

BOOK OF ABSTRACTS

Editor: Gandolfo Dominici

X Business Systems Laboratory International Symposium

MASTERING CHALLENGES:

Navigating the Waves of Innovation in a Tech-Driven World



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National University of Political Studies and Public Administration (SNSPA)

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BOOK OF ABSTRACTS

MASTERING CHALLENGES: NAVIGATING THE WAVES OF INNOVATION IN A TECH-DRIVEN WORLD

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The BSLab Symposium 2026 aims to explore the transformative impact of AI, digital transformation, and emerging technologies on societies, organisations, and markets.

Innovation stands at the core of this transformation, driving new business models, reshaping industries, and redefining the way individuals and organizations adapt to an ever-evolving technological landscape.

By bringing together scholars, researchers, and practitioners, the symposium will foster rigorous discussions on how today's challenges can be effectively mastered to promote long-term economic, social, and environmental well-being.

The shift toward digital ecosystems is redefining human behaviour and offering innovative solutions to everyday tasks while simultaneously presenting new challenges. Technology has become the driving force behind transformative changes across industries, organisations, and society.

The rapid advancement of artificial intelligence (AI), digital transformation, and automation is accelerating innovation at an unprecedented pace, reshaping economic and social landscapes, and introducing complex challenges for individuals, businesses, and policymakers. The effects of these shifts are multifaceted and interconnected, requiring a systemic and interdisciplinary approach to effectively navigate their implications.

As technology continues to evolve, it is essential to proactively address its broad economic, organizational, and societal impacts while ensuring long-term well-being. In this context, systems thinking has become indispensable for guiding these transformations, enabling a holistic perspective that integrates diverse fields and fosters sustainable innovation.

Emphasising a multidisciplinary perspective, the event will facilitate knowledge exchange across disciplines, such as organizational sciences, systems thinking, management, behavioural sciences, ethics, engineering, and decision-making.

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**SYSTEMS THINKING AND
BEHAVIORAL INSIGHTS FOR A
DIGITAL SOCIETY**

A Systemic Model for Integrating Automated Security Testing into Secure Software Development

Mehran Koushkebaghi

*MSc Student in Systems Thinking Practice, Cranfield University;
Head of Product Security, Nationwide Building Society, UK.*

EXTENDED ABSTRACT

As secure software development becomes a strategic imperative, organisations are increasingly embedding automated security scanning tools into their software delivery pipelines to detect syntactic vulnerabilities in early stages of the software development lifecycle. These tools promise early detection of vulnerabilities and improved system resilience. Despite their technical maturity, in practice, large organisations often experience inconsistent or failed implementation of these tools. Detection is frequently decoupled from meaningful prioritisation or remediation, and integration efforts are undermined by siloed structures, unclear responsibilities, and competing goals. Studies in the healthcare sector illustrate that organisational alignment, not detection capability, is the critical bottleneck in effective vulnerability management (Dissanayake, Zahedi, Jayatilaka, & Babar, 2022)

This disconnect points to a deeper, systemic issue. The security tools are typically integrated as isolated technical interventions, while the organisational ecosystems they depend on remain unadapted. A failure to appreciate the socio-technical nature of security interventions often leads decision-makers to prioritise technical deployment over organisational understanding. As a result, interventions are launched without sufficient study of the organisational context in which they must operate.

NIST Secure Software Development Framework (Souppaya, Scarfone, & Dodson, 2022) highlights organisation preparedness as a foundational practice area for secure software development. It outlines a set of principles that organisations should aim to establish (such as defined roles, security culture, and governance). However, its guidance remains high-level and implementation-agnostic. In particular, it lacks operational guidance on how to design and embed these capabilities in real-world contexts. This paper addresses that gap by developing a systemic model for organisational readiness in managing the

risk of software vulnerabilities. The model helps translate SSDF's recommendations into a viable, feedback-driven structure that aligns technical controls with organisational purpose and capability.

The model applies Critical Systems Thinking (Jackson, 2024) to reframe the integration of automated security testing into the software development lifecycle as a systemic intervention rather than a purely technical exercise. Drawing on CST's five systemic perspectives—mechanistic, interrelationship, organismic, purposeful, and environmental (Jackson, 2024)—the model maps the organisational role and context of security testing tools to surface diagnostic insights and identify viable intervention paths. This concept map highlights key interdependencies across organisational structures, development workflows, and feedback mechanisms. It is then extended using the Viable System Model (Beer, 1985) and hierarchy of purpose to design a recursive structure that aligns security responsibilities with strategic intent. Combined, these methods produce a dual-purpose diagnostic and design framework for identifying systemic failure points and enabling more sustainable, context-aware integration of security practices into software delivery processes.

Informed by observations in enterprise security teams in financial institutions, this model supports business leaders, enterprise cybersecurity architects, and system designers in appreciating the complexity of recognising that effective security integration within the software development lifecycle requires not only robust testing tools but also purposeful organisational design that enables shared responsibility, autonomy, and responsiveness to feedback. By grounding in CST, the study addresses interconnectedness, uncertainty, and pluralism in tech-driven environments. The contribution lies in demonstrating how systems thinking can serve as both a diagnostic tool and a design guide for embedding security interventions in complex socio-technical systems. This represents, to the author's knowledge, one of the first applications of CST to secure enterprise software development.

This paper invites further exploration of security as a systemic concern, emphasising the importance of recognising its socio-technical dimensions rather than reducing it to a series of technical interventions. It calls on cybersecurity professionals to reimagine secure software development not simply as a matter of tooling or compliance, but as a systemic design challenge embedded in organisational transformation.

Keywords: Secure software development, critical systems thinking, socio-technical systems, organisational security, automated security testing

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Innovation Appreciation Model: IAM Concept and Methodology

Ulrich Schmitt

*Professor, Stellenbosch Business School, South Africa
Start-Up Founder & CEO, Knowcations, Mauritius.*

EXTENDED ABSTRACT

Intro – Developing innovative paradigms for transforming traditional systems calls for attracting a critical mass of cooperating committing stakeholders to furnish their successful operational acceptance, but the intense and interdependent complexities of the problems and benefits may be difficult to grasp and communicate. By fusing the modified theories of Kano’s attractive quality (AQ) creation and Gupta/Lehmann’s value propositions (VP) design, two multi-stage heuristics for unscrambling product/system affordances are presented with a focus on facilitating client acquisition and retention.

Methods – The ‘Innovation Appreciation Model’ (IAM) was prompted and is exemplified by a novel personal knowledge management system design and community platform for knowledge co-creation. Developed in an academic research and entrepreneurial start-up context, it applies conceptual analysis, systems thinking, and design science research methodologies; the model advocates a 6 (values) x 8 (qualities) matrix able to address diverse client segments according to their relevant preferences.

Results – In the test case (complementing BS-Lab paper provides more details to support this article’s summaries), the novel informing options simplify promoting individual and institutional utilities to address six different personas and due diligence matters. The approach affords to transparently communicate the rationales and needs for transformative paradigm shifts and radical systemic interventions in support of system entrepreneurship.

Conclusions – Adopting extended AQ-VP-notions as a fused model is a novel contribution to the literature. The model and informing layers are currently applied by a start-up venture to structure, for example, blogs, pitches, animated videos, and system specifications; they are also fit-for-(re)purpose by other developers, marketeers, or decision makers in their own areas of expertise or application.

The agenda of digital transformation for systemic adaptability

The vision of the author's start-up is to build a digital platform for knowledge co-creation. As an innovative Tech4Good technology, it aims for serving platform community members with diverse abilities, contexts, means, and ends (ACME). The novel approach takes account of ever more complex career-spanning roles and needs challenged by current inadequate or unsustainable practices and methods as well as by the current lack of adequate tools, support, and trust.

This entrepreneurial phase is complementing a longitudinal design science research (DSR) project and stream of academic publications which motivated and rationalized the continually evolving artefacts and design theories in support of complexity awareness, co-creation skills, knowledge and social connectedness; all are prioritized by the Inner Development Goals (IDG) (IDG Initiative, n.d.; IDG Project, 2021) as a means to reach the Global Goals for Sustainable Development. However, designs of products and interventions not only need to be fit-for-purpose/evolution, but they also need to be fit-for-communication/comprehension to gain the vital acceptance of stakeholders for effective transformations (O'Raghallaigh et al., 2011).

Pre-requisites of successful change

A recent qualitative study, for example, delved into how organizations “perceive and address the various organizational aspects of the ‘Great Reset’s’ mandate for organizational change”. Based on the managers’ responses, its findings underscore “the necessity and immediacy of alterations to traditional systems and the development of innovative paradigms across various sectors”. Prioritizing digital transformations (DT) for systemic adaptability, however, also calls for reskilling tied to effective tools, methods, and technologies in all design and operative stages of organizational and system development (Roblek et al., 2024).

DT's expert-and-literature-derived key elements and process steps have been synthesized in a digital transformation canvas (DTC) as a conceptual framework for guiding successful digital transformation initiatives. The DTC's building blocks cover (1) DT Strategy [Purpose], (2) DT Operational Pillars [People, Process, Platform, Partner, Project], (3) DT Value [Product, Performance, Planet], and (4) DT Pitfalls [Privacy, Protection]. In these contexts, DT actors may take up multiple roles to effectively combine social (mentor, mentee, networker), generative (pioneer, innovator), and leadership (enabler,

manager) responsibilities (Elia et al., 2024) with knowledge acquisition, retention, recall, use, and transfer being the key drivers (Anohina-Naumeca, 2023). Handling these drivers effectively is essential. In his updated structured literature review of scientometric research of the Knowledge Management (KM) discipline, Serenko confirmed the state of KM research as empirical by its nature with authors adopting case studies, surveys, and interviews as their preferred methodologies, but at the expense of gradually declining conceptual works. This empirical focus results in a wide scope of “dramatically under-represented” or “poorly understood KM themes”, for example, the role of individuals, design science, knowledge waste, outcomes, and impact. To fill these gaps, Serenko emphasizes the need for researchers to embark on - and for editors and reviewers to welcome – submissions addressing these declining clusters (Serenko, 2021), pp. 1908, 1913). This adjustment may also help to prevent KM from becoming a “purely academic field” (Hislop et al., 2018) “where scientific research output is targeted at academics rather than industry professionals” (Serenko, 2021) and to pave the way for increasing interest and participation of practitioners. The research presented in this abstract inhabits this declining or underrepresented cluster of applied conceptual work pursued by System Entrepreneurship (SE). SEs are confronted with high uncertainties of decision situations, subjective possibilities of affording disruptive remedies to systemic dilemmas, emerging co-creating opportunities alongside the paths opted for, and the “need to attract a critical mass of cooperating stakeholders to create a chain of commitments that reaches a tipping point” (Schlaile et al., 2021).

In pursuit of a solution

Its idea to conceptualize a system-analytical tool and adopt/adapt it as an innovation appreciation model (IAM) seeks to facilitate the informing and recruiting of potential users for a novel digital platform ecosystem-under-development. The article’s key objective/contribution is, hence, the methodology behind the IAM whose application, however, is demonstrated (in a separate complementing BS-Lab paper that provides more details to support this article’s summaries) based on the novel personal knowledge management system (PKMS) design and prototype (fitting the cited substitution of traditional system paradigms with a platform for knowledge co-creation as detailed in three recent publications (Schmitt, 2022, 2023; Schmitt and Jolicoeur, 2024)).

The article is further contributing to a longitudinal stream of knowledge management (KM) and design science research (DSR) aiming for creating artefacts (constructs, models, methods, and instantiations incl. prototyping (March and Smith, 1995)) to follow innovative systems thinking and developments. As

complex projects of this nature typically embody evolving findings in need to be presented at appropriate times (incl. reporting on “early visions of technology impact” and “impact on users, organizations and society” (Baskerville et al., 2018)), this article also follows up on the project’s prior peer-reviewed publications. The conceptual analysis and DSR methodologies adopted have been detailed in two prior papers (Schmitt, 2016, 2021) as evidence of the DSR-expected relevance, utility, rigor, and publishability in Information Systems research outlets (Hevner et al., 2004).

Article’s structure and objectives

To ensure its wider applicability, the IAM’s six steps (each with eight distinct criteria) are rooted in generic attractive quality and value propositions (Gupta and Lehmann, 2005; Kano et al., 1984). It, hence, can be adopted and adapted by other developers or decision makers to fit their own areas of expertise or application. To demonstrate its use and utility, the KMS project which triggered its need is also utilized (as mentioned) to exemplify the IAM’s novel application in the commencing start-up venture complementing the academic DSR project.

The IAM’s forty-eight appreciation criteria are meant to structure the PKMS’s logics and logistics as basic building blocks for assembling convincing narratives and for adequately informing diverse groups of its stakeholders. The IAM’s challenge is two-fold: how to attract early potential (individual and institutional) adopters/stakeholders to become members of a PKMS community, and how to subsequently retain this clientele while scaling membership further.

The article presents a literature review to briefly introduce the notions of attractive qualities, value propositions, and an appreciation as well as a development model (section 2), followed by a more detailed account of the IAM’s six progressing levels (section 3 and supplementary report) and a discussion of its merit in light of recent systematic reviews of KMS-related publication and roll-out considerations (section 4).

Keywords: Value Proposition; Attractive Quality; Methodologies and Tools; Design Thinking; Innovation Appreciation Model; Innovation Strategy; Digital Transformation; Knowledge Management Platform.

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Systems thinking for cognitive and emotional engagement in a Tech-Driven Society

Francesco, Caputo

*Department of Economics, Management, and Institutions (DEMI)
University of Naples "Federico II" - Italy*

Armando Papa

Dipartimento di Scienze Economiche e Statistiche/DISES, University of Salerno, Italy

Cristina, Cervino

*Department of Economics, Management, and Institutions (DEMI)
University of Naples "Federico II" - Italy*

EXTENDED ABSTRACT

Preliminary reflections

In the last few decades, the rapid and widespread diffusion of digital technologies across all social and economic levels has radically reshaped socio-economic systems and the nature of human cognition. As Magliocca *et al.* (2024:1) observe, “digital instruments, devices, and platforms are transforming socio-economic structures, giving rise to new ecosystem configurations that demand sustainable, smart, and inclusive growth strategies”. In this landscape, traditional notions of intelligence and engagement are being redefined. Emerging scholarship emphasizes *intelligence augmentation* (IA), viewing human-machine collaboration as a means to enhance cognition rather than replace it (Bassano *et al.*, 2024). Simultaneously, concerns about *cognitive offloading* -the delegation of thinking tasks to technology- highlight the risk of eroding deep and reflective engagement (Apostolopoulos *et al.*, 2020). To understand these challenges and propose possible managerial actions able to address human behaviours and actions, researchers and policy makers call for a systems-thinking approach capable of depicting new holistic feedback and interdependence processes on which to build innovative stakeholder co-creation paths, shaping the digital world in a sustainable, shared, and viable way (Yolles, 2006). To contribute to the ongoing debate about the management of the tech-driven society, the abstract tries to depict a theoretical background for decoding a conceptual model able to address digital transformation without forgetting

and underestimating the key role that cognitive and emotional engagement have for the evolution of society.

