of digital skills across the country. The IT boom created a massive demand for a skilled workforce proficient in diverse digital technologies, setting the stage for India's transformation into a knowledge-based economy.

***Globalization and the expansion of the IT industry***. The early 2000s witnessed India emerging as a global hub for IT outsourcing and business process outsourcing (BPO), driven by rapid globalization and the global demand for cost-effective, high-quality IT services. The liberalization policies of the 1990s laid a strong foundation, but it was the convergence of global economic factors, technological advancements, and strategic government support that truly propelled India into the international spotlight.

The Y2K issue created an urgent demand for software professionals to fix date-related bugs in legacy computer systems worldwide. Indian IT firms capitalized on this opportunity, showcasing their technical expertise. Simultaneously, the dot-com boom fueled the growth of internet-based businesses, increasing the demand for web development, IT support, and software solutions, further enhancing India's global IT footprint.

Multinational corporations, seeking to reduce operational costs and improve efficiency, turned to India for IT services. The availability of a large, English-speaking, technically skilled workforce and a favorable time zone difference made India an ideal outsourcing destination. Companies like Infosys, Wipro, TCS, and HCL rapidly expanded their global client base, offering services ranging from software development to customer support.

The development of Software Technology Parks (STPs) and Special Economic Zones (SEZs) provided the necessary infrastructure, including high-speed internet connectivity, reliable power supply, and state-of-the-art office spaces. These zones offered tax incentives and simplified regulatory processes, attracting both domestic startups and foreign direct investments (FDIs).

The expansion of undersea fiber-optic cables and the proliferation of internet services improved global connectivity, facilitating seamless communication and real-time collaboration between Indian IT firms and international clients. This

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technological advancement was critical in supporting the growth of offshore development centers and remote service delivery models.

The Indian government introduced progressive IT policies, streamlined business regulations, and invested in telecom infrastructure. Initiatives like the National Telecom Policy (1999) deregulated the telecom sector, leading to affordable internet access and mobile connectivity, which were essential for the IT industry's growth.

India’s robust education system, with its focus on engineering and technical disciplines, produced a steady stream of graduates proficient in computer science, engineering, and information technology. This talent pool became the backbone of India's IT success, with institutions like the IITs and NITs gaining global recognition for their quality education.

The globalization of India's IT industry in the 2000s not only revolutionized the country’s economic landscape but also transformed its societal and cultural fabric. It created millions of jobs, fostered innovation, and established India as a key player in the global digital economy.

The early 2000s witnessed India emerging as the preferred destination for IT outsourcing and business process outsourcing (BPO). The liberalization policies of the 1990s laid the groundwork for this growth, but the global demand for cost-effective, high-quality IT services propelled India into the international spotlight.

The Y2K issue created an urgent demand for software professionals to fix date-related bugs in computer systems worldwide. Simultaneously, the dot-com boom fueled the growth of internet-based businesses, increasing the need for web development and IT support. Global companies sought to reduce costs by outsourcing IT services to India, leveraging the country's skilled workforce and favorable business environment. The development of Software Technology Parks (STPs) and Special Economic Zones (SEZs) provided the necessary infrastructure for IT companies to flourish.

***Evolution of digital skills***. As the IT sector expanded during the 2000s, the demand for specialized digital skills grew exponentially. This period marked a significant transition from basic computer literacy to advanced technical competencies, fueled by the rapid globalization of IT services, the rise of the internet economy, and the proliferation of new technologies.

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The IT industry saw the diversification of job roles beyond traditional software development. Professionals were required to manage both front-end and back-end development, with skills in JavaScript frameworks (React, Angular), server-side technologies (Node.js), and API integration. The shift towards continuous integration and deployment (CI/CD) and the adoption of cloud platforms like AWS, Azure, and Google Cloud led to a demand for DevOps engineers skilled in automation tools (Jenkins, Docker, Kubernetes). With the rise of big data, there was an increasing need for data analysts and scientists proficient in statistical tools (R, SAS), machine learning algorithms, and data visualization software (Tableau, Power BI). The growing threats to digital infrastructure created a demand for cybersecurity specialists adept at ethical hacking, penetration testing, risk assessment, and security compliance (ISO, GDPR).

The focus in education and training shifted towards hands-on experience. Coding bootcamps, hackathons, and real-world project-based learning became integral parts of skill development. Technical certifications (like Microsoft Certified Solutions Expert, Red Hat Certified Engineer) provided industry-recognized validation of expertise.

The globalization of IT services led to cross-cultural collaboration, necessitating digital fluency beyond technical know-how. Professionals needed to be adept at using remote collaboration tools (Slack, Zoom, Jira) and managing virtual teams across different time zones.

The digital revolution extended its impact beyond traditional IT roles, with sectors such as finance, healthcare, education, and marketing embracing digital transformation. Skills in digital marketing (SEO, SEM, social media analytics), fintech applications, e-learning technologies, and telemedicine platforms became highly valuable.

This dynamic evolution of digital skills in the 2000s not only met the immediate demands of the IT boom but also laid the groundwork for future innovations in artificial intelligence, blockchain, and the Internet of Things (IoT), ensuring India's continued leadership in the global digital economy.

As the IT sector expanded, the demand for specialized digital skills grew exponentially. This period saw a shift from basic computer literacy to advanced technical competencies, including:

– *Programming and Software Development* - proficiency in languages like Java, C++, .NET, and later Python became essential. Skills in software

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engineering, application development, and system architecture were highly valued.

– *Web Technologies* - the growth of e-commerce and web-based applications increased the demand for web developers skilled in HTML, CSS, JavaScript, and PHP.

– *Database Management* - expertise in database technologies like Oracle, SQL Server, and MySQL became critical for managing large volumes of data.

– *Networking and IT Infrastructure* - certifications such as Cisco's CCNA and CompTIA's Network+ gained popularity as networking became integral to business operations.

– *Project management* - the complexity of IT projects required professionals with skills in project management methodologies like Agile, Scrum, and PMP certification.

***Educational reforms and skill development initiatives***. To meet the growing demand for IT professionals during the 2000s, India's education system underwent comprehensive reforms aimed at bridging the gap between academic instruction and industry requirements. These reforms not only focused on updating technical curricula but also introduced innovative learning methods, industry collaborations, and lifelong learning opportunities to prepare students for the rapidly evolving digital landscape.

**Table 5.6. Educational reforms and skill development initiatives**

| Key Area | Details |
|---|---|
| Curriculum Modernization | Incorporation of emerging technologies, project-based learning, interdisciplinary approach. |
| Proliferation of Private Institutes and Training Centers | Job-oriented courses, global certifications, flexible learning models from institutes like NIIT, Aptech. |
| Rise of Online Learning Platforms | Adoption of MOOCs, self-paced learning, blended learning models enhancing digital literacy. |
| Industry-Academia Collaboration | Campus recruitment drives, internship programs, faculty development initiatives with industry support. |
| Government Initiatives in Skill Development | Programs like NSDC, Skill India Mission, and ICT in education promoting digital skills. |
| Focus on Lifelong Learning and Continuous Upskilling | Emphasis on advanced certifications, professional development through workshops, webinars, and tech conferences. |

*Sources: developed by authors*

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These comprehensive educational reforms and skill development initiatives played a pivotal role in preparing India's workforce for the challenges and opportunities of the global IT landscape, ensuring sustained growth and innovation in the digital era.

***The rise of the BPO and KPO sectors***. The early 2000s marked an era of rapid growth for the Business Process Outsourcing (BPO) and Knowledge Process Outsourcing (KPO) sectors in India, driven by globalization, technological advancements, and cost-effective service models. India emerged as a preferred outsourcing destination due to its large pool of English-speaking, skilled professionals, robust IT infrastructure, and competitive labor costs. This growth not only created millions of job opportunities but also significantly influenced the evolution of digital and soft skills among the Indian workforce.

**Table 5.7. The rise of the BPO and KPO sectors**

| Key Area | Details |
|---|---|
| Expansion of the BPO Sector | Focused on customer support, telemarketing, data entry, technical support driven by cost efficiency and 24/7 operations. |
| Evolution of the KPO Sector | Specialized in market research, legal services, financial analysis, requiring advanced knowledge and analytical skills. |
| Skill Development in BPO and KPO Sectors | Development of digital and soft skills like office tools, communication, problem-solving, and technical support. |
| Impact on Employment and Economy | Created millions of jobs, spurred urban development, and generated substantial foreign exchange earnings. |
| Challenges Faced | Faced high attrition rates, intense global competition, and the need for continuous upskilling to meet evolving demands. |

*Sources: developed by authors*

The BPO sector primarily focused on handling non-core business activities such as customer support, telemarketing, data entry, and technical support.

KPO services, which required specialized knowledge and analytical skills, evolved rapidly to include areas such as market research, legal services, financial analysis, medical transcription, and data analytics.

The rise of the BPO and KPO sectors in the 2000s played a transformative role in shaping India’s digital economy. By creating a dynamic work environment that emphasized both technical and soft skills, these sectors not only fueled economic growth but also laid the foundation for India’s emergence as a global knowledge and service hub.

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The BPO (Business Process Outsourcing) and KPO (Knowledge Process Outsourcing) sectors experienced phenomenal growth, creating millions of jobs. These sectors required a unique blend of digital and soft skills, including:

- *Proficiency in Office Productivity Tools* - expertise in Microsoft Office Suite, CRM software, and data entry tools.
- *Communication and Analytical Skills* - strong English communication, problem-solving, and data analysis capabilities.
- *Technical Support* - skills in troubleshooting, remote support, and IT service management (ITIL certification).

***Government policies and industry support***. The Indian government played an instrumental role in catalyzing the IT boom of the 2000s through a series of strategic policies, regulatory reforms, and industry-focused initiatives. These efforts not only fostered a conducive environment for the growth of the IT sector but also accelerated the development of digital skills across the country.

**Table 5.8. Government policies and IT growth in India**

| Key Area | Details |
|---|---|
| National IT Policy | Promoted IT for economic growth, encouraged IT exports, e-governance initiatives. |
| Public-Private Partnerships (PPPs) | Collaborations with IT firms for training, development of STPIs/SEZs, startup support. |
| Skill Development Programs | Programs like NSDC, Skill India Mission, ICT in education for digital literacy. |
| Regulatory Reforms and Investment Facilitation | FDI liberalization, telecom reforms, strengthened IPR protection for innovation. |
| Impact of Government Policies | Boosted IT exports, created jobs, expanded digital inclusion in remote areas. |

*Sources: developed by authors*

The 2000s were a defining decade for India's digital journey. The IT boom and globalization not only transformed the country's economy but also revolutionized its digital skill landscape. The focus shifted from basic literacy to specialized, high-demand IT competencies, creating a generation of tech-savvy professionals. This era laid the foundation for India's continued leadership in the global technology arena, with a workforce capable of adapting to the ever-evolving digital world.

**3. 2010s: The digital India initiative and the mobile revolution**. The 2010s marked a transformative decade for India, characterized by the widespread

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adoption of digital technologies, the proliferation of mobile devices, and the launch of the ambitious "Digital India" initiative. This era revolutionized the digital landscape, significantly influencing the evolution of digital skills across the country. The convergence of affordable internet, mobile penetration, and government-led initiatives created new opportunities for economic growth, education, governance, and entrepreneurship.

***The launch of the digital India initiative***. In July 2015, the Government of India launched the "Digital India" initiative with the vision of transforming India into a digitally empowered society and knowledge economy. This flagship program aimed to bridge the digital divide by enhancing digital infrastructure, improving digital literacy, and delivering government services electronically.

Expansion of high-speed internet through BharatNet, establishment of Common Service Centers (CSCs), and promotion of digital identity via Aadhaar. The BharatNet project aimed to connect over 250,000 gram panchayats with high-speed broadband, significantly improving connectivity in rural areas. Implementation of e-governance initiatives like eSign, DigiLocker, UMANG, and MyGov platforms to provide seamless access to government services. These platforms facilitated real-time service delivery, reducing bureaucratic delays. Focus on digital literacy programs such as PMGDISHA (Pradhan Mantri Gramin Digital Saksharta Abhiyan) to equip rural populations with basic digital skills. This program aimed to make at least one person in every household digitally literate.

*Impact of digital India:*

– *E-governance* - enhanced transparency, efficiency, and accessibility in public services, including online tax filing, e-voting initiatives, and digital land record systems.

– *Financial inclusion* - growth of digital payment platforms like BHIM, UPI, and mobile wallets, promoting a cashless economy. UPI transactions skyrocketed, making India a leader in digital payment adoption.

– *Entrepreneurship and innovation* - emergence of tech startups, digital platforms, and e-commerce businesses leveraging digital infrastructure, fostering job creation and economic development.

***The mobile revolution: catalyzing digital transformation***. The mobile revolution was a game-changer for India in the 2010s, driven by the rapid

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proliferation of smartphones, affordable data plans, and widespread 4G connectivity.

The availability of budget-friendly smartphones from brands like Xiaomi, Samsung, and Micromax democratized access to digital technology. This enabled even low-income households to participate in the digital economy. The entry of Reliance Jio in 2016 disrupted the telecom industry by offering free voice calls and inexpensive data, leading to a surge in internet usage. Jio's impact was transformative, bringing millions of new users online. Extensive 4G network coverage enabled high-speed internet access even in rural and remote areas, bridging the urban-rural digital divide.

Increased demand for Android and iOS developers proficient in Java, Kotlin, Swift, and cross-platform frameworks like Flutter. The rise of mobile-first businesses created new career paths in app development. Growth of social media platforms (Facebook, Instagram, YouTube) created opportunities in content creation, influencer marketing, SEO, and social media management. Businesses leveraged these platforms for brand promotion and customer engagement. Rise of online education platforms (Byju's, Unacademy, Coursera) promoted digital learning and upskilling. The COVID-19 pandemic further accelerated the adoption of digital classrooms and virtual learning environments. Adoption of remote work models and gig platforms (Uber, Zomato, Fiverr) required digital collaboration and project management skills. This shift also emphasized the importance of time management and self-discipline in digital workspaces.

Proficiency in emerging technologies like artificial intelligence (AI), machine learning (ML), data science, blockchain, and cloud computing. These skills became essential in industries ranging from finance to healthcare. Growing concerns over data privacy and cyber threats increased the demand for cybersecurity experts skilled in ethical hacking, threat analysis, and security compliance. The rise in cybercrime cases highlighted the critical need for robust security protocols. Emphasis on user-centric design led to the rise of UI/UX design skills, focusing on creating intuitive and engaging digital experiences. Companies invested heavily in improving user interfaces to enhance customer satisfaction. Organizations leveraged big data for strategic decision-making, driving the need for data analysts proficient in tools like Python, R, SQL, and Tableau. Data-driven insights became the cornerstone of business strategies.

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***Government initiatives to promote digital skills***. To support the growing demand for digital skills, the government launched various programs and policies:

– *Skill India mission* - focused on providing digital literacy and vocational training to millions of youth, aiming to create a future-ready workforce.

– *Atal Innovation Mission (AIM)* - established to promote entrepreneurship and innovation through Atal Tinkering Labs in schools. These labs encouraged students to develop problem-solving skills and engage in hands-on STEM learning.

– *Startup India initiative* - encouraged digital entrepreneurship by providing funding, mentorship, and ease of doing business. This initiative helped foster a vibrant startup ecosystem, making India the third-largest startup hub globally.

The 2010s were a defining decade for India's digital evolution. The Digital India initiative and the mobile revolution not only transformed the way people lived, worked, and interacted but also reshaped the digital skill landscape. From basic digital literacy to advanced technical competencies, India witnessed an unprecedented growth in digital capabilities, setting the stage for the country's emergence as a global digital leader in the years to come. The lessons learned and the infrastructure established during this period continue to influence India's digital trajectory, driving innovation, economic growth, and societal progress.