Theoretical Background

Systems thinking provides a lens for understanding complex digital ecosystems (Yolles, 2019, 2021). It integrates relationships, feedback loops, and perspectives within socio-technical systems (Basile & Caputo, 2017). For example, recent work on intellectual capital in the artificial intelligence (AI) era underscores that we must integrate human and artificial intelligence within wider conceptual frameworks employing systems-based models to avoid reductionist views (Caputo, 2024). In this view, technology is not merely a tool but a structural part of cognitive systems. Bassano *et al.* (2024) use the Viable System Approach to show that when humans combine technologies with experience and emotions, *intelligent systems* evolve into *wise systems*. Thus, systems thinking reframes AI as part of a larger knowledge ecosystem, aligning with the worldwide call to move beyond competition between human and machine intelligence (Carayannis *et al.*, 2018).

Building on this key challenge, cognitive engagement becomes a central element in emerging debates on managing a tech-driven society (Chaturvedi *et al.*, 2025). It can be defined by active, deep processing of information, in contrast to passive use of technology (Caputo *et al.*, 2019). However, AI tools can lead to *cognitive offloading*, whereby tasks like memory or analysis are delegated externally. Gerlich (2025: 1) notes that offloading “occurs when individuals delegate cognitive tasks to external aids, reducing their engagement in deep, reflective thinking”. While offloading can free mental resources, it “may also lead to a decline in cognitive engagement and skill development” (Gerlich, 2025: 2). With reference to the point, empirical studies demonstrate that heavy use of AI negatively impact actors’ analytical skills and engagement (Keegan *et al.*, 2023). These insights highlight that cognitive engagement must be intentionally supported even (or especially) in high-tech environments. This opens to the need for stakeholder co-creation (or multi-actor value co-creation) as a powerful idea rooted in service-dominant logic and systems theory, which emphasizes involving diverse stakeholders (users, citizens, experts, ...) collaboratively in innovation (Caputo *et al.*, 2020). A systems lens sees stakeholders not as external entities but as integral parts of the socio-technical system. Caputo (2016) argues that stakeholders cannot be approached, analysed, or depicted as merely external actors, and successful organizations must understand stakeholders’ needs and perceptions to survive, while stakeholders can actively shape company strategy, “acting as filters in understanding the market and guiding companies towards a deeper

alignment with context perceptions”. Likewise, Bassano *et al.* (2024) show that intelligence augmentation (IA) can *empower* multi-stakeholder co-creation in complex decision contexts. In their view, reframing human-AI interaction reveals an ‘IA effect’ whereby synergy between humans and AI enhances value co-creation. As a consequence, cognitive and emotional engagement in tech-driven environments cannot be approached as ‘individual’ processes because they emerge as the result of joint understanding and co-construction of knowledge across the system.

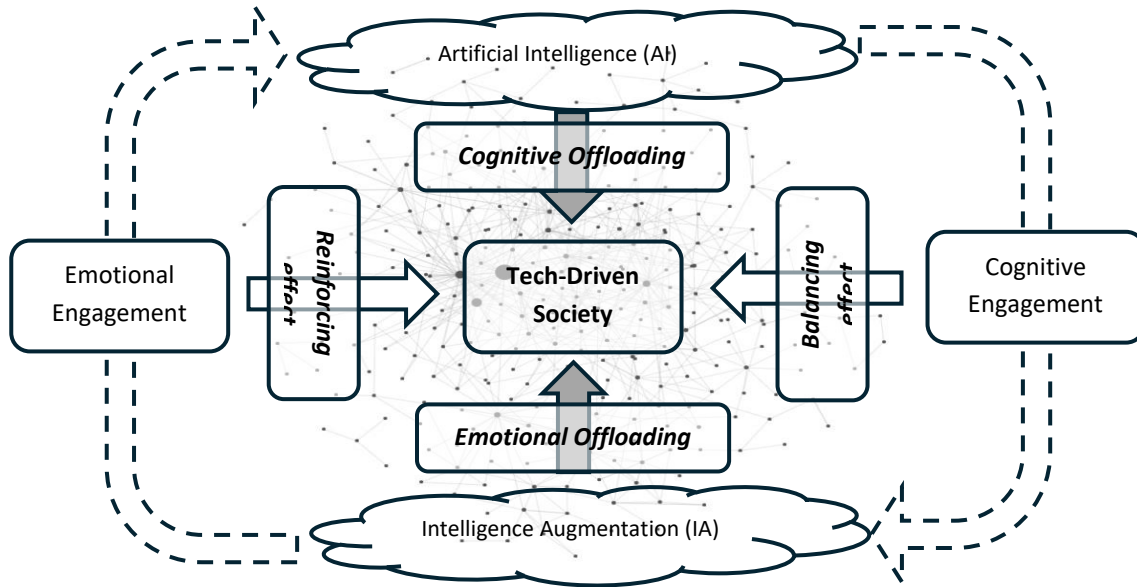
A systems-based loop for promoting and managing a viable tech-driven society

According to the reflections briefly derived from existing literature and briefly summarized in the previous sections, it is possible to state that ongoing digital transformation and the related emergence of a Tech-Driven Society represent key challenges for social researchers and practitioners. The so-called digital world requires new perspectives and models able to explain how the role and contributions of humans can ‘evolve’ within digital infrastructure and technological environment.

In such a direction, it seems that the AI and IA represent two possible building points of a never-ending process in which AI could define new technical paths for increasing processes’ effectiveness, while IA is the way in which new instruments and tools are ‘integrated’ in an evolutionary path that is shaping the new humankind. Moreover, the connection between these two building points cannot be direct, and they cannot be individually considered as causes of the emerging Tech-Driven Society for multiple reasons.

As summarized in the following Figure 1, if AI and IA are approached in isolation, they produce conditions for cognitive offloading (when AI is used without a clear guide and without the appropriate knowledge) and emotional offloading (when IA is developed without taking into consideration context conditions and dynamics). In such a direction, both the relation between AI and IA and they influence on the definition and management of a Tech-Driven society should be mediated by actors’ cognitive engagement -through which it is possible to balance effectiveness orientations with quality and efficiency purposes- and emotional engagement -thanks to which it is possible to stimulate interest, willingness, and participation in new processes and actions-.

Figure 1: A systems-based loop for promoting and managing a viable tech-driven society



Source: Authors' elaboration

Theoretical and practical implications

Multiple insights emerge from the intersection of the above-mentioned threads.

First, *cognitive engagement* can be enhanced through human-AI collaboration, but only if appropriately designed. In such a view, Saviano *et al.* (2023) outline that cooperation among humans and AI within a viable system produces a *cognitive amplification* rather than a simple automation because AI-infused systems move from “intelligent” approaches (based on human guidance) to “wise” scenarios integrating human experience through an appropriate ‘switching point’. In this scenario, humans can avoid routine tasks and focus their attention on higher-order thinking.

Second, systems thinking encourages cognitive alignment across multiple (and divergent) stakeholders. In such a direction, it underlines that the cognitive processes of all involved (and interested) actors should be reconciled for effective co-creation. More deeply, Magliocca *et al.* (2024) explicitly connect systems thinking to this challenge by underlining that Society 5.0 initiatives require aligning stakeholders’ information, interpretation, and cognition through dynamic co-evolutionary paths. Similarly, Tronvoll *et al.* (2017) outline that firms improve competitiveness by shifting from a transactional mindset to a collaborative one, adopting co-evolutionary paths with stakeholders in which technology is not used just for efficiency, but to create dialogues and shared cognitive contexts (e.g. co-design workshops, participatory platforms) based on collective intelligence and strong cognitive engagement.

Third, ethical guidelines are essential to preserve sustainable and viable engagement. With reference to the point, Gerlich (2025) warns that unchecked processes could produce chaotic flows in individual cognitive abilities, reducing their critical thinking and their ability to contextualize available data for solving emerging issues. As a consequence, a multiple-level institutional action is required to cultivate meta-cognitive skills and critical literacy so that users remain active thinkers even while leveraging AI. It means to ‘imagine and develop’ metacognitive training approaches for a balanced AI use to ensure an effective evolution of a tech-driven society, avoiding potential digital inequality (Iles & Yolles, 2002).

Conclusions

A tech-driven society requires for a reshaping of both *what* thinking means and *how* it should be addressed. Thanks to the interpretative lens provided by systems thinking it is possible to face this challenge by remembering that cognitive processes are distributed across human, technological, and institutional layers, all of which must be considered together. By focusing on augmentation processes rather than on the simpler automation, it is possible to reduce the risks for an ‘insensitive digitalization’ and to preserve and enhance the human contribution to the definition of wider opportunities for the next society. Thanks to the stakeholder co-creation, cognitive engagement becomes the key element of innovation, as users and machines become co-authors of digital systems (Chaturvedi *et al.*, 2025).

This means to design systems that are based on active input (e.g., requiring human judgment at key steps) and that transparently share their workings (to build understanding and trust). It also means adopting inclusive, systemic policies that align incentives across stakeholders. When done thoughtfully, technology can transform cognitive ecology by helping humans manage complexity without losing our humanity.

Keywords: Artificial Intelligence; Intelligence Augmentation; Systems Thinking; Cognitive Engagement; Emotional Engagement; Tech-Driven Society

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Crime driven by AI-based recommendation algorithms regarding the proliferation of self-destructive content: suicide, self-mutilation, eating disorders

Maria Gabriela Zoană-Crăciunescu

*National University of Science and Technology Politehnica Bucharest,
Pitești University Center, Romania.*

EXTENDED ABSTRACT

The study aims to address the indirect encouragement of self-destructive behaviors from the perspective of crimes facilitated by recommendation algorithms based on artificial intelligence and conversational voice chatbots. Even if they could be considered antisocial acts, self-destructive actions are not sanctioned by criminal law, as they are assimilated to psycho-emotional or mental health problems. However, what this study wants to do is highlight the commission of crimes by legal entities in the online environment that use artificial intelligence (digital platforms) that determine, encourage, support or do not reject self-harm actions of people in a state of vulnerability or suffering. By verifying the criminal law on the matter, we note the existence of a legislative gap regarding the determination, in any form, to self-destructive behavior, with the sole exception of the irreversible action: suicide, the Romanian criminal code sanctioning the determination or facilitation of suicide.

De lege ferenda, we propose to supplement the current regulation with elements of determining or facilitating suicide in a digital context and to insert a crime regarding determining or facilitating any actions of self-harm in a digital context. In the past, platforms did not consider themselves fully responsible for the content they hosted, throwing responsibility on the content creators or the sites they host. However, our opinion is that the digital platform has the duty not only to eliminate any illegal or dangerous content, but also to ensure that its algorithmic design does not direct users to self-destructive

or self-harming content (this could also be the case for interactive gaming applications) and to analyze the systemic risks to the mental health and physical integrity of users.

In the context where the algorithmic design of a platform can amplify the theme of suffering, despair and self-harm, we believe that we can assimilate it from a criminal point of view as a form of facilitating, facilitating or even determining suicide or serious self-harm, especially since the recommendation algorithms: use machine learning techniques to analyze the user's interaction history (clicks, views, likes, comments, viewing time) and to build a behavioral profile. In the situation where the platform also uses voice interaction, direct interaction and the influence of the voice: AI-therapist, AI-friend etc., especially when the chatbot has a human, warm, empathetic voice, can amplify self-destructive behaviors. Attachment to the synthetic voice increases the user's vulnerability, as a result, the digital platform's liability must also have a criminal nature in the event of harm to the user.

Keywords: artificial intelligence, recommendation algorithms, suicide, self-mutilation, eating disorders, AI-driven crime, self-destructive content.

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**NEW PARADIGMS FOR KNOWLEDGE
MANAGEMENT: CHALLENGES FOR
INTEGRATING HUMAN WITH ARTIFICIAL
KNOWLEDGE**

The New Paradigm of Artificial Knowledge and Its Impact on Knowledge Management Systems

Constantin Bratianu

*Emeritus Professor of the UNESCO Department for Business Administration,
Bucharest University of Economic Studies, Romania.*

EXTENDED ABSTRACT

The purpose of this paper is to introduce the new paradigm of *Artificial Knowledge (AK)* and to analyze its impact on Knowledge Management Systems (KMS) together with Artificial Intelligence (AI).

Herbert Simon, Nobel Laureate in Economics, remarks that “certain phenomena are ‘artificial’ in a very specific sense: they are as they are only because of a system’s being molded, by goals or purposes, to the environment in which it lives. If natural phenomena have an air of ‘necessity’ about them in their subservience to natural law, artificial phenomena have an air of ‘contingency’ in their malleability by environment” (Simon, 1996, p. XI). Technology can be a good example of using the science of artificial to create a new world of things and associated phenomena that amplify human efforts and offer solutions to our existential problems.

Artificial objects and phenomena do not reproduce their natural models but have the challenge of reproducing their specific functionalities. For example, an airplane does not reproduce a bird but its capability to fly. Similarly, artificial intelligence does not reproduce human intelligence but tries to imitate its functions. We call artificial intelligence all those software programs that are capable of passing the famous Turing test (Majumder & Dey, 2023; Russell & Norvig, 2022). Artificial intelligence consists of a series of research domains, amongst which the most important are natural language processing, knowledge representation, automated reasoning, machine learning, computer vision, and robotics (Dwivedi et al., 2019; Loureiro, Guerreiro & Tussyadiah, 2021; Russell & Norvig, 2002). ChatGPT is a new family of artificial intelligence that gained exponential attention from users due to its capacity to generate text, images, sounds, and any combinations of these. Therefore, ChatGPT is a generative

artificial intelligence instrument that is capable of having a dialogue with humans using natural or symbolic languages. That explains its explosive success.

Artificial Knowledge (AK) is an emerging concept in the Science of the Artificial that has been discussed among the first researchers by Bratianu (2025). It is a product of GenAI and its epistemology is totally different than that of human knowledge. If human knowledge is a justified true belief (Audi, 2011; Floridi, 2023; Nonaka & Takeuchi, 2019), artificial knowledge has no relationship to the truth or any reflection of reality (Kurzweil, 2024; Majumder & Dey, 2023; Russell & Norvig, 2022). Artificial knowledge is generated based on some syntactic rules that prioritize the probability of word distribution within a certain semantic text. It is a paradox that artificial knowledge provides meanings, although the algorithms do not operate with meanings. Artificial knowledge is explicit and rational and has no relationship with human tacit knowledge. It is generated from a huge knowledge base that is rational (Lee & Qiufan, 2024; Russell & Norvig, 2022).

The new paradigm of *artificial knowledge* raises challenges in its integration within knowledge management systems, which are human-centred. That means to integrate artificial knowledge with the human knowledge fields of rational, emotional, and spiritual knowledge (Bratianu & Bejinaru, 2019, 2020). The challenge is how to extend the SECI (Socialization, Externalization, Combination, Internalization) model developed by Nonaka and Takeuchi such that it incorporates or connects with a new artificial knowledge generation model. The present paper shows how this extension can be done and how to construct the new artificial knowledge cycle. The paper proposes an artificial knowledge cycle that is composed of the following stages: Combination, Artificialization, Synthetization, and Humanization. We can abbreviate it as CASH and link it through Combination with the SECI cycle. That is a possible useful extension of the SECI cycle to integrate the new components of knowledge management systems – artificial knowledge and artificial intelligence.

Keywords: artificial knowledge, human knowledge, artificial intelligence, human intelligence, knowledge management systems.