**4. 2020s: The Era of Advanced Technologies and the COVID-19 Impact**. The 2020s have ushered in an era defined by rapid technological advancements and significant socio-economic shifts, notably influenced by the COVID-19 pandemic. The global health crisis accelerated digital transformation across sectors, reshaping how people work, learn, and interact. This period has been marked by the adoption of advanced technologies such as artificial intelligence (AI), machine learning (ML), blockchain, cloud computing, and the Internet of Things (IoT). Consequently, the demand for new digital skills has surged, influencing India's economic landscape and workforce dynamics.

***The COVID-19 Pandemic: a catalyst for digital transformation***. The onset of the COVID-19 pandemic in early 2020 acted as an unprecedented catalyst for digital adoption. Lockdowns, social distancing measures, and the shift to remote operations forced organizations and individuals to embrace digital solutions at an accelerated pace.

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The sudden transition to remote work highlighted the importance of digital tools such as Zoom, Microsoft Teams, Slack, and project management platforms like Trello and Asana. Professionals had to quickly adapt to virtual communication and digital project workflows. Educational institutions transitioned to online learning platforms like Google Classroom, Moodle, and Zoom. The demand for digital literacy among students and educators skyrocketed, emphasizing the need for skills in virtual teaching methodologies and online content creation. The pandemic accelerated the growth of e-commerce platforms (Amazon, Flipkart) and digital payment systems (UPI, Google Pay, PhonePe) as consumers shifted to online shopping and contactless transactions. Digital health solutions, including teleconsultations, health monitoring apps, and AI-driven diagnostics, became mainstream, necessitating digital proficiency in healthcare delivery.

***The rise of advanced technologies***. The 2020s have seen the mainstream adoption of advanced technologies that are reshaping industries and creating new career opportunities. AI and ML applications are revolutionizing sectors like healthcare, finance, retail, and manufacturing. Skills in data analysis, algorithm development, and natural language processing (NLP) are in high demand. The shift to cloud-based infrastructures has become essential for business continuity. Expertise in platforms like AWS, Microsoft Azure, and Google Cloud, along with skills in cloud architecture and security, is highly sought after.

The increase in cyber threats during the pandemic highlighted the need for robust cybersecurity measures. Skills in ethical hacking, threat detection, risk management, and compliance with data protection regulations (like GDPR) have become critical. Beyond cryptocurrencies, blockchain is being used for supply chain management, secure digital transactions, and identity verification. Proficiency in blockchain development, smart contracts, and decentralized applications (dApps) is growing in demand. The integration of IoT devices in smart homes, industries, and healthcare systems has created a need for skills in IoT architecture, data analytics, and device security.

***Evolution of digital skills in the 2020s***. The digital skills landscape in the 2020s reflects the growing complexity and interconnectivity of technologies. Key areas of skill development include (Table 5.9).

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**Table 5.9. Digital Skills Evolution and Challenges in the 2020s**

| Key Area | Details |
|---|---|
| Evolution of Digital Skills | |
| Data Science and Analytics | Skills in Python, R, SQL, Tableau, Power BI for data-driven decision-making. |
| DevOps and Automation | Expertise in CI/CD pipelines, automation tools like Jenkins, Docker, Kubernetes. |
| Augmented Reality (AR) and Virtual Reality (VR) | Demand for AR/VR developers, 3D modeling, simulation design in various sectors. |
| Digital Marketing | Proficiency in SEO, SEM, content strategy, social media marketing, Google Analytics. |
| Robotic Process Automation (RPA) | Skills in RPA tools like UiPath, Blue Prism for business process automation. |
| Challenges | |
| Digital Divide | Disparities in digital access, particularly in rural and remote areas. |
| Skill Gaps | Mismatch between industry demands and traditional educational outputs. |
| Cybersecurity Threats | Increased cyber threats require continuous investment in security measures. |
| Data Privacy Concerns | Complexities around data privacy and compliance with evolving regulations. |
| Technological Obsolescence | Need for continuous learning due to rapidly changing technological landscapes. |

*Sources: developed by authors*

***Government and industry initiatives***. Recognizing the importance of digital skills in the post-pandemic world, the Indian government and industry leaders have launched various initiatives:

- *Digital India 2.0* - an enhanced version of the original initiative, focusing on deepening digital infrastructure, promoting cybersecurity, and expanding e-governance services.
- *FutureSkills Prime* - a joint initiative by NASSCOM and the Ministry of Electronics and IT to reskill and upskill the workforce in emerging technologies.
- *National Education Policy (NEP) 2020* - Emphasizes the integration of digital literacy and coding into school curricula, preparing students for future tech-driven careers.
- *Startup ecosystem support* - government schemes like Atmanirbhar Bharat and Startup India continue to foster innovation, digital entrepreneurship, and skill development.

The 2020s represent a pivotal decade in India's digital evolution, marked by the convergence of advanced technologies and the transformative impact of the

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COVID-19 pandemic. This era has redefined the digital skill landscape, emphasizing the need for continuous learning, adaptability, and innovation. As India navigates this dynamic environment, the focus on digital skills will be critical in driving economic growth, fostering technological leadership, and ensuring a resilient, future-ready workforce.

**5. The future of digital skills in India**. Looking ahead, India's digital skills landscape will continue to evolve with emerging technologies such as the Internet of Things (IoT), robotics, quantum computing, and augmented reality. Government initiatives like the National Education Policy (NEP) 2020 aim to integrate digital literacy from the foundational level in schools, emphasizing coding, computational thinking, and problem-solving skills.

As India navigates through the dynamic landscape of the digital age, the future of digital skills holds transformative potential for the country's socio-economic development. With rapid advancements in emerging technologies such as artificial intelligence (AI), machine learning (ML), blockchain, quantum computing, and the Internet of Things (IoT), the demand for new-age digital competencies is set to redefine the workforce. The convergence of these technologies with India's robust digital infrastructure and youthful demographic presents a unique opportunity to position India as a global leader in the digital economy.

The future of digital skills in India will be shaped by several cutting-edge technologies that are expected to dominate the global landscape. As AI becomes embedded in industries like healthcare, finance, agriculture, and logistics, skills in data science, natural language processing (NLP), computer vision, and predictive analytics will be in high demand. Although in its nascent stage, quantum computing promises to revolutionize problem-solving in areas such as cryptography, drug discovery, and financial modeling. Quantum algorithms and quantum programming languages will become critical skills. Beyond cryptocurrencies, blockchain will play a vital role in supply chain management, identity verification, digital contracts, and secure transactions, driving demand for blockchain developers and cryptographic experts. The rollout of 5G networks will accelerate IoT adoption, requiring skills in IoT architecture, sensor data analysis, and cybersecurity for connected devices. With applications in education, entertainment, and training, AR/VR development, 3D modeling, and simulation design will become increasingly relevant.

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Recognizing the pivotal role of digital skills in driving economic growth, the Indian government and private sector are investing heavily in skill development programs (Table 5.10).

**Table 5.10. The impact of the Indian government and private sector and educational institutions on skill development programs**

| Key Area | Details |
|---|---|
| **Government and Industry Initiatives** | |
| Digital India Program 2.0 | Enhances digital literacy, bridges digital divide, fosters e-governance. |
| National Skill Development Mission | Trains millions in emerging technologies under Skill India and PMKVY. |
| FutureSkills PRIME | Reskills professionals in AI, cybersecurity, big data with NASSCOM and MeitY support. |
| National Education Policy (NEP) 2020 | Integrates coding, data science, and digital literacy into school curricula. |
| Collaboration with Tech Giants | Partnerships with companies like Google, Microsoft for advanced tech training. |
| **Educational institutions** | |
| Curriculum innovation | Incorporating emerging technologies into academic programs, including hands-on projects and industry collaborations |
| Vocational training | Expanding technical and vocational education to include certifications in areas like cloud computing, AI, and data analytics |
| Research and development | Fostering innovation through research initiatives in AI, robotics, quantum computing, and sustainable technologies |

*Sources: developed by authors*

Moreover, the focus is shifting towards:

- *reskilling and upskilling* - continuous learning programs, Massive Open Online Courses (MOOCs), and professional certification platforms like Coursera, edX, and Udemy are helping the workforce stay updated with the latest technologies;
- *digital inclusion* - bridging the digital divide through initiatives like BharatNet, which aims to provide high-speed broadband connectivity to rural areas, ensuring that people in underserved regions have access to digital education;
- *entrepreneurship and innovation* - encouraging startups and digital entrepreneurs through incubators, funding support, and mentorship programs. The rise of fintech, edtech, healthtech, and agritech startups is creating new opportunities for digital skill development;

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– *ethical and responsible technology use* - as technology becomes more integrated into daily life, there is a growing emphasis on digital ethics, data privacy, and responsible AI usage.

The future of digital skills in India is dynamic, diverse, and filled with opportunities. As technology continues to evolve, the focus will shift from basic digital literacy to advanced competencies in AI, data science, cybersecurity, and beyond. By fostering a culture of continuous learning, innovation, and inclusivity, India can harness its digital potential to drive sustainable economic growth, social progress, and global leadership in the digital era.

The evolution of digital skills in India reflects the country's adaptability and resilience in the face of technological change. From basic computer literacy in the 1990s to advanced AI and cybersecurity skills in the 2020s, India's journey showcases a robust ecosystem driven by government initiatives, private sector growth, and a young, dynamic population eager to embrace the digital future. The continuous focus on digital education, reskilling, and innovation will be key to sustaining India's growth in the global digital economy.

**Conclusion**. The evolution of digital skills in India is a testament to the country's remarkable journey from the early stages of basic computer literacy in the 1990s to becoming a global leader in advanced digital technologies today. India's digital transformation has been driven by a confluence of factors: robust government initiatives, dynamic private sector contributions, and the relentless pursuit of knowledge by its young and diverse population.

The liberalization of the economy in the 1990s laid the foundation for the IT revolution, while the 2000s witnessed India's rise as an IT outsourcing powerhouse, fostering a demand for specialized technical skills. The 2010s marked the era of widespread digital adoption through the Digital India initiative and the mobile revolution, democratizing access to technology and creating new avenues for entrepreneurship, governance, and education.

The 2020s have accelerated digital transformation, driven by the rapid adoption of emerging technologies such as artificial intelligence, blockchain, IoT, and cloud computing. The COVID-19 pandemic further highlighted the critical role of digital skills, reshaping how people work, learn, and interact.

Despite these advancements, challenges persist—ranging from the digital divide to skill mismatches and cybersecurity threats. However, India's proactive approach through initiatives like Digital India 2.0, National Education Policy

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(NEP) 2020, and FutureSkills PRIME demonstrates a strong commitment to building a digitally empowered society.

Looking ahead, the future of digital skills in India is dynamic and filled with opportunities. Continuous learning, reskilling, and fostering a culture of innovation will be essential in ensuring that India not only adapts to technological changes but also leads the global digital economy. By embracing inclusivity, ethical technology use, and global collaborations, India is well-positioned to harness its digital potential for sustainable growth, social progress, and global leadership in the digital era.

**References:**

1. Agarwal, P. (2020). *Digital India: Challenges and opportunities for bridging the digital divide*. Springer.
2. Bansal, S., & Kapoor, R. (2021). *E-governance and digital transformation in India: Policies and impact on education*. Routledge.
3. Basu, S. (2019). *Digital literacy and skill development in India: A roadmap for inclusive growth*. SAGE Publications.
4. Chakraborty, A., & Sharma, K. (2022). *AI, IoT, and the future of digital skills in emerging economies: Case studies from India*. Oxford University Press.
5. Government of India. (2020). *Digital India Programme: Progress report and future strategies*. Ministry of Electronics and Information Technology.
6. India Skills Report. (2021). *Bridging the skill gap: Challenges and opportunities in India's workforce*. National Skills Development Corporation (NSDC).
7. Kumar, R. (2018). *Digital divide in India: Barriers and solutions for inclusive digital education*. Palgrave Macmillan.
8. National Education Policy (NEP). (2020). *Guidelines for integrating technology in education: Bridging the skill gap*. Ministry of Education, Government of India.
9. NASSCOM. (2021). *FutureSkills PRIME: Reskilling India for the digital economy*. National Association of Software and Service Companies.
10. World Economic Forum. (2022). *The future of work in India: Digital transformation and skill development trends*. WEF Report.

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*Monograph dedicated to the 5th anniversary*
*of Scientific Center of Innovative Research's activities*

# Chapter 5.3. The Evolution of Learning: Digital Technologies in Ukrainian Higher Education

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***Abstract.*** *This section of the monograph explores the evolution of digital technologies in Ukrainian higher education, focusing on the transformative processes that have shaped the educational landscape from the 1990s to the present. The introduction highlights the significant shifts influenced by global technological trends, socio-political changes, and the necessity for educational continuity during crises. The primary purpose of this research is to analyze the key stages of digital transformation, identify the innovations and technologies implemented, and assess their impact on teaching and learning outcomes in Ukrainian higher education institutions. The research methodology involves a comprehensive historical and analytical approach, examining the development of digital infrastructure, pedagogical strategies, and technological integrations across different periods. It also employs a comparative analysis to evaluate the resilience strategies adopted by educational institutions in response to external challenges such as political instability, economic fluctuations, and the COVID-19 pandemic. The results of the study reveal that Ukrainian higher education has undergone significant transformations, marked by the adoption of e-learning platforms, hybrid learning models, and advanced technologies such as artificial intelligence, virtual reality, and big data analytics. The integration of digital tools has enhanced accessibility, personalized learning, and global connectivity, while also reshaping the roles of educators and students. The research identifies both the achievements and the persistent challenges, including digital literacy gaps, infrastructure disparities, and cybersecurity risks. The practical value of this research lies in its comprehensive analysis of the strategies that have fostered resilience and adaptability within Ukrainian higher education. It offers valuable insights for policymakers, educators, and institutions aiming to strengthen digital competencies and create inclusive, future-ready learning environments. Directions for further research include exploring the long-term effects of digital transformation on academic performance, the development of sustainable digital education models, and the potential of emerging technologies to further enhance educational quality and accessibility.*

***Keywords:*** *digital transformation, Ukrainian higher education, e-learning, hybrid learning, digital literacy, educational technology, resilience strategies, online education, artificial intelligence, digital infrastructure.*

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**1. The digital shift: historical context from 1990 to present in Ukrainian higher education**. The digital transformation of Ukrainian higher education has been a complex and evolving process, influenced by global technological trends, socio-political changes, and the country's unique historical trajectory. From the early post-Soviet years to the modern digital era, Ukraine has navigated significant milestones that have shaped its educational landscape. This document provides a comprehensive overview of the key phases, developments, and challenges in the digital shift from 1990 to the present.

***1990s: the foundation of change***. Following Ukraine's independence in 1991, the country faced the significant challenge of rebuilding its educational system to align with democratic values and meet global standards. At that time, digital technologies were still in their early stages of development, and computer literacy among both educators and students was limited. Despite these challenges, the introduction of basic computer courses in universities marked the initial steps toward the integration of technology into the educational process. Universities began to equip their laboratories with personal computers, which were primarily used for administrative tasks and basic programming courses. These early computers were often outdated models, typically acquired through international donations or partnerships with foreign institutions.

To support the growing demand for technological education, specialized programs in computer science and information technology were established. These programs laid a strong foundation for future advancements in the field of digital education. Prominent institutions, such as Kyiv Polytechnic Institute, emerged as pioneers in promoting technical education and fostering a culture of innovation. However, the progress of digital integration faced several obstacles, including limited access to modern hardware, a shortage of trained educators proficient in digital technologies, and inadequate funding to support large-scale technology adoption. Despite these barriers, the early efforts during this period played a crucial role in shaping the future of digital education in Ukraine.