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Mapping the Intersection of Artificial Intelligence, Knowledge Creation, and Co-creation: Bibliometric Insights from 2015-2025

Ioan-Loreni Jerdea

PhD Student, National University of Political Studies and Public Administration (SNSPA), Romania.

EXTENDED ABSTRACT

Artificial intelligence (AI) is increasingly recognized as a transformative force in management and organizational studies. Beyond automating tasks, AI systems are now shaping how organizations create, share, and apply knowledge, making knowledge management a key arena for understanding their impact. As technologies evolve from predictive analytics to generative and collaborative systems, they influence not only the efficiency of knowledge processes but also the very ways in which new knowledge is produced and co-produced.

To capture these dynamics, this study conducts a bibliometric analysis of research at the intersection of AI, knowledge creation, and co-creation. By systematically mapping publications from the past decade, the study identifies the academic foundations of this emerging domain, reveals its thematic clusters, and highlights areas with high potential for further development.

Research on knowledge creation is already highly developed and has long been recognized as a foundational theme in the field of knowledge management (Nonaka & Toyama, 2003; Nonaka & Von Krogh, 2009). More recently, scholars have begun to explore how AI supports knowledge creation (Bag et al., 2021; Chin et al., 2024; Zhang et al., 2025), as well as the dynamics of co-creation between humans and AI systems (Behera et al., 2024; Kirkby et al., 2025; Sjödin et al., 2020; Wang et al., 2025; Wu et al., 2021). Another relevant development is the introduction of the concept of artificial knowledge, understood as the product of AI tools that complements human knowledge within knowledge management systems (Bratianu & Bejinaru, 2025; Di Vaio et al., 2024; Grum, 2020; Saviano et al., 2023). Together, these streams highlight the need for a systematic mapping of the field.

This study adopts a qualitative bibliometric analysis to explore the intersection of artificial intelligence, knowledge creation, and co-creation. The dataset was retrieved from the Web of Science database in September 2025, using a topic search (covering titles, author keywords, Keywords Plus, and abstracts) that combined AI with multiple variations of terms referring to knowledge creation and co-creation, while explicitly excluding value co-creation in order to keep the results focused on knowledge-related research. The full search query was: (TS=(AI) OR TS=("artificial intelligence")) AND (TS=("knowledge creation") OR TS=("co-creation") OR TS=("knowledge generation") OR TS=("knowledge co-production") NOT TS=("value co-creation")). The initial search produced 978 records.

To refine the dataset, only journal articles and conference proceedings were retained, leaving 878 documents. We further limited the scope to business- and computer science-related WoS categories, including Business, Management, Economics, Computer Science Artificial Intelligence, Computer Science Interdisciplinary Applications, and Computer Science Information Systems, which reduced the sample to 510 records. Restricting the dataset to English-language publications resulted in 509 documents, and applying the timeframe 2015-2025 yielded a final set of 498 documents, to focus on the new paradigms for knowledge management.

The analysis was conducted using the Bibliometrix R package and its no-code interface, Biblioshiny (Aria & Cuccurullo, 2017), allowing for mapping the publication trends, co-occurrence networks, thematic structures, and emerging directions in research on AI, knowledge creation, and co-creation.

Results show that the field has expanded rapidly over the past decade, with an annual growth rate of 48.4% that reflects the accelerating role of AI in research on knowledge creation and co-creation. Despite being relatively young, the literature shows strong visibility, with publications receiving on average 17.6 citations per document, suggesting that key contributions are quickly integrated into ongoing debates. Collaboration also emerges as a defining characteristic, as evidenced by an international co-authorship rate of 35.9%, highlighting the global relevance and cross-disciplinary nature of this research domain.

Research output in this field has followed a clear upward trajectory, highlighting several turning points. A first noticeable increase appeared in 2018, with 13 publications, when the number of publications rose above the negligible levels of previous years. A second surge followed in 2020, with 26 publications, coinciding with advances in generative AI that positioned the technology as a practical tool for supporting knowledge processes. The most dramatic expansion occurred in 2024, with 148 publications, more than double compared to the previous year, reflecting the stage at which AI became an integral part of organizational knowledge management strategies rather than an experimental or peripheral application.

This trajectory was sustained in 2025, with 155 publications, confirming the consolidation of the field and its growing maturity.

The keyword co-occurrence analysis reveals several dominant clusters that shape the field. At the center lies “artificial intelligence”, the most connected term, which anchors a cluster including co-creation, machine learning, and innovation, reflecting the technological and managerial foundations of the literature. A second cluster links knowledge management, knowledge creation, and knowledge generation, showing how AI is embedded into established knowledge processes. A third cluster is structured around generative AI, large language models, and human-AI co-creation, pointing to the growing role of human-AI collaboration in shaping new knowledge practices. Another cluster emphasizes creativity, collaboration, user experience, and generative design, highlighting the design and creativity dimension of AI-enabled knowledge work. Together, these clusters indicate that the field is evolving along four complementary directions: technological advances, knowledge management integration, human-AI collaboration, and creativity-driven applications.

The thematic map highlights both the maturity and the future potential of research at the intersection of AI and knowledge processes. Two clusters stand out as basic themes, forming the foundational core of the field: one structured around knowledge management, knowledge creation, knowledge generation, and AI, which reflects the integration of AI into established knowledge management literature; and another combining AI, co-creation, and human-AI collaboration, which demonstrates the consolidation of human-AI collaboration as a central dimension of knowledge practices. At the same time, the map identifies computational creativity and AI co-creation as a motor theme, suggesting that creativity-focused applications of AI have high development potential and are likely to shape future research directions. Finally, the cluster built around AI agents, co-creative agents, and co-creative AI emerges as a niche theme, signaling a specialized but promising area of inquiry that is still peripheral compared to the main body of literature.

In conclusion, research on AI, knowledge creation, and co-creation has expanded rapidly, with annual output accelerating especially after 2020 and peaking in 2024-2025. The field is marked by strong collaboration, as international co-authorship exceeds one-third of all publications, and its intellectual structure is anchored by keywords such as artificial intelligence, knowledge management, knowledge creation, co-creation, and innovation.

Thematic mapping shows that clusters around knowledge management, knowledge creation, and AI, together with AI, co-creation, and human-AI collaboration, represent foundational themes at the core of

this literature. At the same time, computational creativity and AI co-creation emerge as motor themes with strong research potential, while AI agents and co-creative agents remain niche themes, signaling more specialized but promising areas of research.

This study is limited by its reliance on the Web of Science database, which may exclude relevant contributions indexed elsewhere. Future research should broaden the dataset, apply longitudinal techniques to trace conceptual evolution, and complement bibliometric evidence with empirical insights, especially on underdeveloped areas such as human-AI co-creation and creativity-driven applications, which appear to hold particular potential for advancing both theory and practice.

Keywords: artificial intelligence, knowledge creation, co-creation, human-AI collaboration, knowledge management.

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Knowledge accessibility in the Artificial Intelligence Age

Claudiu Coman

*Faculty of Sociology and Communication, Department of Social Sciences and Communication,
Transilvania University of Braşov, Romania*

Ecaterina Coman

*Faculty of Economics and Business Administration, Department of Management and Economic
Informatics, Transilvania University of Braşov, Romania*

Vlad Bătrânu-Pinţea

*Faculty of Sociology and Communication, Department of Social Sciences and Communication,
Transilvania University of Braşov, Romania*

Ioana Matei

*Faculty of Sociology and Communication, Department of Social Sciences and Communication,
Transilvania University of Braşov, Romania*

EXTENDED ABSTRACT

The purpose of this paper is to highlight the use of Artificial Intelligence (AI) in a world where AI overuse may impact knowledge and transform everything into simple, basic information. Knowledge is accessible to everyone faster through Artificial Intelligence, but sometimes it might not be correct and/or accurate. It is used and then forgotten, and so it is not knowledge anymore, but mere information. While AI significantly enhances knowledge accessibility by generating, curating, and distributing vast amounts of information, it also introduces the risk of epistemic overloading - a condition where users face difficulties discerning credible knowledge amid abundance. This abstract examines the implications of AI-generated content on information quality, attention economy, and trust in knowledge, as well as bringing a new perspective on constructing better and more relevant knowledge through modern ways, such as using AI. Drawing on cognitive science and information theory, it proposes design strategies for AI systems that help users filter, contextualize, and validate knowledge effectively. Abundance is not a threatening aspect immediately, but it can pose as a real danger in different branches of knowledge, and it may disrupt either

creative ideas or strong, well-researched branches, through the phenomenon of abundance generated by Artificial Intelligence, such as ChatGPT, Gemini, Claude, Grok, and so on.

Some authors discuss knowledge representation linked with AI (Russell & Norvig, 2021), while others stress the idea that AI redefines knowledge completely (Floridi, 2014). Scientific knowledge also serves as a real key point in this analysis because it suffers from many changes in the age of Artificial Intelligence (Nickles, 2017). There is a growing emergence of AI, which reproduces certain knowledge systems rooted mainly in labor, capitalism and control (Pasquinelli, 2023) as well as the gatekeeping role of AI in shaping accessible knowledge (Mittelstadt, 2016). This paper could pose as a relevant extension of analysis regarding the impact of AI on knowledge and how it can nurture or offer better accessibility towards knowledge, also considering the possible obstacles in the use of modern technology for better productivity, enhanced relevance and strengthened accessibility to knowledge.

Keywords: knowledge accessibility, artificial intelligence knowledge, digital age, informatization of knowledge.

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From digital tools to human competencies: How Artificial Intelligence shapes emotional intelligence and knowledge management

Ioana Marin

PhD student, National University of Political Studies and Public Administration, Romania.

Adriana Grigorescu

Member of the Romanian Scientists Academy, National University of Political Studies and Public Administration, Romania.

Radu Marin

PhD student, National University of Political Studies and Public Administration, Romania.

EXTENDED ABSTRACT

In This paper aims to analyze how digital transformation is reshaping knowledge management and decision-making processes within organizations, and how managers can benefit from this momentum to strengthen their organizational knowledge base. The paper will suggest a conceptual framework that highlights the need of refining employees' emotional intelligence as a prerequisite for effective knowledge management. By fostering emotional intelligence, organizations can enhance collaboration, tacit knowledge sharing, and adaptability to change. At the same time, the paper will analyze how artificial intelligence can be deployed not only as a tool for gathering and distributing knowledge, but also as a catalyst that influences and potentially augments employees' emotional intelligence through adaptive learning systems, feedback mechanisms, and human-machine interaction. The overarching goal is to ensure that organizations adopt AI in a manner that complements and strengthens the human resources rather than replacing them.

According to Bratianu, C., & Bejinaru, R. (2019), emotional intelligence is central to leadership, motivation, and organizational change. Korteling, J.E. et al. (2021) state that, in order to fully benefit from the advantages of AI, organizations need to understand that there is a major difference between human perception and digital reasoning. Several empirical evidences supports these claims. A study

conducted in 2023 by Zsigmond, T. & Mura, L. explore the relationship between emotional intelligence (EI) and knowledge sharing in Slovak SMEs. Using a survey of 508 employees and applying ANOVA and logistic regression, the study determined that EI significantly influence willingness to transfer knowledge. According to the authors' findings, higher EI levels increase knowledge-sharing behavior. The research highlights the importance of EI for strengthening human resource management, particularly in the context of past and current global crises. Other scholars have emphasized the ethical dimensions of AI adoption.

Lungu, D.C., Grigorescu, A., & Yousaf, Z. (2024) raise ethical questions regarding the integration of Artificial Intelligence into human resource management. The authors state that, while AI can enhance efficiency and objectivity, its application raises ethical challenges that directly affect employees' trust in organizational systems and, consequently, their willingness to share knowledge. In the authors' opinion, this is a process that can be strongly mediated by emotional intelligence. Similarly, Xuan, Z. & Ziqing, X., (2024), emotional intelligence not only directly promotes knowledge sharing but also enhances psychological safety, which itself mediates knowledge behaviors. The authors consider that it is crucial to develop tools that can help with strengthening emotional intelligence, while cultivating a culture of psychological safety, thereby enabling more effective knowledge sharing in fast-paced, competitive industries.

There are also recent papers that aim to analyse the connection between emotional intelligence, AI, and knowledge management. Dr. Khan, S.H., et al (2025) states the fact that there is a significant connection between emotional intelligence and knowledge management. A study conducted by the authors revealed that the most emotionally intelligent employees are more likely opened to share their knowledge. The authors considers that organizations must implement technologically advanced knowledge management systems in order to enhance and sustain this knowledge-sharing behavior. Likewise, Olan, F. et al (2023) considers that AI must be complemented by human-centered competencies to achieve meaningful outcomes. In their opinion, emotional intelligence plays a critical role in ensuring that employees not only engage in knowledge sharing but also build the trust, empathy, and collaboration necessary for leveraging AI-driven insights. Jarrahi, M.H, et al (2023) consider that, while AI capabilities are reshaping the knowledge managements' core dimensions, its true capabilities lies in building effective partnerships between artificial systems and humans. The authors emphasize that it is crucial for organizations to adopt and/or develop such systems that complement human expertise rather than replacing it.

Building on this, Edwards, J.S., & Lönnqvist, A. (2023), suggest that there is an increased need to rebuild knowledge management practices, which can lead to an improved and dynamic decision-making process within organizations.

The current paper will aim to further analyze how digital transformation reshapes knowledge management and decision-making processes within organizations, with main focus on the roles that emotional intelligence and AI are playing in this new paradigm. The paper will also propose a conceptual framework that positions emotional intelligence as a mandatory factor in order to enhance and streamline knowledge sharing and organizational adaptability, while recognizing AI as the main enabler of knowledge sharing within the organization and a catalyst for strengthening employees' emotional intelligence. In doing so, the paper will aim to demonstrate that a more balanced adoption of digital transformation within organizations is needed, highlighting that AI resources augment rather than substitute human resources. Last but not least, the paper will aim to contribute to the ongoing debate on how organizations can align technological innovation with human capital development to enhance resilience, creativity, and dynamic decision-making in the knowledge economy.

Keywords: knowledge management, decision-making processes, emotional intelligence, artificial intelligence, knowledge sharing, human resource management.

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Reframing Entrepreneurial Innovation and Growth through Neuromanagement and Knowledge Management in the Age of Artificial Intelligence

Alina-Mirela Teacu Parincu

Associate professor,

The Institute for Business Administration in Bucharest (ASEBUSS) Bucharest, Romania

EXTENDED ABSTRACT

This The framework of this paper is built around an overview of the nexus between neuromanagement and knowledge management for entrepreneurial innovation and growth, in the dynamic arena of entrepreneurship. The impact of the unprecedented waves of change, the avalanche of information, and the artificial intelligence revolution are permanent challenges faced by the entrepreneurial environment, therefore the adoption of innovative business scenarios, strategies, and tools becomes mandatory to thrive. Although companies recognize the value of innovation on performance and the need to be competitive, they fail to coherently exploit the opportunities generated by the digital revolution and the impact of artificial intelligence, as well as entrepreneurial dynamics, mainly due to the lack of education and information. In the context of the digital revolution, global performance means more than access to technology, it means human-centered knowledge, which must be transformed into competitive advantage. Access to this knowledge can be facilitated by integrating the innovative approach of Neuromanagement, which brings insights from neuroscience to reveal emotional knowledge, and knowledge management, one of the pillars of modern organizations, complemented by the transformative role of artificial intelligence, which can process impressive amounts of emotional and rational data, and support management growth and transformation, with a direct impact on performance. The integration of Neuromanagement, Knowledge management and Artificial intelligence can transform static

knowledge systems into dynamic ecosystems, which can bridge the innovation gap with high-performance competitors and provide actionable insights for the entrepreneurial ecosystem.