***2000s: the growth of information technologies***. The early 2000s witnessed a significant shift in Ukrainian higher education, marked by the rapid expansion of internet access and the increasing availability of personal computers. This decade represented the beginning of a more structured and systematic approach to digital education in the country. Ukrainian universities began experimenting

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with e-learning platforms; however, access to these technologies was often limited due to infrastructural constraints, particularly in less developed regions.

To address these challenges, national academic networks were established, which facilitated resource sharing and collaboration among institutions. Additionally, the government launched several national programs aimed at improving IT literacy among both students and faculty members. These initiatives promoted the integration of digital tools into teaching methodologies and administrative processes, laying the groundwork for a digitally competent academic environment.

A key policy document, the "Information Society Development Strategy", highlighted the critical role of education in driving national digital transformation. This strategy underscored the importance of equipping students and educators with the necessary digital skills to thrive in an increasingly technology-driven world.

Moreover, partnerships with European educational institutions, particularly through Ukraine's involvement in the Bologna Process, played a pivotal role in facilitating knowledge exchange and the adoption of best practices in digital education. International programs like Erasmus+ further supported this development by enhancing student and faculty mobility across Europe, which contributed to the growth of digital competencies and exposure to innovative educational technologies.

During this period, universities also made significant investments in upgrading their technological infrastructure. This included the development of modern computer laboratories, the expansion of internet connectivity across campuses, and the establishment of digital libraries. These efforts collectively created a strong foundation for the continued growth and evolution of digital education in Ukraine, setting the stage for future advancements in the integration of technology within the academic landscape.

***2010s: accelerating digital integration***. The 2010s were characterized by rapid technological advancements and a growing recognition of the importance of digital education. The widespread availability of smartphones, high-speed internet, and affordable devices facilitated greater access to online courses and digital resources among students and educators. As a result, Massive Open Online Courses (MOOCs) became increasingly popular among Ukrainian students, offering diverse learning opportunities beyond traditional classroom settings. In

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response to these technological advancements, universities began adopting blended learning approaches that combined conventional in-person classroom instruction with online educational components. This blended learning model provided enhanced flexibility and effectively catered to the diverse learning needs of students across various disciplines.

The political crisis in 2014, along with subsequent conflicts, underscored the urgent need for adaptable and flexible learning environments. These events led to a significant increase in the reliance on digital platforms to maintain educational continuity during times of disruption. The annexation of Crimea and the ongoing conflict in Eastern Ukraine severely disrupted the operations of many educational institutions, thereby accelerating the transition to remote learning in the affected regions. In light of these challenges, comprehensive educational reforms were implemented, placing a strong emphasis on digital literacy as a fundamental competency. Consequently, digital literacy was integrated into national curricula to better prepare students for the demands of a rapidly evolving digital world.

***2020s: the digital transformation era***. The COVID-19 pandemic in 2020 acted as a catalyst, accelerating the digital shift in Ukrainian higher education. The rapid transition to remote learning exposed both the strengths and weaknesses of the existing digital infrastructure. Platforms like Moodle, Google Classroom, and Microsoft Teams became essential tools for remote education. Institutions developed comprehensive online courses, virtual labs, and digital assessments. Educators embraced multimedia content, virtual labs, and interactive learning tools to enhance student engagement. The use of video conferencing, digital collaboration tools, and interactive simulations became commonplace. Significant investments were made to improve digital infrastructure, provide training for educators, and support students in adapting to new learning environments. The Ministry of Education and Science of Ukraine launched initiatives to standardize online education and ensure quality. The ongoing conflict further stressed the need for resilient digital education systems. Many universities relocated their operations online, supporting displaced students and faculty. International support and partnerships played a crucial role in sustaining educational activities.

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**Table 5.11. Stages of Digital Shift in Ukrainian Higher Education**

| Stage | Key Developments |
|---|---|
| 1990s: The Foundation of Change | Introduction of basic computer courses, focus on IT education, initial adoption of computers, limited access to technology. |
| 2000s: The Growth of IT | Expansion of internet, introduction of e-learning platforms, government initiatives for IT literacy, international collaborations. |
| 2010s: Accelerating Digital Integration | Proliferation of smartphones and online learning, blended learning models, crisis-driven adaptation post-2014, digital competence frameworks. |
| 2020s: The Digital Transformation Era | Rapid transition to remote learning due to COVID-19, widespread use of LMS, digital pedagogy innovations, resilience during ongoing conflicts. |

*Sources: developed by author*

The historical context of the digital shift in Ukrainian higher education reflects a journey of adaptation, innovation, and resilience. From the early days of basic computer literacy to the current era of sophisticated digital ecosystems, Ukraine's educational system has demonstrated remarkable growth. As the country continues to embrace digital transformation, the focus remains on creating inclusive, flexible, and future-ready learning environments. The lessons learned from past experiences will guide future policies and practices, ensuring that Ukrainian higher education remains competitive and responsive to global trends.

**2. Key innovations and technologies in Ukrainian higher education by periods**. The integration of digital technologies in Ukrainian higher education has evolved through distinct periods, each marked by significant innovations and technological advancements. This document outlines the key developments from the early 1990s to the present, highlighting how Ukraine’s educational landscape has adapted to technological trends and socio-political changes. The digital transformation journey reflects Ukraine’s resilience, adaptability, and continuous pursuit of educational excellence amidst evolving global and local challenges.

***1990s: the foundation of change***. In the aftermath of Ukraine’s independence in 1991, the higher education sector began to lay the groundwork for digital integration. This period was characterized by the initial exposure to information technology, setting the stage for future advancements in digital learning environments.

Universities initiated courses on fundamental computer skills, which included word processing, spreadsheet management, and introductory programming using languages such as Pascal, BASIC, and C++. Specialized

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faculties for computer science and information technology were established to foster technical expertise and drive technological innovation within academia. Institutions adopted desktop computers early on, equipping them with DOS-based systems to support administrative functions, data management, and basic educational activities. The development of early educational software focused on technical disciplines, offering tools for mathematical modeling, physics simulations, and language learning applications. Pilot projects were launched to establish local area networks (LANs) in universities, enabling resource sharing, internal communication, and the development of rudimentary networking capabilities. Additionally, limited and slow dial-up connections provided initial access to the internet, laying the groundwork for future advancements in digital connectivity.

***2000s: the growth of information technologies***. The early 2000s marked a period of rapid technological adoption, fueled by increased internet accessibility, global digitalization trends, and educational reforms aimed at integrating modern technologies.

The deployment of high-speed broadband and Wi-Fi networks across university campuses has significantly enhanced digital access for both students and faculty. The introduction of platforms such as Moodle and Blackboard has facilitated online learning, supported course management, and enabled the creation of virtual classrooms, thereby advancing distance education initiatives.

National programs, such as the "National Informatization Program," have actively promoted digital literacy, provided funding for ICT infrastructure, and encouraged the adoption of e-learning within public universities. The integration of projectors, interactive whiteboards, and audio-visual aids has revolutionized traditional lectures, fostering more interactive and engaging learning environments.

Additionally, the development of online correspondence courses, virtual seminars, and distance education programs through email, online forums, and basic web portals has expanded educational accessibility. The widespread adoption of software suites like Microsoft Office and OpenOffice has become instrumental for academic writing, data analysis, and administrative management tasks. Furthermore, the transition from paper-based systems to digital libraries and archives has enabled easier and more efficient access to scholarly materials and research databases.

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***2010s: accelerating digital integration***. The 2010s witnessed a transformative shift towards comprehensive digital integration, driven by technological advancements, globalization, and socio-political events such as the 2014 Ukrainian revolution.

The ubiquitous use of smartphones and tablets has empowered mobile learning, microlearning, and real-time access to academic resources through various educational applications. The implementation of hybrid teaching methods, which combine in-person instruction with online learning components, has enhanced both flexibility and student engagement. Ukrainian universities have partnered with global platforms such as Coursera, edX, and Prometheus to offer Massive Open Online Courses (MOOCs), thereby democratizing access to quality education.

The adoption of cloud platforms, including Google Drive, Microsoft OneDrive, and Dropbox, has facilitated collaborative projects, efficient data storage, and remote access to academic content. Subscriptions to international academic databases like JSTOR, Scopus, and Web of Science have significantly expanded research opportunities and improved scholarly communication. The introduction of domain-specific software for STEM education, such as MATLAB, AutoCAD, SPSS, and virtual lab simulations, has enhanced the learning experience in fields like engineering, economics, and medical studies.

Additionally, the deployment of secure online assessment tools, equipped with automated grading systems, proctoring technologies, and plagiarism detection features, has played a crucial role in maintaining academic integrity. The promotion of open educational resources (OERs) has further supported inclusive education by providing free, accessible, and high-quality learning materials to a broad audience.

***2020s: the digital transformation era***. The COVID-19 pandemic in 2020 acted as a catalyst for a full-scale digital transformation in Ukrainian higher education. This era is marked by advanced digital ecosystems, hybrid learning environments, and a focus on resilience amidst crises, including the ongoing geopolitical conflicts.

Platforms like Google Classroom, Microsoft Teams, Moodle, and Canvas have become integral for remote learning, enabling seamless content delivery and fostering effective student-teacher interaction. The adoption of immersive technologies has provided interactive learning experiences through virtual labs,

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medical simulations, architectural design applications, and historical reconstructions. The implementation of artificial intelligence has facilitated personalized learning pathways, adaptive assessments, predictive analytics, and intelligent tutoring systems to enhance educational outcomes.

Additionally, platforms such as Slack, Trello, Asana, and Microsoft Planner are widely used for managing academic projects, supporting research collaborations, and facilitating virtual teamwork. To ensure the security of academic data and privacy, institutions have strengthened cybersecurity protocols by incorporating encrypted data transfers, multi-factor authentication, and comprehensive cybersecurity training programs.

The development of smart classrooms, equipped with interactive boards, high-definition cameras, and advanced conferencing systems, has supported simultaneous in-person and remote instruction, enhancing the flexibility of learning environments. The expansion of Open Educational Resources (OERs) has further promoted inclusive education, with universities creating digital repositories containing textbooks, lecture notes, and multimedia content.

Moreover, the integration of game-based learning platforms, educational simulations, and interactive quizzes has significantly enhanced student motivation and engagement. The utilization of big data analytics has enabled institutions to track student performance, optimize curriculum design, and make data-driven policy decisions. Finally, there has been notable growth in educational technology startups, offering innovative solutions in e-learning, virtual labs, language learning applications, and AI-driven educational tools, further enriching the digital learning landscape.

The evolution of digital technologies in Ukrainian higher education reflects a dynamic journey of adaptation, resilience, and innovation. Each period has contributed to building a robust digital infrastructure that supports flexible, accessible, and high-quality education. As Ukraine continues to embrace technological advancements, the focus remains on enhancing digital literacy, ensuring equitable access, and fostering a culture of continuous learning and innovation. The lessons learned from navigating political, health, and technological challenges have positioned Ukrainian higher education as a resilient and forward-thinking sector, ready to thrive in the global educational landscape.

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**3. Challenges and resilience of digital technologies in Ukrainian higher education**. The integration of digital technologies in Ukrainian higher education has been transformative, providing numerous opportunities for enhanced learning, advanced research, and improved administrative efficiency. However, this digital evolution has not occurred without significant challenges. Ukraine's complex socio-political landscape, coupled with economic fluctuations, technological disparities, and recent geopolitical crises, has continuously tested the resilience of its educational institutions. This document aims to explore the major challenges encountered by Ukrainian higher education in adopting digital technologies and highlights the strategies that have been instrumental in fostering resilience and adaptability within the system.

***Infrastructure disparities*.** Significant disparities exist between urban centers and rural areas concerning internet connectivity, access to modern devices, and the availability of technological infrastructure. Educational institutions in rural regions often face slow internet speeds, outdated hardware, and unreliable power supplies, all of which limit the effectiveness of online learning environments. Many universities, particularly those in less developed regions, continue to rely on obsolete hardware and outdated software, restricting their ability to utilize advanced digital tools effectively. This includes deteriorating computer laboratories, limited bandwidth capabilities, and the absence of smart classroom technologies. Additionally, there is often an insufficient number of IT support staff available to maintain and troubleshoot digital systems, creating bottlenecks that hinder the management of large-scale digital platforms.

***Financial constraints*.** Economic challenges have significantly restricted both government and institutional budgets, limiting their ability to upgrade digital infrastructure and invest in new technologies. Budget allocations often prioritize immediate academic needs, such as basic operational costs, over long-term investments in technological advancements. The high costs associated with software licenses, modern equipment, and comprehensive cybersecurity measures present additional barriers to the widespread adoption of digital technologies. Many institutions struggle to afford the state-of-the-art tools required to support modern e-learning environments effectively. Furthermore, there is a heavy reliance on international grants and donor programs for the

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development of digital infrastructure, which raises concerns about the sustainability of these initiatives once external funding is no longer available.

***Digital literacy and skills* gap.** A significant gap exists in digital literacy and technological skills among both educators and students. Many educators lack formal training in digital pedagogy, online course design, and the effective use of advanced educational technologies. Traditional teaching methods continue to dominate, with some educators resistant to adopting new technologies due to unfamiliarity and a lack of confidence in using digital tools. Although younger generations are generally more tech-savvy, gaps remain in their digital literacy, particularly in areas related to academic research, data security, and critical thinking within online environments. Limited exposure to advanced software tools further hampers their ability to engage effectively in digital learning. Additionally, the absence of standardized digital competency frameworks results in inconsistent levels of digital literacy across different institutions, educators, and student populations.

***Cybersecurity risks*.** The rapid shift to online platforms has significantly increased vulnerabilities related to data breaches, phishing attacks, and unauthorized access to sensitive information. Weak cybersecurity protocols, outdated antivirus systems, and poor data management practices are common issues within many educational institutions. The geopolitical tensions in Ukraine have further exacerbated these risks, with an increased number of cyberattacks targeting educational institutions and their digital infrastructures. These institutions often become targets for politically motivated cyber warfare, which threatens the security of academic data and disrupts online learning environments. Additionally, limited awareness among both students and staff regarding safe online practices increases susceptibility to various cyber threats, making comprehensive cybersecurity education a critical need.

***Equity and inclusion*.** Ensuring equity and inclusion in digital education remains a significant challenge. Students with disabilities face numerous barriers due to the lack of universally designed digital content and the limited availability of assistive technologies. Many educational platforms do not support accessibility features such as screen readers, captioning, or adaptive devices, thereby excluding students with specific needs. Financial disparities among students also play a crucial role in limiting access to digital education. Students from low-income families often struggle to afford personal devices or maintain stable

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internet connections, placing them at a disadvantage and increasing the risk of digital exclusion, which leads to significant learning gaps. Furthermore, the predominance of English-based digital resources creates additional barriers for students with limited proficiency in English, restricting their access to a wide range of academic materials.

***Resistance to change*.** Resistance to change is another significant barrier to the adoption of digital technologies in Ukrainian higher education. Traditional teaching methods remain deeply ingrained, and many faculty members accustomed to conventional pedagogical approaches are hesitant to embrace digital innovations. Some educators perceive technology as a threat to academic integrity and classroom control, fearing that it may undermine the traditional educator-student dynamic. Additionally, bureaucratic processes and rigid administrative structures within educational institutions often slow down the implementation of new technologies. The lack of flexible policies to support rapid digital adaptation during times of crisis further exacerbates this issue. Concerns about the rapid pace of technological change also contribute to reluctance among educators, as they worry that the tools they invest time in learning may soon become obsolete.

***Impact of external crises*.** External crises have had a profound impact on the digital transformation of Ukrainian higher education. The sudden shift to online learning during the COVID-19 pandemic exposed significant gaps in preparedness, infrastructure, and digital competencies across institutions. Many universities struggled to transition effectively to remote learning, leading to disrupted academic schedules, reduced instructional quality, and declining student engagement. The Russian invasion of Ukraine further disrupted educational activities, causing widespread damage to infrastructure and forcing institutions to rapidly adapt to remote and hybrid learning environments. The displacement of students and faculty due to the conflict posed additional challenges in maintaining educational continuity. Moreover, frequent power outages and natural disasters in certain regions complicate the reliance on digital technologies, highlighting the need for robust contingency plans and resilient infrastructure to support uninterrupted learning.