Keywords: Neuromanagement, Knowledge Management; Innovation; Artificial Intelligence; Entrepreneurial growth; Performance.

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Innovation and Sustainability as Drivers of Organizational Performance in the Romanian IT Industry

Adela Mustatea

PhD. Candidate, SNSPA, Romania

EXTENDED ABSTRACT

Innovation, sustainability, and organizational performance have become inseparable elements in the current discourse of management, particularly in industries shaped by constant technological change. The Romanian IT industry, which has grown rapidly in recent years and has increasingly positioned itself on the global map of competitiveness, provides a fertile context for exploring how these three pillars can be harmonized within integrative managerial models.

This study proposes a conceptual and empirical examination of the connections between innovation, sustainability, and organizational performance, with the aim of identifying ways in which Romanian IT companies can create added value and achieve long-term resilience.

Innovation is generally understood as the ability of organizations to generate and implement new ideas, products, processes, or business models that contribute to competitiveness and differentiation.

In the IT sector, innovation represents not only a technical imperative but also a cultural and strategic one. It encompasses rapid adaptation to technological changes, the development of cutting-edge solutions, and the creation of an organizational environment that fosters creativity, collaboration, and agility. Sustainability, in turn, goes beyond the ecological dimension to integrate economic viability and social responsibility. In an industry where the main resource is human capital, sustainability is closely linked to practices that ensure employee well-being, knowledge transfer, and the long-term development of capabilities.

Organizational performance, often measured in financial terms, must be redefined to reflect the multiple outcomes that derive from innovation and sustainability. This includes customer satisfaction, talent retention, stakeholder trust, and the ability to remain competitive in a volatile global market.

The premise of this research is that these three elements—innovation, sustainability, and performance—cannot be treated as independent variables but must be approached within integrative models of management. Fragmented strategies, where innovation is pursued without consideration of sustainability or where performance is measured in narrow financial indicators, risk undermining organizational resilience. By contrast, integrative models allow companies to align creativity with responsibility and to translate strategic vision into both short-term achievements and long-term impact. This perspective is particularly relevant for Romanian IT companies, which face the dual challenge of keeping up with global technological developments and contributing to local socio-economic progress.

The study adopts a mixed methodological approach designed to capture both depth and breadth. Qualitative research, through interviews with managers and case studies of representative IT firms, reveals the nuances of how integrative models are conceived and implemented. These insights are complemented by quantitative analysis based on survey data collected across the industry, which identifies broader patterns and correlations between innovation practices, sustainability initiatives, and performance outcomes. By combining these methods, the research offers a comprehensive view of how Romanian IT companies navigate the interplay of the three dimensions.

Findings indicate that the sector is strongly innovation-driven, with many companies emphasizing technological creativity, rapid adaptation, and solution-oriented development. However, sustainability is often less embedded in organizational strategies, appearing more as a collection of isolated initiatives rather than as a structural component of innovation and performance. Yet, there are examples of companies that succeed in aligning sustainability with innovation by embedding responsibility in their processes, from green IT practices to inclusive workplace cultures and community-oriented projects. These companies demonstrate that integrative models can simultaneously foster competitiveness and contribute to social and environmental goals. Importantly, performance in such organizations is evaluated beyond financial profit, incorporating aspects such as employee engagement, knowledge sharing, client trust, and adaptability.

The implications of these findings are significant. On a theoretical level, the study contributes to redefining the conceptual framework of management in the digital age by emphasizing the

interdependence of innovation, sustainability, and performance. Rather than being seen as separate priorities, they must be understood as mutually reinforcing processes that strengthen organizational resilience. For managers, the research provides concrete recommendations: fostering a culture of continuous learning, embedding sustainability into innovation strategies, and using multidimensional performance metrics that capture both tangible and intangible outcomes. For policymakers, the results underline the need to create supportive ecosystems that incentivize sustainable innovation and facilitate collaboration between industry, academia, and government.

Ultimately, the study argues that Romanian IT companies have the opportunity to position themselves as leaders in integrative management practices. By adopting models that connect innovation with sustainability and redefine performance, these organizations can generate value not only for shareholders but also for employees, customers, and society. In a global context where responsibility and adaptability are becoming as important as technological advancement, such an integrative approach is essential. The Romanian IT industry thus emerges not only as a competitive economic sector but also as a laboratory for testing new ways of managing in an interconnected and rapidly changing world.

This research contributes to advancing the understanding of how innovation, sustainability, and organizational performance can be combined into cohesive models that ensure long-term growth and resilience. It shows that the path forward is not to privilege one dimension at the expense of the others but to integrate them into a holistic vision of management. In doing so, Romanian IT companies can both respond to immediate market challenges and anticipate future shifts, positioning themselves at the forefront of sustainable innovation in Europe and beyond.

Keywords: innovation, sustainability, organizational performance, integrative management, Romanian IT industry.

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Hybrid Knowledge Sharing: A New Dimension in Knowledge Management Theory

Ruxandra Bejinaru

Associate professor, “Stefan cel Mare” University of Suceava, Romania.

EXTENDED ABSTRACT

The digital transformation of organizations and the growing ubiquity of artificial intelligence (AI) technologies have fundamentally altered the dynamics of knowledge creation, storage, and use. While much of Knowledge Management (KM) theory has traditionally centered on human-to-human exchanges of tacit and explicit knowledge (Nonaka & Takeuchi, 1995; Davenport & Prusak, 1998), the current context calls for a paradigm shift. Artificial systems increasingly act as knowledge agents, mediating, generating, and curating knowledge flows alongside human contributors. In this evolving landscape, a new theoretical dimension emerges—Hybrid Knowledge Sharing (HKS)—which redefines the mechanisms through which knowledge is disseminated, interpreted, and applied.

HKS can be conceptualized as the integration of human and machine-based sharing processes within a single socio-technical ecosystem, namely the organization (Bratianu & Bejinaru, 2025). On one side, human actors contribute tacit, contextual, and creative knowledge, grounded in experience, intuition, and foresight (Polanyi, 1966; Nonaka & Toyama, 2003). On the other, AI systems provide scalable, efficient, and data-driven (explicit) knowledge generation and distribution, capable of processing massive datasets, identifying patterns, and offering predictive insights (Brynjolfsson & McAfee, 2017; von Krogh, 2018). The value of HKS lies in orchestrating this complementarity: machines extend the reach and precision of knowledge flows, while humans ensure contextual interpretation, ethical filtering, and innovative recombination.

We propose the following theoretical arguments to support the recognition of HKS as a new dimension in KM:

1.Epistemic Integration: Traditional KM theory focused on the dynamics of tacit and explicit knowledge. HKS extends this framework by requiring the reconciliation of human tacit knowledge with machine-generated knowledge (which is explicit), creating a hybrid epistemic domain where sensemaking and data analytics co-evolve.

Hybrid Knowledge Sharing (HKS) expands classic KM. It doesn't just turn tacit know-how into documents and share them among people. It also joins what people know with what AI tools produce (summaries, patterns, answers) inside the same system—and makes them inform each other over time. Until recently, the knowledge management theory was focusing on how to convert personal know-how (tacit) into documents and routines (explicit) so others can use it. Since recently, AI generates a lot of “explicit” content on its own—drafts, explanations, suggestions, code, classifications—at scale and speed. Much of it looks polished, but the reasoning path is hidden. The momentum shifts the focus on the mix of human context and fast AI output.

2.Expanding the Scope of Knowledge Actors: In human-centered KM, knowledge sharing depends on trust, reciprocity, and organizational culture (von Krogh, 2018). In hybrid systems, AI emerges as a new knowledge actor, capable of curating, filtering, and recommending knowledge. Sharing thus occurs not only between people but also between people and algorithms. For example, recommendation systems in learning platforms or expert search engines mediate knowledge flows by shaping what is visible and relevant. This implies that HKS expands the ecosystem of actors and requires mechanisms for transparency and explainability (Shneiderman, 2020).

Knowledge sharing has long depended on interpersonal trust. In HKS, this is expanded into hybrid trust, where employees must also rely on algorithmic recommendations. Trust therefore depends on AI explainability, fairness, and governance frameworks that safeguard against bias (Shneiderman, 2020; Floridi & Cows, 2019).

Human knowledge sharing often involves tacit insights—contextual, experiential, and emotionally embedded (Polanyi, 1966). AI systems, by contrast, excel at handling explicit, codified, and large-scale data. Hybrid knowledge sharing therefore means bridging two epistemic domains: the richness of tacit human knowledge with the scalability of machine-generated patterns. Humans provide sensemaking and contextualization, while AI extends reach and precision. This complementarity enriches the collective knowledge base.

Knowledge sharing thrives when participants trust the source and perceive shared knowledge as relevant and reliable (Davenport & Prusak, 1998). In HKS, trust must extend to AI-generated outputs. Employees must believe that algorithmic recommendations are fair, explainable, and free from harmful bias. However, Bawden and Robinson (2020) highlight the “dark side” of digital information, where extremes such as overload, distortion, and unreliability hinder knowledge creation. Without such trust, AI-mediated sharing may generate resistance rather than engagement. Studies on human-centered AI emphasize explainability as a precondition for building this hybrid trust (Floridi & Cowls, 2019).

3. Innovation and Foresight: Hybrid sharing processes enhance innovation by enabling organizations to combine the scope of AI-driven knowledge discovery with the depth of human creativity and foresight. This allows organizations not only to optimize current practices but also to anticipate and design future trajectories (Vecchiato, 2012).

For humans, innovation often arises from the recombination of diverse knowledge sources (Nonaka & Toyama, 2003). Hybrid knowledge sharing enables humans to access novel patterns identified by AI, while AI benefits from the creative reinterpretation and explicit contributions of humans. This creates a virtuous cycle: machines broaden the horizon of possibilities, while humans provide creativity, foresight, and ethical reasoning. The result is a more dynamic and generative sharing environment.

Recognizing HKS as a new dimension of KM advances theory by positioning sharing as no longer an exclusively social activity, but a socio-technical interactional process. It challenges organizations to redesign KM practices to support hybrid flows, develop digital literacy, embed ethical governance, and cultivate leadership capable of integrating human and artificial contributions. Jobin, Ienca, and Vayena (2019) map the global landscape of AI ethics guidelines, revealing convergences and divergences across principles.

Methodologically, the paper builds on foresight analysis and conceptual modeling, enriched by insights from case studies in higher education and knowledge-intensive organizations. It proposes a framework for Hybrid Knowledge Management (HKM), which integrates human creativity, ethical reasoning, and strategic vision with AI-driven efficiency, scalability, and data-driven intelligence.

The main contribution of this study is to articulate a ‘strategic vision for KM as an integrative discipline’ capable of guiding organizations through the socio-technical transformations brought by AI. By repositioning KM as a mediator between human and artificial knowledge, the paper highlights pathways for innovation, knowledge sharing and organizational resilience.

This paper argues that Hybrid Knowledge Sharing is both a necessary response to the challenges of digital transformation and a strategic opportunity for organizations to achieve resilience, creativity, and sustainable growth in the age of hybrid intelligence. By embedding HKS into KM theory, scholars and practitioners could gain a more comprehensive understanding of how knowledge ecosystems must evolve in the 21st century (Bratianu & Paiuc, 2025).

In conclusion, Hybrid Knowledge Sharing represents a necessary evolution of KM theory and practices in the age of AI. It redefines sharing as a process that integrates human tacit knowledge with machine-generated insights, mediated by trust, ethics, and organizational culture. By balancing the efficiency of AI with the contextual richness of human sensemaking, HKS offers a path toward more resilient, innovative, and ethically grounded knowledge ecosystems.

Keywords: knowledge management, hybrid knowledge sharing, artificial intelligence, socio-technical systems, knowledge worker, knowledge agents.

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Measuring Technological Resilience through Interval-Based Composite Indicators

Carlo Drago

Prof. PhD /Associate Professor, University Niccolò Cusano Rome, Italy.

Valentina Giglio Moro

PhD Student, University Niccolò Cusano Rome, Italy.

Katarzyna Lewkowicz-Grzegorzczuk

Dr. PhD /Adjunct Assistant Professor, Bialystock University, Poland.

Aneta Kargol-Wasiluk

Dr. PhD /Adjunct Assistant Professor, Bialystock University, Poland.

Angelo Leogrande

PhD /Adjunct Professor, LUM University Giuseppe Degennaro, Italy.

EXTENDED ABSTRACT

Throughout the twenty-first century, the innovation has fundamentally changed economic systems, but have also changed organizational structures, and societal behaviors. In spite of this, artificial intelligence (AI), automation, and digital transformation have been accelerating at a rapid pace, revealing a growing gap between technological diffusion and societal readiness (Brynjolfsson & McAfee, 2014). It is important to recognize that resilience involves multiple dimensions, including adaptation and transformation (see also Olsson et al., 2014). In this respect, traditionally, innovation indices can emphasize input-output efficiency, not recognizing resilience's multidimensional nature which involves the shocks absorption, by adapting to disruption, and transforming into sustainable paths. In order To address this gap, this paper proposes a novel interval-based composite indicator of technological resilience, integrating behavioral, ethical, and adaptive components into the measurement of digital transformation.

So, the indicator is constructed using a Monte Carlo simulation framework that applies stochastic weighting across four interdependent dimensions: (1) technological capability (measured by public

attention to artificial intelligence), (2) organizational transformation (digital transformation), (3) human capital and digital skills, and (4) ethical and governance awareness (digital ethics or responsible innovation). Each dimension is operationalized through high-frequency behavioral data extracted from Google Trends between 2004 and 2025 (see Google Trends 2025). In this respect by simulating 10,000 random weight vectors uniformly distributed under the constraint of unit sum, the indicator produces an interval distribution for each territorial unit, rather than a single deterministic score (for the approach of constructing interval based composite indicators see Drago 2021 and Gatto and Drago 2020 for a different approach see Drago 2023). This methodological approach takes into the account the uncertainty inherent in composite indicators (Saltelli et al., 2007; OECD & JRC, 2008) and introduces robustness in evaluating regional technological resilience. This measure is also based on Saisana et al. (2005), in which we represent and measure the uncertainty of the different results of the composite indicator using interval data for each region (see Gioia and Lauro 2005). The different results are represented by the center of the interval obtained, allowing us to identify and measure the extent to which the results are uncertain based on the interval minima and maxima.

In a more general context, this interval-based indicator framework allow to consider the measuring of societal readiness for technological change. In this respect, It aligns with emerging paradigms of transformative innovation policy (Schot & Steinmueller, 2018) but also with anticipatory governance (Guston, 2014), emphasizing resilience not as static resistance but as the capacity for directed adaptability. In this sense, the indicator provides policymakers and researchers with a tool to assess how different societies navigate waves of innovation, balancing efficiency, inclusivity, and ethical governance, by integrating behavioural data, uncertainty simulation, and systemic interpretation. The Italian case study shows that regions can achieve technological resilience through cognitive adaptability and collective awareness as well as industrial strength. These findings can encourage a specific global rethink of innovation metrics, advocating for indices that capture the learning, ethical and anticipatory aspects of digital transformation in a technology-driven world.

Keywords: Technology, Innovation, Resilience, Composite Indicators, Interval-based Composite Indicators

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Integrating Human and Artificial Knowledge in Recruitment: Managing Cognitive Bias as a Strategic Knowledge Governance Challenge in Austrian Financial Organizations

Andreea Bunica

PhD, Doctoral School in Management, SNSPA, Romania

EXTENDED ABSTRACT

Recent As artificial intelligence (AI) systems increasingly permeate organizational decision-making, recruitment emerges as a critical area where human and machine knowledge must be integrated in an effective manner. However, rather than achieving synergy, many Austrian financial institutions experience various constraints, where algorithmic suggestions are often dismissed in favor of gut feelings and personal judgment (Black & van Esch, 2020; Gilch & Sieweke, 2021). This paper argues that similarity attraction bias, namely the preference for candidates perceived as similar to the decision-maker, is not only a psychological phenomenon, but also a knowledge integration failure, in which subjective human knowledge prevails rational knowledge (Byrne, 1971; Gladwell, 2005). Thus, bias mitigation should be reframed not as a compliance function but as strategic knowledge governance.

Building on Constantin Bratianu's (2011) conceptualization of knowledge fields, where rational, emotional, and spiritual knowledge flows must be consciously integrated rather than left to compete, it may be proposed that bias represents a dominance of emotional knowledge over analytical knowledge in recruitment decision-making. In traditional hiring contexts, recruiters and managers rely heavily on subjectivity, gut feeling and perceived cultural fit (Byrne & Nelson, 1965; Koivunen et al., 2019). These tacit heuristics are nonlinear and fast, providing a sense of certainty, but they often leave out the knowledge inflows that diversity

could bring (Greenwald & Banaji, 1995; Lieberman et al., 2015). Conversely, AI-based screening tools offer structured, rationalized, and data-driven knowledge outputs, yet are frequently rejected due to perceived threat to human expertise (Hausman, 2012; Raghavan et al., 2019). Therefore, recruitment is not just a space where bias can occur, but it is also a place where different ways of knowing and deciding compete for influence.

This research is based on a mixed-methods study conducted across Austrian financial institutions, encompassing nine expert interviews and 120 survey responses from HR managers and decision-makers. The findings reveal three consistent patterns. First, structured tools such as AI pre-selection systems are often formally implemented but informally bypassed, especially when senior decision-makers invoke intuition as a justification. Second, bias is rarely perceived as bias; rather, it is interpreted as knowledge-based judgment (“I know the type that works here”). This supports existing research showing that people tend to place too much confidence in their own judgments, especially when those judgments are based on familiar patterns or mental shortcuts (Gladwell, 2005; Bowles et al., 2006). Third, participants confessed they trusted AI more when the system clearly explained its decisions, highlighting that building understanding, not just automating tasks, is key to making human-AI collaboration work.

Based on these findings, this paper proposes the following Knowledge Integration Framework for Inclusive Recruitment:

The first one is the knowledge awareness layer. Bias should be understood not as a moral failing, but as a distortion in how knowledge is processed, where emotional shortcuts often dominate logical thinking (Wilson et al., 2000). Training programs should focus on improving cognitive awareness rather than relying solely on ethical appeals.

The second proposal is the knowledge structuring layer. Unspoken decision-making criteria need to be made visible and traceable. This can be done through tools like structured scoring guides and interviews, and narrative evaluations of candidates (Barber & Roehling, 1993; Bergström & Knights, 2016).

The third one is represented by the knowledge mediation layer. AI should not replace human judgment, but complement it. It can offer alternative perspectives that encourage recruiters to reflect more deeply on their initial impressions. To support this, recruiters should be given access to AI systems that explain their reasoning clearly, without enforcing rigid decisions (Pfieffelman et al., 2010; Raghavan et al., 2019).

In this approach, recruitment becomes a process of organizing and applying knowledge, not only selecting individuals. Diversity is no longer just a demographic target, but it becomes a strategy for broadening the range of perspectives and insights within an organization (Herring, 2009; Hunt et al., 2018). For Austrian financial institutions, which is situated at the crossroads of economic stability and digital innovation, relying on uniform decision-making risks creating knowledge blind spots that can slow progress.

Ultimately, bringing together human and AI-driven knowledge in recruitment takes more than just the right tools, it requires a mindset of openness and self-awareness about the limits of one's own perspective. This means recognizing that no single source of knowledge, namely human or machine, has all the answers, and that meaningful progress comes from thoughtful collaboration between both, as Bratianu (2011, 2015) points out.

Keywords: AI in Recruitment; Austrian Financial Sector; Cognitive Bias; Decision-Making Governance; Human/Artificial Knowledge Integration; Knowledge Management; Similarity Attraction Bias.

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Framing Consumer Archetypes through Customer Knowledge Management lens

Alexandru Capatina

Professor, Dunarea de Jos University of Galati, Romania.

Oana Daniela Modrogeanu Lupoe

Assistant Professor, Dunarea de Jos University of Galati, Romania.

EXTENDED ABSTRACT

The purpose of this paper is to propose a profiling tool emphasizing four emerging consumer archetypes (Trend Integrators, Aware Consumers, Opportunity Explorers, and Sustainability Advocates) through the theoretical lenses of Customer Knowledge Management (CKM), Knowledge Dynamics (KDY), and the Knowledge Fields (KF) frameworks. It provides a foresight-oriented approach to understanding consumer engagement and its implications for brand experience research

Customer Knowledge Management (CKM) emphasizes the bidirectional flow of knowledge as a driver of innovation and brand value creation (Bratianu et al., 2022). Knowledge Dynamics (KDY), as articulated in the thermodynamic interpretation of knowledge processes, explains how rational, emotional, and spiritual knowledge fields interact within organizational and consumer ecosystems (Bratianu & Bejinaru, 2019, 2020). Together, these frameworks allow a clear understanding of the cognitive, affective, and value-driven dimensions of consumer behavior.

The Trend Integrator reflects a knowledge-sharing propensity within CKM. While acting as co-creators and collaborators, these consumers foster dynamic flows of knowledge that enable firms to anticipate megatrends and innovate accordingly. Their behavior reflects a continuous combination of rational foresight with emotional engagement, which resonates with the knowledge dynamics spiral (Nonaka & Takeuchi, 1995; Bratianu et al., 2022).

The Aware Consumer embodies knowledge safeguarding strategies, demonstrating vigilance against misinformation and over-commercialization. Their selective disclosure of personal data mirrors the knowledge protection mechanisms discussed in CKM research, highlighting the role of trust and privacy

in sustaining brand experience (Monfort et al., 2025). They emphasize rational knowledge fields, tempered by cautious emotional investments.

The Opportunity Explorer exemplifies consumers who actively generate and transfer knowledge to brands by identifying nascent opportunities in emerging markets. Their openness reflects exploration and externalization processes in knowledge dynamics, positioning them as boundary-spanners between organizational innovation and market foresight (Bratianu et al., 2021, Vătămănescu et al., 2022). Their behavior emphasizes the transformative potential of rational knowledge fields integrated with an entrepreneurial spirit.

The Sustainability Advocate reflects a selective but purposeful knowledge-sharing orientation. They prioritize ethical consumption and align with values-driven emotional and spiritual knowledge fields (Bratianu & Bejinaru, 2019). Their decisions illustrate how CKM integrates consumer empowerment and societal expectations to foster brand authenticity and long-term sustainability.

These four profiles illustrate how future consumer behaviors can be understood as knowledge-intensive archetypes. Integrating CKM, KDY, and KF frameworks reveals that consumer foresight is not only about anticipating economic trends but also about co-creating meaning across rational, emotional, and spiritual domains of knowledge.

The proposed framework advances theoretical contributions by positioning four consumer archetypes within the dynamic interplay of knowledge flows, demonstrating how foresight perspectives enrich brand experience research, and offering insights for firms to strategically engage consumers as co-creators of innovation.

Keywords: consumer behaviour, foresight, customer knowledge, knowledge dynamics.

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The impact of Professional Social Networks for Knowledge Dynamics and Managerial Competitiveness in Pre-University Educational Institutions: A Bibliometric Perspective

Petrică-Dumitru Becheș

PhD Student, National University of Political Studies and Public Administration, Romania

EXRTENDED ABSTRACT

The increasing integration of digital technologies has transformed how organizations create, share, and institutionalize knowledge. Within education, professional social networks (PSNs) such as LinkedIn or ResearchGate have shifted from tools of visibility to strategic infrastructures enabling collaboration, innovation, and managerial competitiveness. Despite strong attention in corporate and higher education research, their impact in pre-university institutions remains underexplored. This study addresses this gap by conducting a systematic review and bibliometric analysis of 103 publications indexed in the Web of Science (1993–2025).

Using the Bibliometrix R package (Aria & Cuccurullo, 2017), the research identifies trends, thematic clusters, and conceptual frameworks. Results confirm a significant rise in scholarly interest after 2016, consistent with the adoption of PSNs in educational management. Thematic mapping reveals that knowledge, innovation, competitiveness, and performance form the dominant clusters, highlighting the strategic role of PSNs as knowledge brokers (Vătămănescu et al., 2018b; Vătămănescu et al., 2023b).

From the perspective of knowledge dynamics, PSNs play a role not only in disseminating information but also in supporting knowledge creation, transfer, and transformation processes central to organizational development (Brătianu, 2015). Brătianu (2020) emphasizes that knowledge is not a static resource but a dynamic flow shaped by context, culture, and managerial practices. This aligns with the way PSNs enable adaptive learning and collaborative knowledge strategies in schools (Brătianu & Vătămănescu, 2017).

The analysis also highlights the fragmented nature of the field: 98.9% of authors contributed only one publication, suggesting an emergent knowledge domain without consolidated theoretical foundations. Geographically, contributions are concentrated in Russia, China, Portugal, and Spain, with emerging work in Romania and Eastern Europe (Pînzaru et al., 2016; Pop et al., 2024).

Three major research gaps emerge. First, there is a lack of longitudinal studies to capture how sustained engagement with PSNs affects managerial competitiveness and knowledge flows in education. Second, qualitative studies are limited, leaving unexplored the nuanced ways in which PSNs shape organizational culture and decision-making (Brătianu & Bejinaru, 2025). Third, there is insufficient comparative analysis of how PSNs mediate knowledge dynamics across different educational systems, despite evidence that cultural and institutional contexts strongly influence knowledge strategies (Brătianu, 2018).

The contributions of this research are threefold. First, it offers the first bibliometric synthesis of the intersection between PSNs, knowledge dynamics, and managerial competitiveness in pre-university education. Second, it situates PSNs within the broader field of knowledge management, showing how they accelerate knowledge flows and support competitiveness (Vătămănescu et al., 2018a). Third, it proposes a future research agenda that emphasizes knowledge-driven competitiveness and institutional resilience in education (Brătianu, 2023).

Practically, findings suggest that school leaders and policymakers should leverage PSNs as knowledge infrastructures to support professional development, collaborative leadership, and organizational adaptability. Theoretically, this study strengthens the link between knowledge dynamics theory (Brătianu, 2015) and the emerging role of digital platforms in education.

In conclusion, PSNs act as knowledge catalysts that enhance both managerial competitiveness and organizational development. Although fragmented, the field is evolving rapidly and holds significant promise. Future research should integrate longitudinal, comparative, and qualitative approaches to fully capture how PSNs reshape knowledge dynamics in pre-university education.

Keywords: professional social networks, knowledge dynamics, managerial competitiveness, organizational development, pre-university education, bibliometric analysis.

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From Absorption to Innovation: A Qualitative Analysis of Internal Knowledge as a Mediator of External Knowledge

José Luis Román-Vásquez

Departamento de Estudios Organizacionales y Desarrollo Humano (DESODEH), Facultad de Ciencias Administrativas, Escuela Politécnica Nacional, Quito-Ecuador.

Iván De la Vega

Centrum PUCP Business School, Lima-Perú.

EXTENDED ABSTRACT

Large-scale This research has its origin in a previous study entitled "the mediating role of internal knowledge in the relationship between external knowledge and innovative performance, in which, from a quantitative approach, it was shown that both external and internal knowledge resources have a significant influence on obtaining innovative results in companies, with internal knowledge acting as a mediator in this relationship. However, important questions remained unanswered regarding the specific mechanisms through which this mediation occurs and the differentiated role of different types of external knowledge, such as technological knowledge and market knowledge. Based on these findings, the present study adopts a qualitative design to explore in greater depth how internal processes transform external knowledge into innovation processes. through semi-structured interviews and case studies of large companies in Ecuador, the research seeks to identify the organizational dynamics, knowledge management practices and contextual conditions that shape the interaction between internal and external knowledge. The expected results will provide a richer view of the mediating role of internal knowledge, highlighting the distinctive contribution of the various types of knowledge external to technological and non-technological innovation. This study not only expands theoretical understanding but also offers practical implications for businesses and policymakers in developing countries seeking to enhance innovation through effective knowledge management.

Knowledge-Based View (KBV) of the Firm

In a dynamic global context moving toward digitalization and with growing social demands, companies face the challenge of remaining competitive (De La Torre & De La Vega, 2025).

In this context, the Knowledge-Based View (KBV) of the firm allows for positioning knowledge as the most strategic resource for achieving and maintaining a competitive advantage (Grant & Phene, 2022). At their core, firms exist as integrating entities of specialized knowledge, coordinating people's skills to produce goods and services (Varshney, 2024). Knowledge, particularly tacit and experiential knowledge, is considered unique, difficult to imitate, and fundamental to innovation and value creation (Johannessen, 2022). From this perspective, innovation arises not only from the possession of knowledge, but also from the firm's ability to integrate, combine, and reconfigure diverse knowledge assets to generate new capabilities and solutions (Linares-Barbero & De La Vega, 2025).

In emerging economies, where technological infrastructure and institutional support are often limited, the KBV provides a useful lens for understanding how firms rely on internal learning and knowledge assimilation to innovate (Ray et al., 2023). Rather than focusing solely on external acquisitions or technological imports, the KBV underscores the importance of cultivating internal absorptive and integrative capacities that allow organizations to transform both internal and external knowledge into innovation (Pereira & Bamel, 2021). This conceptual foundation is particularly relevant for exploring how internal knowledge mediates the transformation of external knowledge into innovative outcomes, as proposed in the present research.

Internal and External Knowledge Resources

The ability to manage knowledge (KM) is important for enhancing a company's performance in the current knowledge-driven economy (Chen & Yu, 2023). External knowledge is the product of key collaborations and relationships within the company. Managing external knowledge comes with modifying or establishing novel KM processes that can favor the acquisition, internalization, and retention of knowledge (Abdalla et al., 2020). It can come from within the same industry (suppliers, competitors, and customers) or from sources outside the industry (laboratories, research centers, and universities) (Cruz et al., 2023). The concept of absorptive capacity is closely related to the utilization of external knowledge, referring to a company's ability to recognize, acquire, and exploit such knowledge for creative and innovative purposes (Ding et al., 2023; Ritter-Hayashi et al., 2021).