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**Table 5.12. Challenges of digital transformation in Ukrainian higher education**

| Challenges | Details |
|---|---|
| Infrastructure Disparities | Urban-rural divide, outdated equipment, limited technical support |
| Financial Constraints | Limited funding, high cost of technology, dependence on external aid |
| Digital Literacy and Skills Gap | Faculty training needs, student preparedness, lack of standardized training |
| Cybersecurity Risks | Data protection issues, geopolitical cyber threats, lack of cyber awareness |
| Equity and Inclusion | Accessibility barriers, socio-economic inequalities, language barriers |
| Resistance to Change | Cultural barriers, institutional rigidity, fear of technological obsolescence |
| Impact of External Crises | COVID-19 pandemic, ongoing conflict, natural disasters, power outages |

*Sources: developed by author*

While the integration of digital technologies in Ukrainian higher education has created new opportunities for growth and development, it has also presented a complex set of challenges. Addressing these challenges requires comprehensive strategies that focus on improving infrastructure, enhancing digital literacy, ensuring equity, and fostering resilience in the face of both internal and external crises.

***Resilience strategies and adaptive measures***. To ensure the sustainability and adaptability of digital technologies in Ukrainian higher education, a multifaceted approach is necessary. These strategies not only address the current challenges but also build a resilient foundation capable of withstanding future disruptions. Resilience strategies encompass government policies, technological innovations, capacity building, international collaborations, and community-driven initiatives. Adaptive measures are continuously evolving to meet emerging challenges, including cybersecurity threats, socio-economic disparities, and the dynamic nature of digital education technologies.

***Government and policy initiatives***. The Ukrainian government has been actively involved in developing comprehensive strategies to integrate digital technologies across all educational levels. Initiatives such as the "Digital Agenda for Ukraine" are designed to promote digital literacy, enhance technological infrastructure, and support the modernization of the educational system. These

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policies are aimed at ensuring the continuity of education during times of crisis, which includes the implementation of flexible curriculum adaptations and remote learning protocols. The adoption of distance learning policies during emergencies has become a standard practice, allowing for uninterrupted educational activities. In addition, new legislation has been introduced to support the accreditation of e-learning programs and to formally recognize digital competencies within academic credentials. The government also encourages institutional autonomy, empowering universities to develop and implement customized digital strategies tailored to address their unique challenges and specific needs.

***Technological innovations***. Technological innovations in Ukrainian higher education have focused on enhancing flexibility and resilience. One of the key developments is the adoption of hybrid learning models, which combine online and face-to-face instruction to provide adaptable educational experiences. Smart classrooms equipped with advanced audiovisual (AV) tools facilitate seamless hybrid learning, ensuring that both in-person and remote students can participate effectively. The widespread adoption of Open Educational Resources (OER) has supported diverse learning needs by providing free, accessible learning materials. OER platforms have been instrumental in bridging the digital divide, particularly in underfunded institutions. Additionally, the use of cloud-based platforms for secure data storage, collaborative projects, and resource sharing has become prevalent. Cloud solutions reduce dependency on local servers, enhancing both scalability and accessibility for students and educators. The development of mobile-friendly platforms has further expanded the reach of digital education, making it accessible to students without personal computers. Partnerships with local technology startups have also been fostered to create innovative educational applications, virtual laboratories, and cutting-edge e-learning solutions.

***Capacity building and professional development***. Capacity building and professional development initiatives have been crucial in equipping educators and students with the necessary digital skills. Educators participate in workshops, webinars, and certification courses to enhance their digital pedagogy skills and to stay updated with emerging technologies such as artificial intelligence (AI), virtual reality (VR), and data analytics. Continuous professional development programs ensure that educators are well-prepared to integrate these technologies into their teaching practices. For students, various programs have been established to improve competencies in digital research, cybersecurity, and

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critical thinking. Activities like hackathons, coding boot camps, and digital literacy campaigns are increasingly popular, providing hands-on experience and fostering problem-solving skills. Additionally, peer-to-peer learning models are encouraged, where tech-savvy students mentor their peers, promoting a collaborative and supportive learning environment. Digital literacy and ICT-related courses have been embedded across academic disciplines to ensure that all students, regardless of their field of study, acquire comprehensive digital skills.

***International collaboration***. International collaboration has played a significant role in enhancing the digital capabilities of Ukrainian higher education institutions. Universities actively cooperate with international universities, organizations, and technology companiesto share resources, exchange expertise, and adopt best practices. Partnerships with global organizations such as UNESCO, the European Union (EU), and other international bodies have supported knowledge exchange and capacity-building efforts. Ukrainian institutions participate in international exchange programs, such as Erasmus+, which foster cross-cultural learning experiences and enhance digital competency development. Collaborative Online International Learning (COIL) projects connect Ukrainian students with peers worldwide, promoting global awareness and collaborative problem-solving. Furthermore, Ukrainian universities are involved in global research initiatives focusing on areas such as digital education, cybersecurity, and educational resilience. International grants and funding opportunities are leveraged to support digital infrastructure development, capacity-building projects, and innovative educational programs.

***Community and institutional support.*** Strong community and institutional support systems are essential for the successful integration of digital technologies. The creation of digital communities, including online forums, social media groups, and professional networks, provides platforms for educators and students to share experiences, discuss challenges, and exchange solutions. These communities foster knowledge sharing and collaborative learning. Recognizing the psychological impact of remote learning and crisis-related stress, institutions have launched mental health initiatives, including virtual counseling services, stress management workshops, and mental health hotlines to support student well-being. Additionally, universities have established help desks, IT support teams, and online resource centers to assist students in navigating digital

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platforms and troubleshooting technical issues. To promote inclusive education, institutions are implementing accessible technologies and adopting inclusive teaching practices to support students with diverse learning needs, including those with disabilities.

***Cybersecurity enhancements.*** As digital technologies become more embedded in educational environments, cybersecurity has become a top priority. Institutions have implemented multi-factor authentication (MFA), data encryption, and regular cybersecurity training to safeguard sensitive data and ensure the integrity of digital platforms. Universities invest in advanced security infrastructure, including firewalls, intrusion detection systems, and secure virtual private networks (VPNs), to protect against cyber threats. Dedicated cybersecurity teams have been established to monitor, prevent, and respond to security breaches effectively. Collaboration with national cybersecurity agencies strengthens institutional security frameworks and ensures alignment with national and international cybersecurity standards. Regular security assessments are conducted to identify vulnerabilities, while corrective measures are promptly implemented to mitigate risks. Furthermore, institutions organize workshops, seminars, and awareness campaigns to educate both students and staff on safe online practices, promoting a culture of cybersecurity awareness across campuses.

***Innovation and EdTech development***. The growth of the educational technology (EdTech) sector has been pivotal in driving digital transformation within Ukrainian higher education. Universities actively encourage the development of EdTech startups, providing support through incubators and accelerators that offer funding, mentorship, and resources to entrepreneurs working on educational solutions. Innovative teaching methods, such as game-based learning and AI-driven personalized learning experiences, have been integrated into academic programs to enhance student engagement and motivation. AI-driven analytics tools help educators tailor content to meet the unique learning needs of each student, improving academic outcomes. The adoption of immersive technologies, including virtual reality (VR) and augmented reality (AR), has expanded opportunities for hands-on learning, particularly in disciplines like science, medicine, and engineering. In addition, the introduction of blockchain-based digital certificates and badges ensures secure verification of academic achievements, enhancing the

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credibility of digital credentials. Institutions also utilize data-driven platforms to track student engagement, identify at-risk learners, and optimize teaching strategies, contributing to continuous improvement in educational practices.

Through these comprehensive strategies and adaptive measures, Ukrainian higher education institutions are not only addressing the challenges of digital transformation but also laying the groundwork for a resilient, inclusive, and future-ready educational ecosystem.

**Table 5.13. Resilience Strategies and Adaptive Measures**

| Resilience Strategies | Details |
|---|---|
| Government and Policy Initiatives | National digital education strategies, emergency response frameworks, legislative reforms |
| Technological Innovations | Hybrid learning models, open educational resources, cloud computing, mobile learning solutions |
| Capacity Building and Professional Development | Faculty training programs, student digital literacy initiatives, mentorship and peer learning |
| International Collaboration | Global partnerships, Erasmus+ programs, cross-border research projects, international funding |
| Community and Institutional Support | Peer networks, mental health support, student support services, inclusive learning environments |
| Cybersecurity Enhancements | Improved security protocols, incident response teams, regular security audits, awareness campaigns |
| Innovation and EdTech Development | Support for EdTech startups, gamification, AI integration, VR/AR technologies, digital credentialing |

*Sources: developed by author*

The journey of digital transformation in Ukrainian higher education has been marked by both formidable challenges and inspiring resilience. Despite financial constraints, infrastructure disparities, and external crises, Ukrainian institutions have demonstrated adaptability through innovative strategies, policy reforms, and community support. As Ukraine continues to navigate complex global and local dynamics, the focus remains on strengthening digital resilience, fostering inclusive education, and leveraging technology to build a future-ready higher education system. The lessons learned from these experiences provide a robust foundation for continued growth, ensuring that Ukrainian higher education remains dynamic, competitive, and resilient in the face of future challenges.

**4. Impact on teaching and learning**. The integration of digital technologies has fundamentally reshaped the educational landscape in Ukraine, influencing not only how knowledge is delivered but also how students engage with and absorb

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information. This transformation has introduced several key developments that have significantly impacted teaching methodologies and learning outcomes:

***Enhanced accessibility.*** Digital technologies have broken down geographical barriers, enabling students from remote and underserved regions to access quality education. Online courses, virtual classrooms, and digital libraries have made learning materials available to a broader audience, promoting inclusivity and educational equity. This has been particularly crucial during times of crisis, such as the COVID-19 pandemic and geopolitical conflicts, where physical access to educational institutions was limited.

***Personalized learning.*** The adoption of adaptive learning technologies and data-driven platforms has allowed for the customization of learning experiences. Educators can now tailor instructional content to meet the diverse needs of students, taking into account their learning styles, progress, and specific areas of difficulty. This personalized approach fosters greater student engagement, improves academic performance, and supports differentiated instruction that caters to both high-achieving and struggling learners.

***Global connectivity.*** Digital tools have facilitated connections between Ukrainian students and the global academic community. Through online collaboration platforms, virtual exchange programs, international webinars, and Massive Open Online Courses (MOOCs), students and educators can participate in cross-cultural learning experiences, broadening their perspectives and enhancing their academic networks. This global connectivity also promotes the exchange of innovative teaching practices and research collaborations.

***Interactive and engaging learning environments.*** The use of multimedia resources, such as videos, simulations, and interactive applications, has transformed traditional lectures into dynamic learning experiences. Gamification techniques and virtual reality tools further engage students, making complex concepts more accessible and stimulating critical thinking. Interactive digital tools also promote active learning strategies, encouraging students to take a more participatory role in their education.

***Flexibility and self-paced learning.*** Digital education offers the flexibility to learn at one's own pace, accommodating different schedules and learning speeds. This flexibility is particularly beneficial for working students, lifelong learners, and those with other commitments, enabling them to balance education with personal and professional responsibilities. Asynchronous learning models,

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supported by recorded lectures and online discussion forums, empower students to manage their learning independently.

***Enhanced teacher roles*.** The role of educators has evolved from being the sole source of knowledge to facilitators of learning. Teachers now guide students in navigating digital resources, fostering critical thinking, and applying knowledge in practical contexts. Professional development programs have also emerged, helping educators acquire the necessary digital skills to enhance their teaching effectiveness. This shift has led to more collaborative learning environments, where teachers and students co-create knowledge.

***Data-driven decision making*.** The use of learning analytics enables educators to monitor student progress in real-time, identify learning gaps, and adjust instructional strategies accordingly. This data-driven approach supports early intervention, continuous improvement in teaching practices, and evidence-based decision-making. Analytics tools help institutions track academic performance trends, optimize resource allocation, and design targeted support programs.

***Collaborative learning opportunities*.** Digital platforms have enabled collaborative learning through group projects, online discussions, and peer-to-peer feedback systems. This fosters the development of teamwork, communication skills, and problem-solving abilities, preparing students for the demands of the modern workforce.

***Integration of emerging technologies*.** The incorporation of technologies such as artificial intelligence, virtual laboratories, and blockchain for credential verification has expanded the scope of educational possibilities. These technologies not only enhance the learning experience but also prepare students for careers in rapidly evolving digital environments.

Overall, the integration of digital technologies in Ukrainian higher education has not only expanded access to education but also enriched the learning experience, making it more engaging, personalized, and globally connected. The transformation continues to evolve, shaping a future where education is more inclusive, adaptable, and resilient in the face of emerging challenges.

**5. Future prospects of digital technologies in ukrainian higher education**. The rapid integration of digital technologies in Ukrainian higher education has laid the foundation for a transformative future. As the country continues to navigate socio-political challenges, economic transitions, and the

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evolving demands of the global knowledge economy, digital technologies are poised to play an increasingly pivotal role in shaping the educational landscape. This document explores the future prospects of digital technologies in Ukrainian higher education, focusing on emerging trends, potential innovations, and strategic priorities that will define the next phase of educational development.

*Continued digital infrastructure development*. Ensuring reliable and high-speed internet connectivity across both urban and rural areas will continue to be a top priority for the future of Ukrainian higher education. Investments in advanced technologies, such as fiber-optic networks, 5G connectivity, and satellite internet solutions, will play a critical role in bridging the digital divide and providing equitable access to online learning resources for all students. The development of smart campuses equipped with Internet of Things (IoT) devices, automated systems, and integrated digital platforms will significantly enhance administrative efficiency, improve campus security, and enrich the overall student experience. Moreover, building robust digital infrastructures that can withstand external disruptions—including cyberattacks, power outages, and natural disasters—will be essential. This will involve the establishment of advanced data centers, secure cloud storage solutions, and comprehensive disaster recovery systems to ensure educational continuity under all circumstances.

*Advanced pedagogical strategies*. The future of pedagogy in Ukrainian higher education will be deeply influenced by the integration of advanced technologies. The use of artificial intelligence (AI) and machine learning algorithms will enable the creation of personalized learning pathways that are tailored to meet individual student needs, learning styles, and academic progress. This personalized approach will help maximize student engagement and improve learning outcomes. Additionally, there will be a shift towards competency-based education (CBE) models, which focus on the mastery of specific skills and knowledge areas. CBE allows students to progress at their own pace and earn credentials based on demonstrated competencies rather than relying solely on traditional time-based metrics. The integration of gamification techniques and immersive technologies such as virtual reality (VR) and augmented reality (AR) will also create engaging, interactive learning environments that promote critical thinking, creativity, and problem-solving skills, making learning both dynamic and effective.

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*Integration of emerging technologies*. The integration of emerging technologies will revolutionize multiple aspects of higher education in Ukraine. AI-driven tools will transform administrative processes, curriculum development, and student support services. For example, intelligent tutoring systems will offer personalized learning experiences, automated grading systems will enhance assessment efficiency, and predictive analytics will provide insights into student performance trends, enabling timely interventions and improved learning outcomes. The adoption of blockchain technology will ensure secure, transparent, and tamper-proof verification of academic credentials, simplifying the process for students to share their achievements with potential employers and academic institutions globally. Additionally, the use of big data analytics will provide valuable insights into student behavior, learning patterns, and academic performance. This data-driven approach will support informed decision-making to optimize teaching strategies and improve institutional policies.

*Sustainable and inclusive education models*. The future of Ukrainian higher education will see the seamless integration of online and offline learning environments, providing students with flexible, accessible, and personalized educational experiences. Hybrid learning models will become more prevalent, catering to diverse learning preferences and accommodating the varying life circumstances of students. There will be a strong emphasis on inclusive education, leading to the adoption of Universal Design for Learning (UDL) principles. These principles ensure that digital content and learning environments are accessible to all students, including those with disabilities. Additionally, sustainable digital education practices will be prioritized to reduce the carbon footprint of higher education institutions. This will include the adoption of energy-efficient data centers, paperless classrooms, and eco-friendly e-learning platforms, contributing to environmental sustainability while enhancing the quality of education.

*Global collaboration and internationalization*. Global collaboration will play a crucial role in the future of Ukrainian higher education. Increased partnerships with international universities, research institutions, and global organizations will foster the creation of virtual learning communities, enabling students to participate in cross-cultural exchanges, joint academic projects, and collaborative research initiatives. Digital technologies will facilitate these global

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research collaborations, allowing Ukrainian institutions to contribute to and benefit from cutting-edge scientific advancements. Furthermore, the development of digital verification systems will enhance the interoperability of academic credentials, supporting the international mobility of students and graduates. This will make it easier for Ukrainian students to pursue further education and career opportunities abroad while attracting international students to Ukrainian institutions.

*Enhanced student experience and support services*. The student experience in Ukrainian higher education will be significantly enhanced through the integration of advanced digital technologies. AI-powered virtual academic advisors will provide personalized guidance on course selection, career planning, and academic support, ensuring that students receive tailored advice to meet their individual goals. The incorporation of digital platforms for mental health support, including teletherapy services, wellness applications, and virtual counseling, will address the growing need for mental health and well-being services among students. Additionally, digital technologies will support lifelong learning by offering flexible, modular courses and micro-credentials designed to meet the evolving needs of adult learners, professionals, and non-traditional students. This will create opportunities for continuous education and skill development beyond traditional degree programs.

*Cybersecurity and data privacy*. As Ukrainian higher education becomes increasingly reliant on digital platforms, the need for robust cybersecurity frameworks will be more critical than ever. These frameworks will include advanced security measures such as AI-driven threat detection systems, sophisticated encryption technologies, and multi-factor authentication protocols to protect sensitive data and ensure the integrity of digital learning environments. Comprehensive cybersecurity education programs will be implemented to raise awareness among students, faculty, and administrative staff about best practices for online safety. In parallel, institutions will adopt ethical data governance practices to ensure the responsible collection, storage, and use of student data. This commitment to data privacy will safeguard student information, foster trust, and support compliance with international data protection regulations, such as the General Data Protection Regulation (GDPR).

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**Table 5.14. Future Prospects of Digital Technologies in Ukrainian Higher Education**

| Key Areas | Details |
|---|---|
| Continued Digital Infrastructure Development | Expansion of high-speed internet, smart campuses, resilient digital infrastructure |
| Advanced Pedagogical Strategies | Personalized learning, competency-based education, gamification, immersive learning |
| Integration of Emerging Technologies | AI in education, blockchain for credentials, big data and learning analytics |
| Sustainable and Inclusive Education Models | Hybrid learning environments, universal design for learning, eco-friendly practices |
| Global Collaboration and Internationalization | Cross-border virtual learning, international research partnerships, global credential recognition |
| Enhanced Student Experience and Support Services | AI-powered academic advising, mental health platforms, lifelong learning opportunities |
| Cybersecurity and Data Privacy | Advanced cybersecurity measures, ethical data governance, privacy protection |

*Sources: developed by author*

The future of digital technologies in Ukrainian higher education holds immense potential to transform teaching, learning, and institutional management. By embracing innovative technologies, fostering global collaborations, and prioritizing inclusive and sustainable practices, Ukraine can build a resilient, future-ready educational ecosystem. Strategic investments in digital infrastructure, pedagogical advancements, and student-centered services will ensure that Ukrainian higher education remains competitive, dynamic, and responsive to the demands of the 21st-century knowledge society.

**Conclusion**. The evolution of digital technologies in Ukrainian higher education has been a dynamic journey marked by resilience, innovation, and adaptability. From the early days of basic computer literacy in the 1990s to the comprehensive digital ecosystems of the 2020s, Ukrainian higher education has continuously adapted to global technological trends, socio-political changes, and unprecedented external crises. Each phase of this evolution—shaped by milestones such as Ukraine's independence, the growth of internet technologies, political transformations, and the global COVID-19 pandemic—has played a critical role in shaping the current educational landscape.

The integration of key innovations, including e-learning platforms, blended learning models, artificial intelligence, virtual and augmented reality, and open educational resources, has transformed teaching methodologies and enriched

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learning experiences. Despite facing challenges such as infrastructure disparities, financial constraints, digital literacy gaps, and cybersecurity risks, Ukrainian institutions have demonstrated remarkable resilience. Strategic government policies, international collaborations, capacity-building initiatives, and community-driven efforts have been instrumental in overcoming these barriers.

Looking forward, the future of digital technologies in Ukrainian higher education is promising. Continued investments in digital infrastructure, the adoption of advanced pedagogical strategies, the integration of emerging technologies, and a focus on sustainable and inclusive education models will ensure that Ukrainian higher education remains competitive on the global stage. The lessons learned from past experiences, combined with a commitment to continuous improvement, will guide future developments, fostering an educational ecosystem that is dynamic, flexible, and prepared to meet the demands of the 21st-century knowledge society.

**References:**

1. Brinkley, A., Desants, B., & Flemm, M. (2003). *Mystetstvo buty vykldachem: Praktychniy posibnyk* (O. I. Sydorenko, Ed.). Kyiv: Navchalno-metodychnyy tsentr Konsortsium iz udoskonalennia menedzhment-osvity v Ukraini.
2. Dale Carnegie. (2011). *Yak zdobuvaty druziv i vplyvaty na liudey*. Retrieved from https://barracuda-book.com
3. Dychkivska, I. M. (2004). *Innovatsiini pedahohichni tekhnolohii: Navchalnyi posibnyk*. Kyiv: Akademvydav.
4. Hronlund, N. E. (2005). *Otsiniuvannia studentskoi uspisnosti: Praktychniy posibnyk*. Kyiv: Navchalno-metodychnyy tsentr Konsortsium iz udoskonalennia menedzhment-osvity v Ukraini.
5. Khudolii, L. M. (2023). *Metodychni vkazivky shchodo prokhodzhennia navchalnoi praktyky OS "Mahistr" zi spetsialnosti 072 - finansy, bankivska sprava, strakhuvannia ta fondovyy rynok*. Kyiv: NUBiP Ukrainy.
6. Moranova, N. P., Serheeva, L. M., Romanova, H. M., & Mykytiuk, S. M. (2023). *Profesiinyi rozvytok pedahohichnykh i naukovo-pedahohichnykh pratsivnykiv v umovakh vidkrytoi osvity: Metodychnyi posibnyk*. Chernivtsi: Vydavnychyi dim "Bukrek."
7. Morse, N. V., Hlazunova, O. H., & Mokriiev, M. V. (2016). *Metodyka stvorennia elektronnoho navchalnoho kursu (na bazi platformy dystantsiinoho navchannia Moodle 3)*. Kyiv: Ahrar Media Hrup.
8. Prokopenko, A. I., Dotsenko, S. O., Moskalenko, V. V., et al. (2021). *Tekhnolohii dystantsiinoho navchannia: Diialnosti ta resursy MOODLE: Navchalnyi posibnyk*. Kharkiv: Novyi kurs.
9. Ushynskyi, K. D. (1983). *Liudyna yak predmet vykhovannia. Sproba pedahohichnoi antropolohii. Vybrani pedahohichni tvory* (Vol. 1). Kyiv: Radianska shkola.
10. Verkhovna Rada Ukrainy. (2014). *Zakon Ukrainy "Pro vyshchu osvitu"* (2014 with amendments from April 23, 2024). Retrieved from https://zakon.rada.gov.ua/laws/show/3642-20#n6

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

## Conclusion

The rapid advancement of digital technologies has fundamentally reshaped the way individuals, businesses, and institutions function in the modern world. This monograph has explored the multidimensional nature of digital skills, highlighting their significance in economic development, education, business, governance, and societal transformation. By systematically analyzing various facets of digital competency, this research provides a comprehensive understanding of the role digital skills play in ensuring individual empowerment, business competitiveness, and national resilience in an increasingly digitalized global landscape.

The research establishes digital skills as a fundamental requirement for digital citizenship, emphasizing their legal, societal, and economic implications. It demonstrates the need for robust policy frameworks to ensure equitable access to digital resources and to protect individuals from digital exclusion.

The study illustrates how digital tools enhance business efficiency, financial transparency, and decision-making capabilities. The results indicate that the adoption of artificial intelligence, automation, and digital accounting practices significantly improves operational effectiveness and financial reporting accuracy.

Digital competencies are shown to play a pivotal role in economic security, business reputation, and crisis management. The findings emphasize the importance of integrating digital skills into workforce development strategies to enhance organizational adaptability and long-term stability.

The research highlights the evolving role of leadership in a digitalized world, underscoring the necessity of digital empathy, communication, and mental well-being strategies. The results suggest that effective digital leadership enhances productivity, employee engagement, and overall workplace well-being.

The study provides a comparative analysis of digital education initiatives worldwide, demonstrating that nations investing in digital competency development experience greater economic growth and innovation. It highlights the importance of integrating digital skills into national education policies to reduce global digital disparities.

This monograph offers both theoretical insights and practical recommendations for fostering digital competencies at individual, organizational, and national levels. The research contributes to the academic discourse by

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proposing frameworks for digital skill integration and provides actionable strategies for policymakers, educators, and business leaders to enhance digital literacy and adaptability.

Future studies should explore the evolving nature of digital skills in response to emerging technologies such as artificial intelligence, blockchain, and quantum computing. Additional research is needed to assess the socioeconomic impact of digital literacy, as well as to develop frameworks for integrating digital competencies into lifelong learning strategies. Moreover, examining the role of governments in regulating digital education and workforce development will be crucial for sustaining digital transformation efforts globally.

As digitalization continues to shape every aspect of modern life, the necessity of digital skills cannot be overstated. This monograph serves as a critical resource for understanding and advancing digital competency frameworks, ensuring that individuals and organizations are well-equipped to navigate the challenges and opportunities of an increasingly digitalized world. By prioritizing digital literacy and fostering an inclusive digital ecosystem, societies can ensure sustainable development, economic resilience, and equitable participation in the global digital economy.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

# References:

1. Acemoglu, D. & Autor, D. (2011). Skills, Tasks, and Technologies: Implications for Employment and Earnings. *Handbook of Labor Economics*, Vol. 4B, Elsevier, pp. 1043-1171. Retrieved from: https://doi.org/10.1016/S0169-7218(11)02410-5.
2. Acemoglu, D., & Autor, D. (2011). Skills, tasks, and technologies: Implications for employment and earnings. *Handbook of Labor Economics*, 4B, 1043–1171. Retrieved from: https://doi.org/10.1016/B978-0-444-53008-3.00004-7
3. Acemoglu, D., & Restrepo, P. (2018). Artificial intelligence, automation, and work. *National Bureau of Economic Research*. Retrieved from: https://doi.org/10.3386/w24196
4. Adobe. (2020). *Adobe Learning Fund: Supporting workforce training and innovation*. Retrieved from https://www.adobe.com
5. Agarwal, P. (2020). *Digital India: Challenges and opportunities for bridging the digital divide*. Springer.
6. Akinsola, K. (2023). International Trade Agreements and Treaties: Case Studies of Bilateral, Regional, and Multilateral Trade Agreements and Their Impact on International Commerce and Investment..
7. Amazon. (2020). Upskilling 2025: Preparing Our Workforce for the Future. *Amazon Press Release*. Retrieved from: https://www.aboutamazon.com/news/workplace/upskilling-2025
8. Apanasenko, L. G. (2018). Health of the nation and labor potential of Ukraine. *Scientific notes of the Institute of Economics, Management and Business Law*, 2, 69-121.
9. Arner, D. W., Barberis, J., & Buckley, R. P. (2015). The evolution of Fintech: A new post-crisis paradigm. Geo. J. Int'l L., 47, 1271. Retrieved from: https://heinonline.org/HOL/LandingPage?handle=hein.journals/geojintl47&div=41&id=&page=.
10. Arshava, I.F. (2019). Age aspect of psychological rehabilitation potential of patients with depressive disorders and its influence on the process of rehabilitation. *Science and education a new dimension. Series : Pedagogy and Psychology*. Vol. VII (77), Issue: 188. Budapest : Society for Cultural and Scientific Progress in Central and Eastern Europe, 77 – 79.
11. Artemieva O. O., Tomsha A. O. (2020) Bukhhalterskyi oblik v umovakh didzhytalizatsii. S. 50–54. eprints.kname.edu.
12. Aula, P. (2010). *Social media, reputation risk and ambient publicity management*. Strategy & Leadership, *38*(6), 43–49. https://doi.org/10.1108/10878571011088069
13. Baczyńska, A.K. (2015). Analytical, Practical, and Emotional Intelligence and Line Manager Competencies. Management and Business Administration. Central Europe, 23(4), 34–54.
14. Bahatska, K. i Heidor, A. 2019. Biznes-protsesy v umovakh dydzhytalizatsii ekonomiky. Scientia fructuosa. 127, 5 (Zhov 2019), 23–32. doi.org/10.31617/visnik.knute.2019(127)03.
15. Bansal, S., & Kapoor, R. (2021). *E-governance and digital transformation in India: Policies and impact on education*. Routledge.
16. Barnett, M. L., Jermier, J. M., & Lafferty, B. A. (2006). *Corporate reputation: The definitional landscape*. Corporate Reputation Review, *9*(1), 26–38. https://doi.org/10.1057/palgrave.crr.1550012
17. Barney, J. B. (1991). *Firm resources and sustained competitive advantage*. Journal of Management, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108
18. BAS bukhhalteriia u khmari gigacloud.ua/offer/bas-hmara
19. Basu, S. (2019). *Digital literacy and skill development in India: A roadmap for inclusive growth*. SAGE Publications.
20. Becker, B. E., Huselid, M. A., & Ulrich, D. (2001). *The HR scorecard: Linking people, strategy, and performance*. Harvard Business Press.
21. Bengel, J. (2018) Education, advanced and further training in the field psychology in rehabilitation . *Rehabilitation (Stuttg)*. Vol. 53(2), 124 – 130.
22. Benko M.M., Sopko O.V. Digital-bukhhalteriia: sutnist ta zmistovi kharakterstyky. ir.kneu.edu.ua/bitstream/handle/