Internal knowledge, in contrast, represents the firm's accumulated experience, routines, and organizational memory developed through learning-by-doing and shared practices (Hu et al., 2021). It embodies both tacit and explicit dimensions part of the organizational culture, including technical expertise, managerial know-how, and problem-solving skills embedded within teams and structures (Hervas-Oliver et al., 2021). The interaction between internal and external knowledge is inherently complementary: while external knowledge expands the scope of potential innovation, internal knowledge determines the firm's ability to absorb and transform those inputs into valuable outcomes (Aliasghar et al., 2023). In developing-country contexts, where firms often face resource and capability constraints, strengthening internal knowledge systems becomes essential to leverage external sources effectively (Ray et al., 2023). This dynamic interplay underpins the mediating role of internal knowledge explored in the present research (De la Vega et al., 2023).

Absorptive Capacity as a Linking Mechanism

Absorptive capacity serves as the essential mechanism linking external knowledge acquisition with internal knowledge development and, ultimately, innovation performance (Hurtado-Palomino et al., 2022). Originally conceptualized by Cohen and Levinthal (1990), absorptive capacity refers to a firm's ability to recognize the value of new external information, assimilate it, and apply it to commercial ends. This dynamic capability operates through four interrelated processes—acquisition, assimilation, transformation, and exploitation—each requiring both individual learning and organizational coordination (Naqshbandi & Jasimuddin, 2022). Firms with strong absorptive capacity not only identify and internalize relevant external knowledge but also adapt and recombine it with existing internal resources, creating new competencies and innovation outcomes (Abou-Foul et al., 2023).

The literature highlights that internal knowledge plays a pivotal role in enabling absorptive capacity because it provides the cognitive frameworks and interpretive skills necessary for understanding and contextualizing external inputs. Without sufficient internal expertise and organizational learning routines, external knowledge may remain unassimilated or poorly utilized (Khraishi et al., 2023). Moreover, absorptive capacity is influenced by organizational structures, culture, and prior related knowledge, all of which shape the efficiency of knowledge transfer and transformation (Sancho-Zamora et al., 2022). Despite extensive quantitative research linking absorptive capacity to innovation, less is known about the qualitative, processual aspects of how these mechanisms operate within firms,

particularly in developing economies. This research addresses that gap by exploring the internal dynamics and contextual conditions through which firms transform absorbed external knowledge into innovation.

Knowledge Mediation and Innovation Outcomes

Knowledge mediation represents the process through which internal knowledge acts as a conduit, transforming and contextualizing external knowledge to generate innovation outcomes (Li & Gao, 2023). Prior empirical studies, including the preceding quantitative research that informs this study, have demonstrated that internal knowledge partially mediates the relationship between external knowledge and both technological and non-technological innovation (Chiu & Lin, 2022; Corrocher & Lenzi, 2022). This mediating function occurs because internal knowledge enables firms to interpret, integrate, and adapt external inputs to their strategic and operational realities. Mediation is a dynamic organizational process in which internal knowledge reconfigures external stimuli into innovative products, services, and managerial practices.

Innovation outcomes are typically classified as technological—encompassing product and process innovations—and non-technological, such as marketing or organizational innovations (OECD & Eurostat, 2018). The nature and strength of mediation can vary depending on the type of knowledge involved; for instance, technological knowledge may require deeper technical assimilation, whereas market knowledge demands interpretive and adaptive skills. Yet, most studies have focused on the quantitative validation of mediation effects, offering limited insights into how internal knowledge performs this transformative function. The current qualitative research therefore seeks to uncover the mechanisms, routines, and contextual enablers that explain how internal knowledge mediates between external knowledge and diverse innovation outcomes, offering a more nuanced and process-oriented understanding of this relationship.

Keywords: Internal knowledge, external knowledge, innovation mechanisms, qualitative research, developing countries.

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The New Model of Syncretic Leadership and Its Influence on Knowledge Management Systems

Dan Paiuc

Associate Professor / Center for Research in Management (CRM) within the Faculty of Management of the National University of Political Studies and Public Administration, Bucharest, Romania.

EXTENDED ABSTRACT

This conference paper introduces and presents the new concept and model of *Syncretic Leadership* (SL). It analyses its impact on Knowledge Management Systems (KMS) alongside its vectors: Artificial Intelligence (AI) alongside its subsequent Artificial Knowledge (AK), Digital Transformation (DT), Multicultural Workforce (MW), and Constant Change (CC).

Digital leadership, as a distinct concept and research field, emerged in the mid-to-late 2010s, evolving from earlier concepts like e-leadership which became prominent in the late 1990s as information technology and the internet grew (Klein, 2020; Paiuc, 2024b). Today, in 2025, the reality that digital transformation is a key initiative for 74% of organizations and that 94% of large companies in the US and UK already have a digital transformation strategy reveals that digital leadership alone is no longer sufficient. When we also factor in the rise and integration of AI, it risks becoming obsolete and calls for a new management model (Backlinko Team, 2025).

The global artificial intelligence market, which in 2025 was around \$400 billion, is anticipated to reach more than \$1.8 trillion by 2030 (Howarth, 2025). In this context, 35.5% of people now use AI tools daily, and 83% of companies claim that utilizing AI in their business strategies is a top priority (Howarth, 2025). Adding to this, 86% of CEOs consent that AI and business go hand-in-hand since AI is mainstream technology in their offices; however, around 3 in 4 CEOs worry about limited transparency in the AI market, and 4 in 10 executives consider AI to be prohibitively expensive (Alexandrea, 2025; Howarth, 2025). All this is pushing the new leaders to consider and integrate AI as a new vector in their management matrixes (Abbas et al., 2024).

As presented by Bratianu and Paiuc (Bratianu & Paiuc, 2025), artificial knowledge is a new concept that emerges into the knowledge management systems as a direct outcome of AI. Leaders are confronted for the first time with a wave of AK via systems our employees reporting AI resultants – that test their decision making managerial dash board and the existing leadership status quo (Bevilacqua et al., 2025) .

Six out of ten job seekers research an organisation's commitment to diversity and inclusion before applying, and 69% say workplace diversity is a deciding factor in choosing or preferring an employer. Moreover, companies in the top quartile for ethnically diverse boards are 13% more likely to outperform those in the bottom quartile (de Jager, 2025). Adding to this we have to consider that in April 2025 around 25% of US employees worked remotely at least some hours. (Backlinko team, 2025). This requires a new management perspective, where diversity and inclusion are redefined beyond traditional classifications and developed to encompass remote and hybrid work practices, cultural intelligence, and cross-border collaboration (Paiuc, 2024a). Leaders must embrace demographic diversity and recognise differences in work styles, digital accessibility, and cultural norms to build truly inclusive organisations in a global and increasingly digitally connected workplace (Alcorn & Eisenfeld, 2022).

As an answer to the above new mentioned reality Dan Paiuc forged late 2025 the concept of *syncretic leadership* that embrace AI and AK, digital transformation, cultural diversity and continuous change as its main vectors (Paiuc, 2025). The idea of syncretic comes from the Greek *synkretismos*, once used to describe how the Cretans set aside differences to unite against common threats, a notion later reproduced by Plutarch and reinterpreted by Erasmus (Erasmus et al., 2001; Van Hoof, 2010). In leadership, syncretism will reflect an inclusive and adaptive style that integrates diverse perspectives. The new concept of SL highlights leaders who integrate and combine cultural and intellectual traditions with AI and digital tools to shape resilient organisations in a fast-changing world.

Syncretic leadership brings novelty by extending beyond traditional models of inclusion, weaving together diverse cultural and intellectual traditions with the capabilities of AI, AK, and digital transformation. Its integration into KMS creates organisations that are not only more resilient and adaptive but also capable of turning diversity and artificial intelligence into strategic assets for innovation and long-term value creation.

Keywords: Syncretic leadership, AI, artificial knowledge, digital transformation, multicultural workforce, knowledge management systems.

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Green Intellectual Capital as a Driver of Innovation and Competitive Advantage in Romania's BPO Sector

Andreea-Laura Oprea
PhD Student, SNSPA, Romania.

EXTENDED ABSTRACT

This research examines how green intellectual capital supports innovation and strengthens competitive advantage in Romania's rapidly evolving, tech-driven BPO sector. As BPO organizations increasingly adopt digital tools, automation, and AI-based systems, environmental knowledge and sustainability-oriented practices have become essential for shaping modern business performance. Green intellectual capital reflects the way employees, internal processes, and external relationships integrate environmental awareness into daily operations. In a sector where technology and knowledge are core resources, this combination creates an important foundation for innovation and long-term organizational resilience.

The study investigates how BPO companies leverage sustainability-focused knowledge to enhance efficiency, reduce operational waste, and develop services that meet the expectations of global clients who value both digital transformation and responsible business practices. Embedding sustainability into business operations fosters a culture of continuous learning, knowledge sharing, and innovative problem-solving, which are crucial for maintaining competitiveness in fast-paced, technology-intensive environments. Green intellectual capital enables organizations to not only meet compliance and ethical standards but also to identify new business opportunities, improve service quality, and differentiate themselves in highly competitive markets.

By exploring the interplay between green human capabilities, environmentally responsible processes, and sustainable collaboration with partners, this research highlights how green intellectual capital contributes to organizational agility. Employees equipped with sustainability knowledge and digital skills can drive innovative practices, while efficient, green-focused processes improve productivity and reduce environmental impact. Similarly, maintaining relationships with clients and suppliers who share

sustainability values strengthens relational capital and enhances the organization's reputation in global markets.

The future research employs a mixed-methods approach, combining quantitative surveys with qualitative interviews, to provide a comprehensive understanding of the ways in which green intellectual capital supports innovation and competitive advantage. This approach allows for the identification of practical strategies and best practices that BPO companies can implement to translate sustainability principles into measurable business outcomes. It also enables the examination of potential challenges, such as aligning technological adoption with green initiatives and ensuring employee engagement in sustainability efforts.

Environmental knowledge is increasingly recognized not only as an ethical imperative but also as a strategic resource that supports continuous innovation, strengthens market positioning, enhances reputation, and builds long-term resilience in a digital economy. Future research will explore how emerging technologies, including AI, automation, and advanced analytics, can further enhance green intellectual capital, enabling BPO firms to accelerate sustainable innovation and achieve a stronger competitive edge. By linking sustainability, technology, and knowledge management, this study aims to provide both theoretical insights and practical guidance for BPO organizations seeking to navigate the challenges and opportunities of a tech-driven, environmentally conscious business landscape.

Keywords: Green Intellectual Capital, Innovation, Competitive Advantage, Business Process Outsourcing (BPO), Tech-Driven Business, Sustainability, Knowledge Management.

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Can artificial intelligence solve the dispersed knowledge problem in managerial decision-making processes?

Laura-Ștefania Bogdan

PhD student, Multidisciplinary Doctoral School of the National University of Political Studies and Public Administration (SNSPA), Bucharest, Romania.

Elena-Mădălina Vătămănescu

Full Professor, Faculty of Management, National University of Political Studies and Public Administration (SNSPA), Bucharest, Romania.

Elena Dinu

PhD, Center for Research in Management, National University of Political Studies and Public Administration (SNSPA), Bucharest, Romania.

EXTENDED ABSTRACT

This research intends to examine the issue of dispersed knowledge within organizations, positioning itself under the interdisciplinary umbrella that connects management theory with artificial intelligence (AI). From a Hayekian perspective, knowledge cannot be perfectly aggregated by any decision-making authority (Hayek, 1945). The idea of perfect centralization represents an unrealistic construct, a utopia. In reality, nolens volens, managers are compelled to operate permanently with fragmented and incomplete data, with pieces of knowledge, seeking to construct an image solid enough on the basis of which to decide and engage in strategic actions, aimed at successfully achieving organizational objectives. On the other hand, the remarkable technological advances of recent years, intertwined with the widespread acceptance of AI, promise to transform decision-making processes, revolutionizing them through mechanisms that enable the rapid processing of large volumes of data.

Taking stock of such approaches, the paper aims to analyze whether AI can address this epistemic limitation and ultimately offer managers the chance to make decisions under conditions of full knowledge - otherwise impossible for human cognitive capacity. The study seeks to: 1. investigate the way in which dispersed knowledge manifests in the decision-making process within internationalized SMEs; 2. assess

the extent to which AI can effectively aggregate dispersed knowledge; 3. analyze the relationship between AI and the quality of managerial decisions grounded in intelligent algorithms; 4. evaluate the impact that AI-assisted decisions have on organizational performance; 5. provide an answer to the question “To what extent can AI support the managerial decision-making process in contexts marked by the emergence of black swans?”

The research will employ a mixed methodology, articulating quantitative and qualitative approaches in order to offer a comprehensive view of the phenomenon. The quantitative component involves administering a Likert-scale questionnaire (1–7) to managers of internationalized SMEs and modeling the responses through PLS-SEM equations. The sample size will consist of approximately 100 respondents, selected through a non-probabilistic strategy with elements of snowball sampling. The qualitative component relies on 10 semi-structured interviews intended to provide contextual frameworks that explain and complement the previously projected statistical picture.

The adoption of AI-based systems has the potential to improve the result of the decision-making process when it is used for a more efficient integration of explicit knowledge. Nevertheless, even under the most optimal scenarios, it is estimated that artificial intelligence will not be able to solve the problem of fragmented knowledge but merely alleviate certain “symptoms” of it. AI-based systems are built on algorithms derived from the past, which provide answers and forecasts based on information that has been previously inserted and encoded (Bender et al., 2021). The algorithm is dependent on the “historical” character of the data, being unable to generate knowledge that transcends the dataset used to train the model. In addition, tacit knowledge is not accessible to AI and therefore cannot be algorithmically programmed (Brynjolfsson & Mitchell, 2017; Falckenthal et al., 2025; Fenoglio et al., 2022). Thus, AI relies on extrapolation, lacking the ability to anticipate “black swans” in the absence of a pre-existing dataset.

Keywords: Dispersed knowledge; Artificial intelligence; Decision-making process; Explicit knowledge; Tacit knowledge; Hayek.

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CORPORATE SOCIAL RESPONSIBILITY AND ETHICS: TECHNOLOGICAL FRONTIERS FOR INNOVATION

The role of sustainability in Fashion Luxury: a multiple case study approach

Patrizia Gazzola

Full Professor, Department of Economics, University of Insubria, Varese, Italy.

Niccolò Bianchi Cavalieri

Department of Economics, University of Insubria, Varese, Italy.

Daniele, Grechi

Assistant Professor, Department of Law, Economics and Cultures, University of Insubria, Como, Italy.

EXTENDED ABSTRACT

The luxury fashion sector confronts a fundamental paradox wherein its core values of exclusivity, creativity, and heritage increasingly conflict with global sustainability imperatives. Previously perceived as protected from the environmental and social challenges affecting the broader business landscape, luxury fashion now faces intensified scrutiny regarding its significant environmental impact and opaque supply chains. It is important to remember that the fashion industry accounts for approximately 10% of global CO₂ emissions and 20% of worldwide water pollution, while consuming 98 million tons of non-renewable resources annually (Ellen MacArthur Foundation, 2017; Textile Exchange, 2022).