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

23. Bennabi D. (2015). Risk factors for treatment resistance in unipolar depression. *A systematic review . J. Affect. Disord.* Vol. 171, 137 – 141.
24. Bessen, J. (2015). *Learning by doing: The real connection between innovation, wages, and wealth*. Yale University Press.
25. Bessen, J. E. (2019). *AI and jobs: The role of demand*. *NBER Working Paper No. 24235*. National Bureau of Economic Research. https://doi.org/10.3386/w24235
26. Bharadwaj, A.S. (2000) A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation. MIS Quarterly, 24, 169-196. http://dx.doi.org/10.2307/3250983
27. Boden, M. A. (2016). AI: Its nature and future. *Oxford University Press*.
28. Bohlmeijer, E. (2011). Efficacy of an early intervention based on acceptance and commitment therapy for adults with depressive symptomatology: Evaluation in a randomized controlled trial. *Behav Res Ther.* Vol. 49(1), 62 – 67.
29. Boyatzis, R. E. (1982). *The competent manager: A model for effective performance*. Wiley. Retrieved from: https://www.scirp.org/reference/referencespapers?referenceid=2119706.
30. Brinkley, A., Desants, B., & Flemm, M. (2003). *Mystetstvo buty vykldachem: Praktychniy posibnyk* (O. I. Sydorenko, Ed.). Kyiv: Navchalno-metodychnyy tsentr Konsortsium iz udoskonalennia menedzhment-osvity v Ukraini.
31. Brinton Anderson, B., Vance, A., Kirwan, C. B., Eargle, D., & Jenkins, J. L. (2016). How users perceive and respond to security messages: a NeuroIS research agenda and empirical study. European Journal of Information Systems, 25(4), 364–390. https://doi.org/10.1057/ejis.2015.21
32. Brynjolfsson, E. & McAfee, A. (2014). The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies. W.W. Norton & Company, New York, 2014, pp. 67-101. Retrieved from: https://edisciplinas.usp.br/pluginfile.php/4312922/mod_resource/content/2/Erik%20-%20The%20Second%20Machine%20Age.pdf.
33. Brynjolfsson, E., & Hitt, L. M. (1998). Beyond the productivity paradox. Communications of the ACM, 41(8), 49–55. https://dl.acm.org/doi/abs/10.1145/280324.280332.
34. Brynjolfsson, E., & Hitt, L. M. (2000). *Beyond computation: Information technology, organizational transformation and business performance*. Journal of Economic Perspectives, *14*(4), 23–48. https://doi.org/10.1257/jep.14.4.23
35. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W W Norton & Co. Retrieved from: https://psycnet.apa.org/record/2014-07087-000.
36. Brynjolfsson, E., & McAfee, A. (2014). The second machine age: Work, progress, and prosperity in a time of brilliant technologies. W. W. Norton & Company.
37. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W.W. Norton & Company.
38. Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W. W. Norton & Company.
39. Brynjolfsson, E., & McAfee, A. (2017). *Machine, platform, crowd: Harnessing our digital future*. W.W. Norton & Company.
40. Bughin, J., Hazan, E., Ramaswamy, S., Chui, M., Allas, T., Dahlström, P., ... & Trench, M. (2018). Skill shift: Automation and the future of the workforce. McKinsey Global Institute.
41. Burke, M., & Kraut, R. E. (2014). Growing closer on Facebook: Changes in tie strength through social network site use. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 4187–4196. https://doi.org/10.1145/2556288.2557094
42. Burlakova, I, Sheviakov, O. (2021). Psychologycal predictors of the formation of health-preserving competentmess of future specialists. *Public administration and Law Review.* 4(8), 74-79.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

43. Burlakova, I. (2024). The impact of emotional intelligence and digital empathy on the financial stability of enterprises. *International Conference on Economics, Accounting and Finance*, Estonia, November 2024, 75-76. Available at: https://conf.scnchub.com/index.php/ICEAF/ICEAF-2024/paper/view/803
44. Burlakova, I. (2024). The main directions of the development of digital well-being. *4th International Conference on Corporation*, Scientific Center of Innovative Researches OU, Management, 65-67. DOI: 10.36690/ICCM-2024-65-67
45. Burlakova, I., Sheviakov, O., & Kondes, T. (2021). Coaching as a tool for the formation of corporate well-being. Available at: <https://conf.scnchub.com/index.php/ICEAF/ICEAF-2021/paper/view/306
46. Burlakova, I., Sheviakov, O., & Kondes, T. (2022). Cognitive flexibility of thinking as a necessary condition for human adaptation to complex life situations. *Relationship between Public Administration and Business Entities Management*, Estonia, November 2022. Available at: https://conf.scnchub.com/index.php/RPABM/RPABM-2022/paper/view/481
47. Burlakova, I.(2014). Role and place of health management in the system security personnel of business entities : *Economics and management: problems of science and practice: Collection of scientific articles*, 2,Verlag SWG imex GmbH. 237.
48. Bushuev, Yu. V. (2021). On medical problems of physical education in high schools. *Collection of scientific works of the NMAPE employees. P. L. Shupik*, 10, 1225-1229.
49. California Consumer Privacy Act (CCPA). (2018). Assembly Bill No. 375. Retrieved from: https://oag.ca.gov/privacy/ccpa.
50. Cann, O. (2014). Crisis in Leadership Underscores Global Challenges. Available at: https://www.weforum.org/press/2014/11/crisis-in-leadership-underscores-global-challenges/
51. Carnevale, A. P., Smith, N., & Melton, M. (2011). *STEM: Science, technology, engineering, and mathematics*. Georgetown University Center on Education and the Workforce. Retrieved from: http://hdl.handle.net/10822/559306
52. Cascio, W. F., & Montealegre, R. (2016). How technology is changing work and organizations. *Annual Review of Organizational Psychology and Organizational Behavior, 3*(1), 349-375.
53. Caza, A. (2010). Psychological capital and authentic leadership. *Asia-Pacific Journal of Business Administration.* Vol. 2, №.1, 53 – 70.
54. CEN. (2008). *European e-Competence Framework*. European Committee for Standardization. Retrieved from: https://www.na-bibb.de
55. CEN. (2010). *European e-Competence Framework*. European Committee for Standardization. Retrieved from: https://www.na-bibb.de
56. CEN. (2016). *European e-Competence Framework version 3.0*. European Committee for Standardization. Retrieved from: https://www.na-bibb.de
57. Chakraborty, A., & Sharma, K. (2022). *AI, IoT, and the future of digital skills in emerging economies: Case studies from India.* Oxford University Press.
58. Charter of Fundamental Rights of the European Union. (2000). URL : https://www.europarl.europa.eu/charter/pdf/text_en.pdf
59. Chatzoglou, P. et al. (2017). The relationship between leadership competencies and successful organizational change. In Vrontis, E., Weber, Y., Tsoukatos, E. (Eds). Global and national business theories and practice: bridging the past with the future: selected paper from 10th Annual Conference of the EuroMed Academy of Business, Rome, EuroMed Press, 347-361.
60. Cheema, S., Akram, A., & Javed, F. (2015). Employee Engagement and Visionary Leadership: Impact on Customer and Employee Satisfaction. Journal of Business Studies Quarterly, 7(2), 139.
61. Cherepanska, I., Sazonov, A., Melnychuk, P., Melnychuk, D., Kalchuk, S., Pryadko, V., & Yanovsky, V. (2024). Design of an information-computer system for the automated modeling of systems for automatic orientation of production objects in the machine and instrument industries. *Eastern-European Journal of Enterprise Technologies, 3*(2), 6–19. https://doi.org/10.15587/1729-4061.2024.306516

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

62. Chmeruk, G.(2016). Health management of staff as a fundamentally new approach in formation of the organizational culture of the enterprise : *Trends in the development of national and world science: Collection of scientific articles*,2, Verlag SWG imex GmbH. 242.
63. Choi J, Shim SH, Kim S. The power of emojis: The impact of a leader's use of positive emojis on members' creativity during computer-mediated communications. PLoS One. 2023 May 18;18(5):e0285368. doi: 10.1371/journal.pone.0285368. PMID: 37200355; PMCID: PMC10194970.
64. Christian, A. (2011) Coping style as a mediator of the relationship between depressive symptoms and deliberate self-harm. *Crisis*. Vol. 32, № 5, 272 – 279.
65. Chui, M., Manyika, J., & Miremadi, M. (2018). AI and automation: How they work together. *McKinsey Quarterly*. Retrieved from https://www.mckinsey.com
66. Chung, J. (2018). Relationships among resilience, self-esteem, and depressive symptoms in Chinese adolescents. *J. Health Psychol.* Vol. 19, 13 – 59.
67. Clark, P.G. (2013). Toward a transtheoretical model of interprofessional education: Stages, processes, and forces supporting institutional change. Journal of Interprofessional Care, 27(1), 43–49.
68. Constand, M.K. (2014). Scoping review of patient-centered care approaches in healthcare. *BMC Health Serv Res.* Vol. 14, 271–272.
69. Coventry, P. (2015). Integrated primary care for patients with mental and physical multimorbidity: cluster randomised controlled trial of collaborative care for patients with depression comorbid with diabetes or cardiovascular disease . BMJ. Vol. 350, 637– 638.
70. Culbertson, S. (2010). Feeling good and doing great: The relationship between psychological capital and well-being. *Journal of Occupational Health Psychology.* Vol.15. № 4, 421 – 433.
71. Dale Carnegie. (2011). *Yak zdobuvaty druziv i vplyvaty na liudey*. Retrieved from https://barracuda-book.com
72. Davenport, T. H., & Harris, J. G. (2007). *Competing on analytics: The new science of winning*. Harvard Business Review Press.
73. Davenport, T. H., & Harris, J. G. (2007). Competing on analytics: the new science of Winning. Harvard business review press, Language, 15(217), 24.
74. Davenport, T. H., & Harris, J. G. (2007). *Competing on analytics: The new science of winning*. Harvard Business School Press.
75. Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13(3), 319–340. https://doi.org/10.2307/249008.
76. Davis, F. D. (1989). *Perceived usefulness, perceived ease of use, and user acceptance of information technology*. MIS Quarterly, *13*(3), 319–340. https://doi.org/10.2307/249008
77. Deephouse, D. L. (2000). *Media reputation as a strategic resource: An integration of mass communication and resource-based theories.* Journal of Management, *26*(6), 1091–1112. https://doi.org/10.1177/014920630002600602
78. Deephouse, D. L., & Carter, S. M. (2005). *An examination of differences between organizational legitimacy and organizational reputation.* Journal of Management Studies, *42*(2), 329–360. https://doi.org/10.1111/j.1467-6486.2005.00499.x
79. Deloitte. (2023). *The State of AI in Financial Services.* Retrieved from https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Financial-Services/gx-fsi-ai-institute-state-of-ai-financial-services.pdf (Accessed: November 19, 2024).
80. Digital agenda for Europe. (2024). URL : https://www.europarl.europa.eu/factsheets/en/sheet/64/digital-agenda-for-europe
81. Digital Competence Framework for Citizens (DigComp) (2018). Retrieved from: https://shorturl.at/M5G0j
82. Dodonov, O. H., Putiatin, V. H., & Valetchyk, V. O. (2005). Informatsiino-analitychna pidtrymka pryiattia upravlinskykh rishen [Information-analytical support for decision-making]. *Reiestratsiia, zberihannia i obrobka danykh*, 7(2), 77–93.
83. Dowling, G. R. (2006). *Reputation risk: It is the board's ultimate responsibility*. Journal of Business Strategy, *27*(2), 59–68. https://doi.org/10.1108/02756660610650098

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

84. Dychkivska, I. M. (2004). *Innovatsiini pedahohichni tekhnolohii: Navchalnyi posibnyk*. Kyiv: Akademvydav.
85. European Commission. (2020). *Digital education action plan 2021-2027: Resetting education and training for the digital age*. Publications Office of the European Union.
86. European Union. (2016). General Data Protection Regulation (GDPR): Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016.
87. Fanelli, S. et al. (2020). Managerial competencies in public organizations: the healthcare professionals' perspective. BMC health services research, 20, 1-9.
88. Feldman, M. S., & Pentland, B. T. (2021). *Routine dynamics and digital transformation: A research agenda*. Information and Organization, *31*(3), 100365. https://doi.org/10.1016/j.infoandorg.2021.100365
89. Fombrun, C. J., & Van Riel, C. B. (2003). *Fame & fortune: How successful companies build winning reputations*. Financial Times/Prentice Hall.
90. Fombrun, C., & Shanley, M. (1990). *What's in a name? Reputation building and corporate strategy*. Academy of Management Journal, *33*(2), 233–258. https://doi.org/10.2307/256324
91. Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.
92. Freeman, R. E., Harrison, J. S., & Wicks, A. C. (2010). *Stakeholder theory: The state of the art*. Cambridge University Press.
93. Frey, C. B., & Osborne, M. A. (2013). The future of employment: How susceptible are jobs to computerisation? *Oxford Martin School, University of Oxford*. Retrieved from: https://doi.org/10.1016/j.techfore.2016.08.019.
94. Frey, C., & Osborne, M. (2013). The Future of Employment. How Susceptible Are Jobs to Computerization? Working Paper, Oxford: Oxford Martin. https://doi.org/10.1016/j.techfore.2016.08.019.
95. Friedman, T. L. (2005). The world is flat: A brief history of the twenty-first century. Macmillan. Retrieved from: https://media-1.carnegiecouncil.org/import/studio/The_World_Is_Flat.pdf.
96. Gallardo-Gallardo, E., Thunnissen, M., & Scullion, H. (2020). *Talent management: Context matters*. The International Journal of Human Resource Management, *31*(4), 457–473. https://doi.org/10.1080/09585192.2019.1642645
97. Gartner. (2023). *Top Strategic Technology Trends for 2024*. Retrieved from https://www.gartner.com/en/articles/gartner-top-10-strategic-technology-trends-for-2024 (Accessed: November 19, 2024).
98. Gatzert, N. (2015). *The impact of corporate reputation and reputation damaging events on financial performance: Empirical evidence from the literature*. European Management Journal, *33*(6), 485–499. https://doi.org/10.1016/j.emj.2015.10.001
99. George, B.S.P. (2007). True North: discover your authentic leadership. San Francisco, California: Jossey-Bass/John Wiley & Sons.
100. Government of India. (2020). *Digital India Programme: Progress report and future strategies*. Ministry of Electronics and Information Technology.
101. Grabowski, P. (2022). *Digital competencies in modern economic education: Trends and challenges*. Warsaw: Polish Economic Review.
102. Groves, K.S. (2006). Leader emotional expressivity, visionary leadership, and organizational change. Leadership & Organization Development Journal, 27(7), 566–583.
103. Grynko, T., Hviniashvili, T., & Kaliberda, M. (2023). STRATEGIC MANAGEMENT OF THE ENTERPRISE IN THE CONDITIONS OF THE DIGITAL ECONOMY. *Economy and Society*, (50). https://doi.org/10.32782/2524-0072/2023-50-71.
104. Gualdo, A. M. G., Hunter, S. C., Durkin, K., Arnaiz, P., & Maquilón, J. J. (2015). The emotional impact of cyberbullying: Differences in perceptions and experiences as a function of role. *Computers & Education*, *82*, 228-235. https://doi.org/10.1016/j.compedu.2014.11.013
105. He, Z., Huang, H., Choi, H., & Bilgihan, A. (2023). Building organizational resilience with digital transformation. *Journal of Service Management*, *34*(1), 147-171.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