The luxury segment, despite its distinctive characteristics, cannot evade these sustainability responsibilities. Due to its symbolic significance, global influence, and cultural relevance, the luxury fashion sector faces particularly rigorous examination from stakeholders. Moreover, consumers, regulators, and investors alike expect luxury brands to lead by example, reimagining the concepts of exclusivity and innovation through a sustainability lens (Hennigs et al., 2013; Ozdamar-Ertekin, 2019).

Despite various initiatives, the sector continues to grapple with numerous structural challenges, including compliance with evolving European Union regulations encompassed within the Circular Economy Action Plan (European Commission, 2020). Additionally, widespread consumer scepticism regarding corporate environmental claims presents a significant barrier (Alizadeh et al., 2023; Montgomery et al., 2024). The role of environmental and social responsibility, coupled with robust governance frameworks, represents complex business dimensions that are particularly challenging to address effectively and the

effective integration of ESG principles remains a persistent obstacle within the fashion industry (Fashion Revolution, 2023).

While sustainability is increasingly recognized as a strategic imperative, only a minority of companies successfully implement sustainable practices across their entire value chains (McKinsey & Company, 2021). The luxury sector's defining characteristics (artisanal expertise, premium raw materials, and exclusivity culture) frequently create tensions with the principles of transparency, inclusivity, and circularity (Kapferer & Michaut-Denizeau, 2017; Dekhili et al., 2019).

This framework provides essential foundations for examining these challenges and opportunities, encompassing sustainability concepts in fashion alongside social and governance dimensions of corporate responsibility (Campos Franco et al., 2019). Moreover, the Triple Bottom Line framework offers a particularly relevant lens, advocating for balanced ecological, social, and economic performance through the "3P" approach, thereby highlighting luxury fashion's potential to leverage its premium margins for sustainable transformation (Dyllick & Hockerts, 2002; Rahman & Yadlapalli, 2015). Furthermore, robust sustainable governance mechanisms can mitigate greenwashing concerns through standardized ESG disclosure requirements and independent audit protocols (Eccles et al., 2011).

Moreover, this framework illuminates both the opportunities and inherent contradictions within sustainable luxury. Luxury brands possess distinctive advantages (including extended production cycles, substantial profit margins, and significant symbolic capital) that position them uniquely to pioneer the integration of sustainability with value creation (Arrigo, 2015; Hennigs et al., 2013).

The luxury sector's traditional foundations (heritage, craftsmanship, and exclusivity) increasingly require socio-environmental legitimation to maintain market relevance (Elgeballi & Zaazou, 2023). In this context, sustainability functions as both an emotional loyalty driver and a key differentiation strategy (Rahman & Yadlapalli, 2015; Yang et al., 2023).

However, fundamental tensions persist between core luxury principles and sustainability imperatives: exclusivity versus transparency, scarcity versus circularity, and heritage preservation versus innovation. These paradoxes amplify reputational risks, particularly when consumer trust erodes due to perceptions of superficial "eco-light" initiatives rather than authentic commitment (Dekhili et al., 2019).

Another aspect is represented by the consumer perceptions represent another critical dimension, evolving rapidly as Millennials and Generation Z emerge as influential demographic segments favouring brands

that demonstrate transparency and ethical sourcing practices, despite price sensitivity constraints that may limit sustainable consumption behaviors (Elgeballi & Zaazou, 2023). Research indicates that over 70% of Generation Z consumers consider sustainability a determining factor in purchase decisions (Statista, 2023).

Understanding how Italian fashion houses navigate these contradictions is therefore crucial for determining the feasibility of genuine sustainable luxury models. In this context, sustainable innovation has emerged as both an operational imperative and a source of legitimacy and competitive differentiation. Through a multiple case study methodology, this research compares how leading brands address core sustainability dimensions—encompassing environmental stewardship, social responsibility, governance frameworks, consumer engagement, and supply chain transformation. This comparative analysis provides comprehensive insights into the contradictions and potentials that define the trajectory toward sustainable luxury.

The purpose of this thesis is to examine how five prominent Italian luxury fashion brands communicate and implement their sustainability strategies.

In fact, the analysis of Versace, Gucci, Prada, Valentino, and Dolce & Gabbana enables comprehensive evaluation of their sustainability strategies within established theoretical frameworks, while facilitating comparative assessment of their approaches, commonalities, and unresolved challenges. Particular attention is devoted to supply chain transparency, material innovation, and stakeholder engagement, as these represent critical areas consistently highlighted in both academic literature and industry practice.

The methodological approach integrates systematic literature review with qualitative case study analysis. Primary data sources include sustainability reports, ESG disclosures, and secondary academic literature for each brand, supplemented by industry interviews and market data for validation. This comparative design enables cross-case benchmarking and reveals both the effectiveness of sustainability strategies and potential barriers to systemic transformation. By linking theoretical constructs with empirical evidence, this thesis aims to generate recommendations that are both academically rigorous and practically applicable.

This study contributes to multiple constituencies within the research and professional communities. Academically, it expands understanding of luxury fashion sustainability, a domain significantly under-researched compared to fast fashion (Niinimäki et al., 2020). Practically, it provides actionable insights

for industry professionals, demonstrating how environmental considerations can serve as strategic assets for long-term brand value creation rather than operational constraints.

In conclusion, by examining Versace, Gucci, Prada, Valentino, and Dolce & Gabbana as case studies of heritage brands navigating the sustainability imperative, this dissertation determines the extent to which sustainable practices can integrate with luxury's core values. The research explores how Italian fashion houses might lead industry transformation toward a future where exclusivity and responsibility become complementary rather than contradictory forces.

Keywords: Luxury, Sustainability, Italy, Brands.

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Sustainable Food Choices: an analysis based on the role of Carbon Footprint and Willingness to pay in the Italian Context

Patrizia Gazzola

Full Professor, Department of Economics, University of Insubria, Varese, Italy.

Vincenza Vota

Research Fellow, Department of Economics, University of Insubria, Varese, Italy.

Daniele Grechi

Assistant Professor, Department of Law, Economics and Cultures, University of Insubria, Como, Italy.

EXTENDED ABSTRACT

Food systems are among the major contributors to greenhouse gas emissions, with consumer dietary choices and habits playing a crucial role as environmental determinants (Camilleri et al., 2019; Garnett et al., 2019). In this context, labels that communicate the environmental impact of producing specific food categories have emerged as valuable tools to guide consumers seeking more sustainable eating habits (Canavari and Coderoni, 2020). These informational cues are closely tied to individual consumer traits and preferences.

Existing literature reveals that consumers often underestimate the environmental footprint of their food choices, and that targeted labeling strategies can influence purchasing behavior (Panzone et al., 2020). Therefore, this study aims to determine whether environmental impact information can foster more sustainable consumption patterns by helping individuals make informed decisions or, at the very least, prompting reflection on their dietary habits (Rondoni and Grasso, 2021; Hartikainen et al., 2014). The literature review led to the development of three research hypotheses.

The first Hypothesis (H1) is based on the role of Carbon Footprint Awareness and Choice Behavior Carbon footprint informativeness that increases consumers' likelihood of choosing low-impact dishes, with environmentally conscious individuals showing greater awareness of carbon footprint concepts. Clear carbon labelling encourages sustainable choices, particularly among environmentally sensitive

consumers, though effectiveness depends on awareness, values, and perceived credibility (Camilleri et al., 2019).

Subsequently, the second Hypothesis (H2) is based on Environmental Concern and Willingness to Pay of Consumers. A consumer can evaluate the environmental impact of a product and can have a higher willingness to pay for low-impact dishes. In fact, there are some authors (Konuk, 2019; Fischbach et al., 2022; Rezai et al., 2013) that sustain that WTP for sustainable food is correlated with pro-environmental attitudes, sustainability knowledge, and socio-demographic factors.

The last Hypothesis (H3) is linked with Cultural Food Preferences and Payment Behavior Consumers preferring non-Italian cuisines show different willingness to pay patterns for low-carbon dishes compared to those favoring traditional Italian restaurants. It is possible that food preferences and cultural orientations influence openness to sustainability labels. In fact, consumers familiar with non-traditional cuisines may show greater environmental sensitivity and attribute higher value to low-impact options (Grummon et al., 2025; Seger et al., 2025).

The empirical analysis is based on an online survey conducted in 2024, structured in three sections covering socio-demographic characteristics, dietary habits and restaurant preferences, as well as environmental attitudes and awareness. After data cleaning, 1,067 valid questionnaires were obtained. Various methods (Sirkin, 2006) were employed to test the hypotheses: an OLS linear regression for H1, an ordinal logistic regression for H2, and the non-parametric Mann-Whitney U test for H3.

For the first Hypothesis, the ordinal logistic regression shows a significant relationship between gender, environmental concern, WTP, and perceived informativeness, with consumers more sensitive to sustainability paradoxically feeling less informed, likely due to greater critical thinking. Subsequently, for H2, the OLS regression reveals that WTP for low-emission dishes is positively influenced by perceived informativeness, carbon footprint knowledge, and the importance attributed to environmental impact, while socio-demographic factors are not significant. Finally, for the last Hypothesis (H3), the Mann-Whitney U test detects higher WTP among those who prefer Italian cuisine compared to those who choose ethnic restaurants, with younger individuals in the latter group showing higher values than those over 34, highlighting the joint role of cultural preferences and generational differences.

In conclusion, the study highlights that factors related to attitudes, habits, and the level of information are more relevant than socio-demographic characteristics. To enhance the effectiveness of carbon footprint information, it is therefore essential to develop a comprehensive strategy that combines

consumer education with transparent communication. It should be noted, however, that this study reflects the preferences of Italian consumers, who have specific dietary habits, and its conclusions and analyses cannot be generalized to other cultures with different eating patterns.

Keywords: Food, Sustainable Consumption, Carbon Footprint, Italian Consumers.

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Technological Transformation and Societal Response: A Consensus Community Detection Bibliometric Exploration

Carlo Drago

Associate Professor, University Niccolò Cusano Rome, Italy.

Gentian Hoxhalli

*Senior Lecturer, Luarasi University, Albania.
Armed Forces Academy, Albania*

Valentina Giglio Moro

PhD Student, University Niccolò Cusano Rome, Italy.

Angelo Leogrande

Adjunct Professor, LUM University Giuseppe Degennaro, Italy.

EXTENDED ABSTRACT

The rapid diffusion of artificial intelligence (AI), automation, and digital ecosystems is already changing the global landscape of innovation. While the body of literature on technological change has grown considerably, prevailing paradigms still prioritize efficiency, disruption, and competitiveness (Brynjolfsson & McAfee, 2017; Nambisan et al., 2017). At the same time, the growing interdependence of socio-technical systems necessitates a systemic reconsideration of innovation that integrates resilience, inclusivity, and sustainability as fundamental objectives rather than peripheral outcomes (Fazey et al., 2018; Geels, 2002).

In this context, the study examines the relationship between technological transformation, societal resilience, and systemic sustainability through a bibliometric analysis that maps international research on the topic. The interdependence of technology, institutions, and human agency within an interconnected system is emphasized by Systems Thinking (Von Bertalanffy, 1968; Capra & Luisi, 2014), which asserts that innovation occurs within networks of technology, institutions, and human agency.

Using this systemic and normative perspective, the study investigates how the scientific community has described the relationship between digital transformation, AI adoption, and social well-being. The empirical analysis uses data extracted from Scopus, focusing on peer-reviewed articles and reviews in English. A structured Boolean query was designed to capture relevant research in the literature. After deduplication and normalization, bibliometric techniques such as co-word analysis, co-citation mapping, and thematic clustering were implemented using Bibliometric analysis based on consensus community detection (Aria & Cuccurullo, 2017, Drago 2018, Drago, et al. 2021).

The preliminary findings challenge the literature and allow to identify three major thematic clusters. The first area is organizational readiness and digital adoption, dominated by managerial and technological efficiency perspectives (Vial, 2019). The second cluster, ethical and responsible innovation, emphasizes governance, transparency, and value-sensitive design in AI systems (Stilgoe et al., 2013; von Schomberg, 2013). The third, smaller but rapidly growing cluster integrates sustainability transitions and socio-technical change frameworks to address systemic resilience (Grin et al., 2010; Folke et al., 2016). Research on AI and digital innovation has recently surged, but the intersection of innovation within resilience-oriented, inclusive, and sustainability-driven paradigms remains conceptually fragmented.

By integrating bibliometric evidence and systemic theory, this paper contributes to a comprehensive understanding of the technological transformation process. It advances the argument that innovation must evolve toward a resilience-centric and ethically grounded paradigm in which social well-being and institutional robustness are treated as intrinsic design criteria. This conceptual realignment provides a foundation for future interdisciplinary research and policy formulation consistent with the Sustainable Development Goals (SDGs) and the Responsible Research and Innovation (RRI) frameworks promoted by the European Commission. Thus, the study offers an overview and a normative agenda for addressing the challenges of technological disruption while ensuring long-term societal well-being, inclusion, and sustainability.

Keywords: Artificial Intelligence, Innovation, Digital Transformation, Bibliometric Analysis, Community Detection.

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From Complexity to Clarity: Rethinking ESG Assessment in the Age of AI and VSME

Simone Copes

PhD Candidate, University of Insubria, Italy.

Alessandro Panno

Researcher, University of Insubria, Italy.

EXTENDED ABSTRACT

The Environmental, Social, and Governance (ESG) considerations have moved to the forefront of firms’ strategic agendas, influencing not only internal decision-making but also the expectations of policymakers, investors, and other key stakeholders. This shift, which occurred largely over the last two decades, has been reinforced by major institutional developments, including the EU Green Deal, the Corporate Sustainability Reporting Directive (CSRD), and the European Sustainability Reporting Standards (ESRS), which have strengthened the demand for transparent and comparable sustainability disclosure. Parallel to this regulatory evolution, rapid advances in digital technologies – especially Artificial Intelligence (AI) – are driving profound transformations in organizational processes, governance structures, and ethical challenges associated with corporate sustainability.

Although ESG performance have gained growing attention, their measurement still suffers from inconsistency, opacity, and significant divergence across rating agencies, affecting, overall, market behavior, managerial decisions, and stakeholder trust (Agosto & Tanda, 2025). The persistence of methodological discretion, lack of transparency in underlying metrics, and differences in scope and weighting continue to generate “aggregate confusion” (Berg, Kölbel & Rigobon, 2022), weakening ESG’s potential to support long-term sustainable value creation (Christensen, Serafeim & Sikochi, 2022). These concerns acquire more relevance in digital ecosystems, where emerging technologies offer new possibilities for responsible governance but also raise concerns related to algorithmic opacity, accountability, and ethical fairness.

This study argues that progress in ESG performance assessment may require coupling simplification with technological innovation. It proposes a transparent, normatively grounded ESG performance model

based on the EU's Voluntary SME Standard (VSME). Following the EU Omnibus I package for sustainability, whose purpose is to increase the competitiveness of European firms, the VSME has gained increasing regulatory relevance and is expected to become the operative reference for sustainability reporting in Europe. A key implication of this shift is that large firms will no longer be permitted to request information beyond the VSME from their supply-chain partners, making the standard a likely golden benchmark for ESG disclosure across European value chains.