106. Helm, S. (2007). *The role of corporate reputation in determining investor satisfaction and loyalty*. Corporate Reputation Review, *10*(1), 26–38. https://doi.org/10.1057/palgrave.crr.1550036
107. Henriette, E., Feki, M., & Boughzala, I. (2015). The shape of digital transformation: A systematic literature review. *MCIS 2015 Proceedings*. Retrieved from https://aisel.aisnet.org/mcis2015/10
108. Hersey, P., Blanchard, K., & Johnson, D. (2008). Management of Organizational Behavior: Leading Human Resources (9th ed.). Upper Saddle River, New Jersey: Pearson Education.
109. How to Improve Process Efficiency? Strategies, Tools, and Best Practices (2024). Retrieved from: https://www.6sigma.us/process-improvement/process-efficiency-strategies-tools/
110. Hronlund, N. E. (2005). *Otsiniuvannia studentskoi uspisnosti: Praktychniy posibnyk*. Kyiv: Navchalno-metodychnyy tsentr Konsortsium iz udoskonalennia menedzhment-osvity v Ukraini.
111. Husieva O. Yu., Lehominova S. V.(2018) Didzhytalizatsiia – yak instrument udoskonalennia biznes-protsesiv, yikh optymizatsiia. Ekonomika. Menedzhment. Biznes. 1 (23). S. 33-39
112. Husted, B. W., & Allen, D. B. (2006). *Corporate social responsibility in the multinational enterprise: Strategic and institutional approaches*. Journal of International Business Studies, *37*(6), 838–849. https://doi.org/10.1057/palgrave.jibs.8400227
113. India Skills Report. (2021). *Bridging the skill gap: Challenges and opportunities in India's workforce*. National Skills Development Corporation (NSDC).
114. ISO 31000. (2018). *Risk management – Guidelines*. International Organization for Standardization.
115. ITU Report Reveals Two Digital Divides, Underscores the Importance of Inclusive Wireless Networks for Connecting the 2.6 Billion Unconnected Pop (2023) URL : https://shorturl.at/rLOZB.
116. Jasim, A. F. A. (2019). Conceptual skills in leading change: A competence approach to public sector leadership (Doctoral dissertation, The British University in Dubai (BUiD)).
117. Johnson, H.Th. and Kaplan, R.S. (1987), Relevance lost. The Rise and Fall of Management Accounting, Harvard Business School Press, Boston, 269 p.
118. Judge, T.A., Bono, J.E., Ilies, R., & Gerhardt, M.W. (2002). Personality and leadership: A qualitative and quantitative review. Journal of Applied Psychology, 87(4), 765–780.
119. Judge, T.A., Colbert, A.E., & Ilies, R. (2004). Intelligence and Leadership: A Quantitative Review and Test of Theoretical Propositions. The Journal of Applied Psychology, 89(3), 542–552.
120. Kamiński, J. (2023). *The role of AI and big data in personalized economic education*. Journal of Educational Technology, 15(3), 45-60.
121. Kandampully, J., & Duddy, R. (1999). Competitive advantage through anticipation, innovation, and relationships. Management Decision, 37(1), 51–56.
122. Katerna, O. & Molchanova, K. (2020). Digital transformation of aviation industry in Ukraine. *Collection of scientific papers of DUIT. Series "Economics and Management". Iss. 47*, , pp. 53-63. DOI: 10.32703/2664-2964-2020-47-53-63.
123. Kharazishvili, Y., Kwilinski, A., Bugayko, D., Hryhorak, M., Butorina, V., & Yashchyshyna, I. (2022). Strategic Scenarios of the Post-War Recovery of the Aviation Transport Sustainable Development: The Case of Ukraine. *Virtual Economics*, *5*(3), 7–30. Retrieved from: https://doi.org/10.34021/ve.2022.05.03(1).
124. Khudolii, L. M. (2023). *Metodychni vkazivky shchodo prokhodzhennia navchalnoi praktyky OS "Mahistr" zi spetsialnosti 072 - finansy, bankivska sprava, strakhuvannia ta fondovyy rynok*. Kyiv: NUBiP Ukrainy.
125. Klingensmtih, A. C. (2012). The capacity to delineate and interpret emotion in text messages. https://digitalcommons.liberty.edu/honors/317.
126. Kolbjørnsrud, V., Amico, R., & Thomas, R. J. (2016). How artificial intelligence will redefine management. Harvard business review, 2(1), 3-10. Retrieved from: https://enterprisersproject.com/sites/default/files/how_artificial_intelligence_will_redefine_management.pdf.
127. Kolisnichenko, P. (2024). ADVANCING ECONOMIC EDUCATION IN POLAND: CHALLENGES, INNOVATIONS, AND FUTURE PERSPECTIVES. *Pedagogy and Education*

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

*Management Review*, (4(18), 47–59. https://doi.org/10.36690/2733-2039-2024-47-59.
128. Konrath SH, O'Brien EH, Hsing C. Changes in dispositional empathy in American college students over time: a meta-analysis. Pers Soc Psychol Rev. 2011 May;15(2):180-98. doi: 10.1177/1088868310377395. Epub 2010 Aug 5. PMID: 20688954.
129. Kowalski, M. (2019). *Barriers to digital transformation in Polish education*. Kraków: Academic Press.
130. Krueger, J., Patel, S., & Lim, Y. (2021). Empathy in digital communication: The role of AI and virtual interactions. *International Journal of Human-Computer Interaction, 37*(5), 421–437.
131. Kulynych M., Zhylenko L.(2019) Pohlyblennia zmistu obiektiv i metodu bukhhalterskoho obliku v umovakh tsyfrovizatsii ekonomiky. Ekonomichnyi chasopys Skhidnoievropeiskoho natsionalnoho universytetu imeni Lesi Ukrainky. 2. S. 128-135
132. Kumar, R. (2018). *Digital divide in India: Barriers and solutions for inclusive digital education.* Palgrave Macmillan.
*133.* Kondes, T. V.(2019).On the issue of the formation of healthy lifestyles for students and teachers of the Institute of Economics, Management and Economic Law. *Scientific notes of the Institute of Economics, Management and Business Law*, 3,176-178.
134. Le Deist, F. D., & Winterton, J. (2005). What Is Competence? *Human Resource Development International*, 8(1), 27–46. https://doi.org/10.1080/1367886042000338227.
135. Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of Marketing, 80*(6), 69-96.
136. Lewandowski, A. (2022). *E-learning platforms and their impact on student engagement in Poland*. Polish Journal of Educational Research, 14(2), 67-82.
137. LinkedIn Learning. (2020). Workforce learning report. Retrieved from https://learning.linkedin.com/
138. Liskovich N. Yu. Assessment of the effectiveness of strategic management of aviation enterprises in Ukraine // International scientific journal "Internauka". Series: "Economic Sciences". - 2018. - No. 3. DOI: 10.25313/2520-2294-2018-3-3508.
139. Liu, L., Niu, S., & Carassai, M. (2017, October). The impacts of using different methods to sense emotion in computer-mediated communication. In *2017 IEEE International Conference on Systems, Man, and Cybernetics (SMC)* (pp. 1214-1219). IEEE.
140. Llopis, G. (2014). 7 Ways Leaders Maintain Their Composure in Difficult Times. Available at: http://www.forbes.com/sites/glennllopis/2014/01/20/7-ways-leaders-maintain-their-composure-in-diffcult-times/#27618844708d
141. Loboda N., Chabaniuk O. (2021) Didzhytalizatsiia yak funktsiia oblikovoi diialnosti: koronakryza yak kontekst. conf.ztu.edu.ua/wp-content/uploads/2021/01/337.pdf
142. Majchrzak, A., Markus, M., & Wareham, J. (2016). Designing for Digital Transformation: Lessons for Information Systems Research from the Study of ICT and Societal Challenges. *MIS Q., 40*, 267-277. Retrieved from: https://shorturl.at/Xam4S.
143. Maksymchuk, K. M. (2019). Shtuchnyi intelekt: realii suchasnosti [Artificial intelligence: Realities of modernity]. In *Modeliuvannia ekonomiky: problemy, tendentsii, dosvid. Forum molodykh ekonomistiv-kybernetykiv* [Economic modeling: Problems, trends, experience. Forum of young economists-cyberneticists]. Materials of the VIII International Scientific and Methodological Conference (Lviv, September 28–29, 2017) (pp. 119–121). Lviv.
144. Marler, J. H., & Boudreau, J. W. (2017). An evidence-based review of HR analytics. *The International Journal of Human Resource Management, 28*(1), 3–26. https://doi.org/10.1080/09585192.2016.1244699
145. Maurya, C. D., & Sharma, A. K. (2017). The role of managerial skills in the success of an organization. CLEAR International Journal of Research in Commerce & Management, 8(6), 12–14.
146. Mazzucato, M. (2018). The Value of Everything: Making and Taking in the Global Economy. *Allen Lane*, London, 2018, pp. 202-236. Retrieved from: https://shorturl.at/Kwd1i.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

147. McAfee, A., Brynjolfsson, E., Davenport, T. H., Patil, D. J., & Barton, D. (2012). Big data: the management revolution. Harvard business review, 90(10), 60-68. Retrieved from: https://tarjomefa.com/wp-content/uploads/2017/04/6539-English-TarjomeFa-1.pdf
148. McClelland, D. C. (1973). Testing for Competence Rather than for "Intelligence". American Psychologist, 28, 1-14. http://dx.doi.org/10.1037/h0034092.
149. McKinsey Global Institute. (2023). *The Economic Potential of Generative AI: The Next Productivity Frontier*. Retrieved from https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier (Accessed: November 19, 2024).
150. McStay, A. (2018). *Emotional AI: The rise of empathic media*. SAGE Publications.
151. Melnychuk, D. P. (2007). Kadrovyi audyt yak faktor pidtrymky stratehichnykh rishen u sferi upravlinnia liudskym kapitalom [Personnel audit as a factor in supporting strategic decisions in human capital management]. *Problemy teorii ta metodolohii bukhhalterskoho obliku, kontroliu i analizu: mizhnarodnyi zbirnyk naukovykh prats* [Problems of Theory and Methodology of Accounting, Control and Analysis: International Collection of Scientific Papers], *(2)*8, 122–130. Zhytomyr: ZhDTU.
152. Melnychuk, D. P. (2008). Naukovoteoretychni osnovy kadrovoho audytu: krytyka ta shliakhy onovlennia u ploshchyni upravlinnia liudskym kapitalom [Scientific-theoretical foundations of personnel audit: criticism and ways of renewal in the field of human capital management]. *Problemy teorii ta metodolohii bukhhalterskoho obliku, kontroliu i analizu: mizhnarodnyi zbirnyk naukovykh prats* [Problems of Theory and Methodology of Accounting, Control and Analysis: International Collection of Scientific Papers], *(3)*12, 340–349. Zhytomyr: ZhDTU.
153. Michael E. Porter (1985). Competitive Advantage: Creating and Sustaining Superior Performance. *Free Press*, New York, 1985, pp. 45-78. Retrieved from: https://www.hbs.edu/faculty/Pages/item.aspx?num=193.
154. Mikalef, P., Boura, M., Lekakos, G., & Krogstie, J. (2020). *Big data analytics capabilities and innovation: The mediating role of dynamic capabilities*. Information & Management, *57*(2), 103169. https://doi.org/10.1016/j.im.2019.103169
155. Minbaeva, D. (2017). Strategic HRM and knowledge transfer: What do we know and where should we go? *The International Journal of Human Resource Management*, *28*(1), 35–58. https://doi.org/10.1080/09585192.2016.1246463
156. Mind Tools (2018). How good are your management skills? Available at: https://www.mindtools.com/pages/article/newTMM_28.htm
157. Mok, L. (2021). Future-Proof the IT Workforce *Gartner*. Retrieved from: https://shorturl.at/K5RtS.
158. Moranova, N. P., Serheeva, L. M., Romanova, H. M., & Mykytiuk, S. M. (2023). *Profesiinyi rozvytok pedahohichnykh i naukovo-pedahohichnykh pratsivnykiv v umovakh vidkrytoi osvity: Metodychnyi posibnyk*. Chernivtsi: Vydavnychyi dim "Bukrek."
159. Morse, N. V., Hlazunova, O. H., & Mokriiev, M. V. (2016). *Metodyka stvorennia elektronnoho navchalnoho kursu (na bazi platformy dystantsiinoho navchannia Moodle 3)*. Kyiv: Ahrar Media Hrup.
160. Mukovskyi, I. T., Mishchenko, A. H., & Shevchenko, M. M. (2012). *Informatsiino-analitychna diialnist u mizhnarodnykh vidnosynakh: Navchalnyi posibnyk* [Information and Analytical Activities in International Relations: Textbook]. Kyiv: Kondor.
161. Nadler, D.A., & Tushman, M.L. (1990). Beyond the charismatic leader: Leadership and organizational change. California Management Review, 32(2): 77–97,
162. Nam, E. (2023). The Power of Soft Skills: Our Favorite Reads. *Harvard Business Review*. Retrieved from: https://hbr.org/2023/05/the-power-of-soft-skills-our-favorite-reads.
163. NASSCOM. (2021). *FutureSkills PRIME: Reskilling India for the digital economy*. National Association of Software and Service Companies.
164. National Education Policy (NEP). (2020). *Guidelines for integrating technology in education: Bridging the skill gap*. Ministry of Education, Government of India.
165. Natsionalna komisiia z tsinnykh paperiv ta fondovoho rynku (2019) Podannia finansovoi zvitnosti u novomu formati iXBRL /nfp.gov.ua/files/tacsonomia/NSSMC_Financial%20Reporting%20System%20XBRL.pdf.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

166. Nazarenko, O. and Zhong, Hailiang (2020), "The impact of the development of the digital economy on retail trade enterprises in china", Investytsiyi: praktyka ta dosvid, vol. 19-20, pp. 40–45. DOI: 10.32702/2306-6814.2020.19-20.40
167. Nekhai V. (2011). Strengthening the role and value of marketing at a machine-building enterprise. Actual Problems of Economics, 116(2), p. 96–99 (2011).
168. Nekhai, V., Kolokolchykova, I., Rozumenko, S., Nikitina, T. (2022). Anti-crisis Management of Socio-economic Systems Development in the Global Competitive Environment. Review of Economics and Finance, 20, 363-377. DOI: https://doi.org/10.55365/1923.x2022.20.43
169. Nekhai, V., Melnyk, Y., Vyshnivska, B., Bilyk, O., Akimova, L. & Akimov, O. (2024) Economic Consequences of Geopolitical Conflicts for the Development of Territorial Communities in the Context of Economic and National Security of Ukraine. Economic Affairs, Vol. 69(01), pp. 551-563. DOI:10.46852/0424-2513.2.2024.17
170. Nekhai, V., Nesterenko, S., Marchenko, O., Suprunenko, S., & Khrystova, T. (2021). Restorative and productive methods of environmental management in the implementation of environmental policy. *Cuestiones Políticas*. 39 (71), 871-883 (2021). DOI:10.46398/cuestpol.3971.53
171. Nekhai, V., Voloshchuk, Y., Satyr, L., Voloshchuk, K., & Kravets , O. (2023). Production of engineering products as an element of social growth in the global world: legal factor of development: Productos de ingeniería como elemento de crecimiento social en el mundo global: factor jurídico de su desarrollo. *Cuestiones Políticas*, *41*(76), 259-273. DOI: https://doi.org/10.46398/cuestpol.4176.14
172. Noe, R. A., & Kodwani, A. D. (2018). *Employee training and development*. McGraw-Hill Education.
173. Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press.
174. Northouse, P. G. (2019). Introduction to leadership: Concepts and practice. Sage Publications.
175. Nowak, T., & Wójcik, K. (2020). *Digital divide and its implications for economic education in Poland*. European Journal of Educational Studies, 12(4), 123-138.
176. O'Leary, J., Bussey, C., Agarwal, S. (2020). Job-centric upskilling: The new workforce development imperative. *Deloitte Insights*. Retrieved from: https://www2.deloitte.com/us/en/insights/industry/public-sector/on-the-job-upskilling.html.
177. OECD (2013), The Survey of Adult Skills: Reader's Companion, OECD Publishing, Paris, https://doi.org/10.1787/9789264204027-en.
178. OECD (2023), OECD Employment Outlook 2023: Artificial Intelligence and the Labour Market, OECD Publishing, Paris, https://doi.org/10.1787/08785bba-en.
179. OECD (2023), OECD Skills Outlook 2023: Skills for a Resilient Green and Digital Transition, OECD Publishing, Paris, https://doi.org/10.1787/27452f29-en.
180. OECD (2024), *Understanding Skill Gaps in Firms: Results of the PIAAC Employer Module*, OECD Skills Studies, OECD Publishing, Paris, https://doi.org/10.1787/b388d1da-en.
181. Pablo Illanes, P., Susan Lund, S., Mourshed, M., Rutherford, S. & Tyreman, M. (2018). Retraining and reskilling workers in the age of automation. *McKinsey Global Institute*. Retrieved from: https://shorturl.at/jElvR.
182. Packingham v. North Carolina (2017). URL : https://www.supremecourt.gov/opinions/16pdf/15-1194_08l1.pdf
183. Panasiuk V., Burdeniuk T., Muzhevych N. (2021) Osoblyvosti tsyfrovoi transformatsii obliku. Halytskyi ekonomichnyi visnyk. 68. S. 70-76
184. Pantano, E., & Viassone, M. (2015). Engaging consumers on new integrated multichannel retail settings: Challenges for retailers. *Journal of Retailing and Consumer Services*, *25*, 106-114.
185. Pasichnyi, R., Bykova, A., Nekhai, V., Vychivskyi, P., Mosora, L., Akimova, L. (2024). International migration of human resources in the conditions of geo-economic transformations as the main influence on the components of sustainable development of Ukraine in the context of national security. Edelweiss Applied Science and Technology. Vol. 8, No. 6, p. 1354-1365.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

186. Piotrowska, M., & Majewski, P. (2020). *Gamification in economic education: A case study from Poland*. Journal of Interactive Learning Environments, 18(1), 89-104.
187. Polish Ministry of Education. (2021). *Report on the impact of digitalization on economic education in Poland*. Warsaw: Ministry Publications.
188. Poltorak A.S., Palamarchuk V.Iu. (2019) Monitorynh chynnykiv vplyvu na riven finansovoi bezpeky Ukrainy v umovakh didzhytalizatsii. «Modern Economics». № 18. S. 130- 137. doi.org/10.31521/modecon.V18(2019)-20
189. Popivniak Yu. (2020) Peretvorennia metodu bukhhalterskoho obliku v epokhu rozvytku tsyfrovykh tekhnolohii. Internauka. 8. S. 43-52. www.inter- nauka.com/uploads/public/15992023972214.pdf
190. Porter, M.E. (1985) Competitive Advantage. Creating and Sustaining Superior Performance. Free Press, New York, 557 p. DOI: https://doi.org/10.1590/S0034-75901985000200009.
191. Prokopenko, A. I., Dotsenko, S. O., Moskalenko, V. V., et al. (2021). *Tekhnolohii dystantsiinoho navchannia: Diialnosti ta resursy MOODLE: Navchalnyi posibnyk*. Kharkiv: Novyi kurs.
192. Puhakainen, P., & Siponen, M. (2010). *Improving employees' compliance through information security awareness training: An action research study*. MIS Quarterly, *34*(4), 757–778. https://doi.org/10.2307/25750704
193. Punie, Y., editor(s), Redecker, C., European Framework for the Digital Competence of Educators: DigCompEdu , EUR 28775 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-73718-3 (print),978-92-79-73494-6 (pdf), doi:10.2760/178382 (print),10.2760/159770 (online), JRC107466.
194. Putsenteilo P. R., Dovbush A. V. (2021) Osnovni vektory rozvytku bukhhalterskoho obliku v umovakh tsyfrovoi ekonomiky. Innovatsiina ekonomika. 3-4 (87). S. 140-151.
195. PwC. (2020). Financial Services Technology 2020 and Beyond: Embracing disruption. Retrieved from: Retrieved from: https://www.pwc.com/gx/en/financial-services/assets/pdf/technology2020-and-beyond.pdf.
196. PwC. (2023). *AI Predictions 2023*. Retrieved from https://www.pwc.com/us/en/tech-effect/ai-analytics/ai-predictions.html (Accessed: November 19, 2024).
197. Reich, B. H., & Benbasat, I. (2000). Factors that influence the social dimension of alignment between business and information technology objectives. *MIS Quarterly*, 24(1), 81–113. Retrieved from: https://doi.org/10.2307/3250980
198. Rindova, V. P., Williamson, I. O., Petkova, A. P., & Sever, J. M. (2005). *Being good or being known: An empirical examination of the dimensions, antecedents, and consequences of organizational reputation*. Academy of Management Journal, *48*(6), 1033–1049. https://doi.org/10.5465/amj.2005.19573108
199. Saaty, T. l. (1992). The Hierarchon: A Dictionary of Hierarchies. Pittsburgh, Pennsylvania: RWS Publications.
200. Schilling, M. A. (2013). *Strategic management of technological innovation*. McGraw-Hill Education.
201. Schömann, K., Guérot, U., & Lengfeld, H. (2015). *Economic security and social cohesion in Europe: The political economy of European Union stability*. Routledge.
202. Schwab, K. (2017). The fourth industrial revolution. Crown Currency.
203. Scott Kruse, C., Karem, P., Shifflett, K., Vegi, L., Ravi, K., & Brooks, M. (2018). Evaluating barriers to adopting telemedicine worldwide: a systematic review. *Journal of telemedicine and telecare*, *24*(1), 4-12.
204. Scott, S. V., & Walsham, G. (2005). *Reputation and reality: Managing reputations in the digital economy*. Organization Science, *16*(3), 308–324. https://doi.org/10.1287/orsc.1050.0120
205. Semaniuk V. Z. (2018) Informatsiina teoriia obliku v postindustrialnomu suspilstvi: monohrafiia. TNEU, 392 s. dspace.wunu.edu.ua/bitstream/316497/37223/1/
206. Singh, A. S. & Masuku. M. B. (2014). Sampling techniques and determination of sample size in applied statistics research: an overview. International Journal of Economics, Commerce and Management, 2(1): 1-22
207. Smith, W.K., Lewis, M.W., & Tushman, M.L. (2016). Both/And Leadership. Harvard Business Review, May.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

208. Spence, M. (1973). *Job market signaling*. Quarterly Journal of Economics, *87*(3), 355–374. https://doi.org/10.2307/1882010
209. Spencer, L.M. and Spencer, S.M. (1993) Competence at Work: Models for Superior Performance. John Wiley & Sons, New York.
210. Spilnyk I., Paliukh M. (2019) Bukhhalterskyi oblik v umovakh tsyfrovoi ekonomiky. Instytut bukhhalterskoho obliku, kontrol ta analiz v umovakh hlobalizatsii. Vyp. 1-2. S. 83-96. doi.org/10.35774/ibo2019.01.083
211. Spivak, I., Mihus, I., & Greben, S. (2024). A COMPARATIVE ANALYSIS OF THE DIGITAL COMPETENCIES DEVELOPMENT IN ADULT EDUCATION. *Pedagogy and Education Management Review*, (2(16), 18–27. https://doi.org/10.36690/2733-2039-2024-2-18-27
212. Spivak, I., Mihus, I., & Greben, S. (2024). FINANCIAL LITERACY AND GOVERNMENT POLICIES: AN INTERNATIONAL STUDY. *Public Administration and Law Review*, (2(18), 21–33. https://doi.org/10.36690/2674-5216-2024-2-21-33.
213. State of Digital Learning: A Report. (2024). Retrieved from: https://www.elucidat.com/guides/state-of-digital-learning-report-2024/.
214. Sternberg, R.J. (2007). A Systems Model of Leadership. American Psychologist, 62(1): 34–42.
215. Tapscott D. Tapscott A. (2016) Blockchain revolution: how the technology behind bitcoin is changing money, business, and the world. itig-iraq.iq/wp-content/uploads/2019/05/Blockchain_Revolution.pdf.
216. Tapscott, D. (1996). Six themes for new learning from: the digital economy: promise and peril in the age of networked intelligence. Educom Review, 31, 52-54.
217. Teece, D. J., Pisano, G., & Shuen, A. (1997). *Dynamic capabilities and strategic management*. Strategic Management Journal, *18*(7), 509–533. https://doi.org/10.1002/smj.4250180702
218. The Association of College and Research Libraries (ACRL) Framework for Information Literacy for Higher Education. (2016). Retrieved from: https://www.ala.org/acrl/standards/ilframework
219. The Regulation (EU) 2016/679 (General Data Protection Regulation) in the current version of the OJ L 119, 04.05.2016; cor. OJ L 127, 23.5.2018 Retrieved from: https://gdpr-info.eu
220. The Right to Information Act of 2005. (2005). URL : https://rti.gov.in/rti%20act,%202005%20(amended)-english%20version.pdf
221. Tidd, J., & Bessant, J. R. (2020). *Managing innovation: Integrating technological, market and organizational change* (6th ed.). Wiley.
222. Tohidi, H., & Jabbari, M. M. (2012). *The effects of motivation in education*. Procedia - Social and Behavioral Sciences, *31*, 820–824. https://doi.org/10.1016/j.sbspro.2011.12.148
223. Topol, E.J. (2019) Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again. Basic Books.
224. Trusova, N., Nekhai, V., Litvinov, V. & and Ahieieva, I. (2023). Management of Reengineering of Business Processes of the Transport System Enterprises at Freight Transportation. Revista Iberoamericana de Viticultura Agroindustria y Ruralidad. Vol. 10. №30. 129-151. Retrieved from:: https://www.scielo.cl/pdf/rivar/v10n30/0719-4994-rivar-10-30-129.pdf
225. Tufts, S. (2003). Florida, Richard 2002. The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life. New York: Basic Books, 404p. *Just Labour, 2*. https://doi.org/10.25071/1705-1436.180
226. Tufts, S. (2003). Florida, Richard 2002. The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life. New York: Basic Books, 404p. *Just Labour, 2*. https://doi.org/10.25071/1705-1436.180.
227. Ulrich, D. (1997). *Human resource champions: The next agenda for adding value and delivering results*. Harvard Business School Press.
228. UNESCO ICT Competency Framework for Teachers. Retrieved from: https://unesdoc.unesco.org/ark:/48223/pf0000213475_rus

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

229. Universal Declaration of Human Rights (1948). URL : https://www.un.org/en/about-us/universal-declaration-of-human-rights
230. US Supreme Court expands digital privacy rights in *Carpenter v. United States.* URL : https://www.dataprotectionreport.com/2018/06/scotus-expands-digital-privacy-rights-carpenter/#
231. Ushynskyi, K. D. (1983). *Liudyna yak predmet vykhovannia. Sproba pedahohichnoi antropolohii. Vybrani pedahohichni tvory* (Vol. 1). Kyiv: Radianska shkola.
232. Van Laar, E., Van Deursen, A. J., Van Dijk, J. A., & De Haan, J. (2017). *The relation between 21st-century skills and digital skills: A systematic literature review*. Computers in Human Behavior, *72*, 577–588. https://doi.org/10.1016/j.chb.2017.03.010
233. Varenko, V. M. (2013). *Informatsiino-analitychna diialnist: Navchalnyi posibnyk* [Information and Analytical Activities: Textbook]. Kyiv: Universytet «Ukraina».
234. Verkhovna Rada Ukrainy. (2014). *Zakon Ukrainy "Pro vyshchu osvitu"* (2014 with amendments from April 23, 2024). Retrieved from https://zakon.rada.gov.ua/laws/show/3642-20#n6
235. Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, *28*(2), 118-144.
236. Von Solms, R., & Van Niekerk, J. (2013). From information security to cybersecurity. *Computers & Security*, 38, 97–102. Retrieved from: https://doi.org/10.1016/j.cose.2013.04.004
237. Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research, 23*(1), 3–43. https://doi.org/10.1177/009365096023001001
238. Walumbwa, F.O., Avolio, B.J., Gardner, W.L., Wernsing, T.S., & Peterson, S.J. (2008). Authentic leadership: Development and validation of a theory-based measure. Journal of Management, 34(1), 89-126.
239. WCO Customs Brokers Guidelines. (2023). Retrieved from: https://www.wcoomd.org/-/media/wco/public/global/pdf/topics/facilitation/instruments-and-tools/tools/customs-brokers/customs-brokers-guidelines.pdf?db=web
240. Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation.* Harvard Business Review Press. 304 p. Retrieved from: https://hbsp.harvard.edu/product/17039-HBK-ENG.
241. Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation.* Harvard Business Review Press.
242. Westerman, G., Bonnet, D., & McAfee, A. (2014). *Leading digital: Turning technology into business transformation.* Harvard Business Review Press.
243. World Economic Forum (2020): The Future of Jobs Report 2020.*World Economic Forum, Geneva*, 2020, pp. 33-59. Retrieved from: https://www.weforum.org/publications/the-future-of-jobs-report-2020/
244. World Economic Forum (2024). The Future of Global Fintech: Towards Resilient and Inclusive Growth. Retrieved from: https://www3.weforum.org/docs/WEF_The_Future_of_Global_Fintech_2024.pdf
245. World Economic Forum. (2022). *The future of work in India: Digital transformation and skill development trends*. WEF Report.
246. World Economic Forum. (2023). *The Future of Jobs Report 2023*. Retrieved from https://www3.weforum.org/docs/WEF_Future_of_Jobs_2023.pdf (Accessed: November 19, 2024).
247. Wu, T. (2022). Digital project management: rapid changes define new working environments. Journal of Business Strategy, 43(5), 323- 331.
248. Yanenkova, I. H. (2020). Perevahy ta ryzyky vykorystannia shtuchnoho intelektu v Ukraini ta sviti [Advantages and risks of using artificial intelligence in Ukraine and the world]. *Efektyvna ekonomika*, (4). Retrieved from http://www.economy.nayka.com.ua/?op=1&z=7820 (Accessed: November 19, 2024). https://doi.org/10.32702/2307-2105-2020.4.19.
249. Yanovska, V. Levchenko,O., Tvoronovych,V. & Bozhok, A. (2019). Digital Transformation of the Ukrainian Economy: Digitization and Transformation of Business Models. NTI-UkrSURT 2019. SHS Web of Conferences 67, 05003. Retrieved from: https://doi.org/10.1051/shsconf/20196705003.
250. Yudkova, K. V. (2015). Osoblyvosti vyznachennia poniattia «informatsiina systema» [Features of defining the concept of "information system"]. *Informatsiia i pravo*, (2), 39–44.

https://doi.org/10.36690/DSDS ISBN 978-9916-9927-6-0 (pdf)

251. Yukl, G., & Chavez, C. (2002). Influence tactics and leader effectiveness. In: L. Neider and C.A. Schriesheim (eds.), Leadership. Greenwich, Connecticut: New Information Age Publishing.
252. Zaccaro, S.J., Kemp, C., & Bader, P. (2004). Leader Traits and Attributes. In: J. Antonakis, A.T. Cianciolo and R.J. Sternberg (eds.), The Nature of Leadership. Thousand Oaks, California: Sage Publications
253. Zachosova, N., Zhyvko, Z., Kyryliuk, Y., Blikhar, V. Strategic priorities of security - oriented management in financial markets. *Global Trends of Data Analytics in Business Management, Social Sciences, Medical Sciences and Decision making*. [24-th FAI-ICDBSMD 2021. 25, 26 & 27 June 2021]. Editors Prof. M. Lellis Thivagar, Prof. K.K.S. Mer, Prof. Tetiana Zhyber, Prof. Nina Poyda-Nosyk, Mr. Vishwanath Bijalwan, Dr. Ramakant Bhardwaj, Dr. A. Amutha, Dr. Pichyada Pheunpha, Prof. Arceloni Neusa Volpato, Prof. Pankaj Srivastava. Abstract Proceedings of 24th FAI-ICDBSMD 2021 Vol. 6(i), 2021. P.107-109. Available online at https://www.faipublications.com
254. Zetzsche, D. A., Buckley, R. P., & Arner, D. W. (2018). The distributed liability of distributed ledgers: Legal risks of blockchain. University of Illinois Law Review, 2018(4), 1361–1406. Retrieved from: https://heinonline.org/HOL/LandingPage?handle=hein.journals/unilllr2018&div=41&id=&page=
255. Zieliński, L. (2021). *Resistance to digitalization in traditional educational environments*. Gdańsk: Baltic Educational Press.
256. Zuboff, S. (2023). The age of surveillance capitalism. In Social theory re-wired (pp. 203-213). Routledge. Retrieved from: https://www.taylorfrancis.com/chapters/edit/10.4324/9781003320609-27/age-surveillance-capitalism-shoshana-zuboff.

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