The model integrates AI techniques – specifically Natural Language Processing (NLP) and web scraping – to systematically collect and classify firms' sustainability reports. This approach aligns with recent advances in ESG research that employ digital tools to improve comparability and reduce subjectivity in performance assessment (Schimanski et al., 2024; Gutierrez-Bustamante & Espinosa-Leal, 2022; Sokolov et al., 2021). By focusing on a set of material and normatively grounded indicators, the study investigates whether a “less is more” approach can produce a more transparent, scalable, and ethical ESG evaluation framework.

Literature Review

The theoretical debate surrounding ESG measurement is closely linked to longstanding discussions about corporate purpose. Friedman (1962) famously argued that firms should focus on profit maximization within legal boundaries, warning that expanding social responsibilities might undermine managerial accountability. Freeman's (1984) stakeholder theory challenged this view by emphasizing that long-term corporate success relies on addressing the interests of multiple stakeholder groups. Subsequent contributions demonstrate that these perspectives can be reconciled: profitable firms often pursue a broader purpose and values that extend beyond short-term financial gains (Parmar et al., 2010). Within this context, ESG frameworks operationalize stakeholder concerns by translating them into measurable criteria that can inform and guide corporate governance.

Nevertheless, significant methodological limitations continue to affect ESG assessment. Empirical research demonstrates that ratings frequently diverge due to differences in scope, measurement techniques, and weighting choices among providers (Agosto & Tanda, 2025; Berg et al., 2022). Christensen et al. (2022) further emphasize the subjective nature of many ESG evaluations, raising concerns about their reliability. Chatterji, Levine & Toffel (2009) questioned whether social ratings meaningfully capture corporate responsibility, while subsequent studies warn about the risks of greenwashing and superficial compliance (Escrig-Olmedo et al., 2019). Bebhuk & Tallarita (2022)

further warn that basing executive pay on ESG metrics may generate incentives that are misaligned with genuine sustainability outcomes.

Despite these critiques, ESG remains a promising framework for fostering long-term value creation (Ioannou & Serafeim, 2019; Flammer & Bansal, 2017). Edmans (2023) emphasizes the importance of grounding ESG analysis in robust economic logic, and recent work by Martiny et al. (2024) provide evidence of the complex determinants of ESG performance. However, across both academic and policy communities, the call for greater transparency and comparability in ESG measurement persists (OECD, 2025).

Recent technological developments reinforce this need. NLP methods have been leveraged to analyze corporate sustainability disclosures (Schimanski et al., 2024), and machine learning models have been introduced to automate aspects of ESG scoring (Sokolov et al., 2021). These developments illustrate how AI can contribute to more consistent and reproducible ESG assessments, as long as the normative foundations and evaluative criteria remain clearly defined.

Objectives

Responding to the challenges highlighted in literature, this research advances four interconnected objectives.

First, it offers a critical analysis of the methodological inconsistencies and persistent opacity embedded in current ESG scoring practices (Berg et al., 2022; Kotsantonis & Serafeim, 2019; Stubbs & Rogers, 2013).

Second, it develops a simplified ESG performance model aligned with the VSME to promote proportionality, objectivity, and regulatory coherence.

Third, it leverages AI tools to automate data collection, reduce subjectivity, and enhance scalability, with particular attention to SMEs that are frequently excluded from ESG evaluations due to data constraints (Drempetic, Klein & Zwergel, 2020).

Finally, the proposed model will be benchmarked against established ESG ratings to assess its robustness, interpretability, and potential to mitigate rating divergence.

Methodology

The research methodology is organized into three stages.

First, a simplified ESG assessment model is developed on the basis of the VSME, focusing on a limited yet material set of normative indicators across the three ESG dimensions. This ensures proportionality and consistency with emerging EU regulations.

Second, the study deploys NLP and web scraping techniques to automate the extraction and classification of sustainability information from corporate reports and websites. The NLP component identifies ESG-relevant text and transforms it into standardized indicators, drawing on established methodological practices (Gutierrez-Bustamante & Espinosa-Leal, 2022). This digital pipeline reduces subjectivity and enables broader scalability, especially for SMEs.

Third, the simplified ESG score will be benchmarked against ratings from established providers (e.g., Refinitiv, S&P Global, Sustainalytics). Divergence analysis will assess whether the VSME-based, data-minimalist approach offers improvements in transparency, comparability, and interpretability relative to conventional scoring. Special attention is paid to whether the model reduces the size-related bias that affects existing ESG ratings (Drempetic et al., 2020).

Expected Results

Although empirical implementation is ongoing, several expected outcomes can be outlined.

The VSME-based framework aims to improve methodological transparency by focusing exclusively on material, normatively grounded indicators, thereby addressing the “black-box” nature often associated with conventional ESG scores (Kotsantonis & Serafeim, 2019; Stubbs & Rogers, 2013). Additionally, the model is also expected to reduce discrepancies observed across existing ESG providers (Agosto & Tanda, 2025; Berg et al., 2022). By standardizing both the scope and weighting of indicators, this minimalist methodology could generate more uniform results across sectors and firms. In addition, the alignment with VSME principles guarantees proportionality and scalability, making ESG performance assessment feasible for SMEs without excessive reporting burdens. Finally, leveraging AI techniques should improve efficiency and minimize subjectivity in indicator construction, enabling replicable and scalable ESG performance assessment (Schimanski et al., 2024; Gutierrez-Bustamante & Espinosa-Leal, 2022).

Discussion

The findings of this study carry important implications for corporate governance, regulatory policy, and sustainability management. A transparent and simplified ESG framework enhances accountability, limit

greenwashing risks, and long-term value creation (Serafeim & Yoon, 2022; Flammer & Bansal, 2017). By grounding the model in the VSME, the research also addresses ongoing regulatory changes that are transforming sustainability reporting requirements across Europe.

Furthermore, extending ESG measurement to SMEs addresses a major gap in current practice (Drempetic et al., 2020), promoting both the inclusiveness and robustness of sustainability evaluation across value chains. On a broader level, the research bridges theoretical perspectives on corporate purpose with regulatory evolution and methodological innovation. It further shows that embedding AI within a transparent, normative framework can support responsible, ethical, and scalable sustainability evaluation in organizations undergoing digital transformation.

Conclusion

ESG performance measurement remains marked by inconsistency and opacity, constraining its effectiveness in guiding sustainable corporate strategy. This study proposes that a minimalist, VSME-based framework, supported by AI techniques, may deliver greater transparency, comparability, and scalability in ESG evaluation. By aligning with regulatory trends and stakeholder demands, the model could help establish a new benchmark in sustainability governance. Future research will focus on empirical validation across different sectors and firm sizes, as well as exploring its integration into financial analysis and risk management frameworks.

Keywords: ESG performance, Sustainability measurement, VSME, Artificial Intelligence, Corporate governance.

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Understanding the Sustainable Impact of AI Personalization in Tourism: A Systematic Review Supported by Bibliometric Analysis

Hamcerencu Maria

PhD student, Bucharest University of Economic Studies, Romania

Nicolescu Luminița

Professor, PhD Bucharest University of Economic Studies, Romania

Barbu Alexandra

PhD student, Bucharest University of Economic Studies, Romania

EXTENDED ABSTRACT

This paper presents a Systematic Literature Review (SLR) complemented by a Bibliometric Analysis to critically examine the sustainable dimension of AI-driven personalization systems integrated into international tourism. While existing studies predominantly focus on service delivery, operational efficiency, and user satisfaction, this review highlights the need to understand how personalization technologies contribute to long-term sustainability, destination resilience, and economic performance across diverse territories.

Drawing on 80 peer-reviewed academic sources published between 2018 and 2025, this study assesses research trends at the intersection of AI personalization, smart destination development, and sustainable tourism. The review follows PRISMA protocols and employs a meta-narrative synthesis to address the following research questions:

- (1) What economic and sustainability outcomes are associated with AI-driven personalization in international tourism?
- (2) What institutional, infrastructural, and governance-related localisation factors shape the effectiveness of AI personalization technologies?
- (3) What theoretical frameworks and methodological approaches dominate current research, and what blind spots remain?

The findings reveal four major themes. First, AI-driven personalization consistently enhances efficiency, customer retention, and revenue generation, yet its alignment with environmental and social sustainability objectives remains limited. Second, there is a notable absence of sustainability-oriented frameworks in evaluating digital innovation, highlighting a persistent gap between operational performance and long-term destination resilience. Third, localisation emerges as a critical conditioning factor, with governance quality, digital infrastructure, and stakeholder coordination influencing technological outcomes. Fourth, the literature provides limited insight into how personalization technologies support circular economy practices or inclusive tourism business models.

The article will also include a bibliometric analysis of the selected studies, focusing on keyword co-occurrence patterns and authorship distributions across countries.

This study fills a significant gap by integrating personalization technologies into the broader debate on sustainable business strategy in global tourism. By conceptualizing personalization as both a technological solution and a strategic business instrument, the review demonstrates its potential to support measurable outcomes such as enhanced visitor retention, optimized service processes, and more informed destination planning. The results offer practical implications for tourism enterprises and policy makers seeking to align digital innovation with sustainability goals and underscore the need for future research on inclusive growth, adaptive business models, and resilience across tourism economies.

Keywords: AI personalization; sustainable tourism; smart destinations; localization; responsible innovation; bibliometric analysis; SLR.

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Conceptual Framework for Digital-Driven Servitization in the Fashion Industry Domain

Iuliia Iliashenko

Post-doc, Department of Economics, University of Insubria, Italy.

Roberta Pezzetti

Associate Professor, Department of Economics, University of Insubria, Italy.

Patrizia Gazzola

Full Professor, Department of Economics, University of Insubria, Italy.

EXTENDED ABSTRACT

The accelerating diffusion of digital technologies and service-oriented logics across industrial sectors has intensified scholarly interest in the strategic potential arising from the integration of digitalisation and servitization pathways. A growing body of empirical evidence demonstrates that organisations that successfully merge digital transformation with servitization are better positioned to mitigate the paradoxes typically associated with both trends, such as the operational burden of expanding service portfolios or the complexity of managing data-intensive infrastructures, while simultaneously unlocking new opportunities for value creation, competitive differentiation, and resource optimisation. As environmental and social responsibilities become increasingly institutionalised, the convergence of digitalisation and service-based strategies has acquired heightened relevance in sectors characterised by significant ecological footprints, complex supply chain architectures, and accelerated product turnover. In this regard, the fashion and textile industry stands as a paramount example, given its substantial environmental impacts, structural sustainability challenges, and growing societal demand for transparency and accountability.

Although academic literature on sustainability, digital transformation, and the fashion industry has expanded considerably, the conceptualisation of digital servitization as a unified framework for sustainable industry transformation remains notably underdeveloped. The comprehensive literature review undertaken in this study confirmed a fragmented academic landscape, in which existing research is dispersed across diverse areas such as smart manufacturing, e-commerce and digital retailing, circular

economy models, consumer engagement, and value chain transparency. Notably, the analysis revealed a marked scarcity of conceptual research addressing the specific role of post-consumption servitization and the architecture of digitally enabled, service-driven circular fashion ecosystems.

In order to address existing gaps, this paper introduces a comprehensive conceptual framework that theorises digital-driven servitization as a catalyst for the sustainable transformation of the fashion industry. The framework elucidates the mechanisms through which digital servitization reshapes traditional linear value chains and fosters sustainability-oriented business model innovation. Central to this contribution is the articulation of a dual-cycle architecture emerging from the integration of digital tools and service-based interactions across the fashion product lifecycle. The first cycle conceptualised in the framework, the product-service-product (P-S-P) loop, captures the material circularity enabled by digitally supported service activities. Services such as repair, alteration, refurbishment, authenticated resale, rental extension, and digitally coordinated take-back programmes prolong product lifetimes, reduce material waste, and reintroduce garments or recovered fibres into subsequent production processes. The second cycle, the “service-product-service” (S-P-S) loop, captures the circular flow of data generated through digital servitization, supporting design-centric sustainability strategies, including modularity, repairability, material optimisation, and extended product longevity. The study further indicates the necessity of distinguishing the dynamics of digital servitization across B2B and B2C segments contexts. In B2B segment, servitization processes are driven by the needs of supply chain actors, networked manufacturers, and compliance-oriented stakeholders. Digital technologies support batch-level traceability, predictive maintenance, collaborative waste-management infrastructures, and material-accounting systems across multi-tier supply chains. In B2C segment, digital servitization is shaped by consumer behaviour, repair participation, emotional durability, digital engagement patterns, and willingness to engage in circular practices such as resale or rental. Whereas B2B cycles emphasise operational visibility and process optimisation, B2C cycles focus on behavioural transformation and experiential value creation. The framework thus formalises how the dual-cycle architecture functions differently across institutional contexts while contributing to a unified sustainability objective.

A central theoretical advancement of this study is the conceptualisation of post-consumption servitization as a foundational pillar of sustainability-oriented business model development in fashion. Traditionally peripheral within the sector, post-consumption services, repair workshops, on-demand tailoring, rental prolongation services, authenticated resale, digital care guidance, re-commerce platforms, recycling services, and traceability apps, gain strategic importance as digital infrastructures render them

economically viable and scalable. These services provides companies with digitally-mediated sustainability-oriented capabilities to close material loops, to extend product life and mitigate overproduction, to produce high-quality data on product condition and consumer use, and to strengthen consumer-firm relationships through continuous value co-creation. Consequently, post-consumption servitization becomes a critical mechanism for operationalising circular fashion strategies.

Reinforcing findings from prior servitization scholarship, this study identifies a complex system of determinants, drivers, barriers, and limitations shaping digital servitization in fashion. Determinants include digital readiness, organisational capabilities, data-management infrastructure, ecosystem collaboration, and sustainability-oriented strategic intent. Drivers arise from regulatory requirements, increasing sustainability consciousness among consumers, technological progress, and the emergence of circular revenue models. Barriers manifest across all stages: from design and production to distribution, use, and post-use; and include operational complexity, cost constraints (particularly for SMEs), resistance to organisational change, data interoperability issues, limited skillsets, and the absence of standardised protocols for traceability and circular service coordination. Limitations include dependency on consumer engagement, unresolved issues in cross-actor data governance, and infrastructural heterogeneity across global supply chains.

Grounded in the systematic synthesis of interdisciplinary evidence, this conceptual paper offers the first holistic framework integrating digital servitization, post-consumption services, and dual-cycle circularity into a unified model for sustainability-oriented business model innovation in fashion. Addressing the conceptual fragmentation identified in the literature and differentiating the logic of digital servitization across B2B and B2C domains, the study advances theoretical understanding and provides actionable guidance for practitioners navigating the sustainable transformation of the fashion sector.

Keywords: digital servitization, sustainability-oriented business models, circular fashion, post-consumption, product lifecycle.

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Zooming in B2B managerial strategies in business internationalization in the digital transformation paradigm

Adriana-Elena Biea

*Researcher, PhD, National University of Political Studies and Public Administration (SNSPA),
Bucharest, Romania.*

Victoria Palăr

Doctor, SMILE DENT THERAPY, Bucharest, Romania.

EXTENDED ABSTRACT

Economic globalization and rapid technological advances have significantly lowered traditional barriers to entry in international markets, fundamentally reshaping the way firms compete and expand beyond national borders. In parallel, the COVID-19 pandemic has further accelerated these changes by demonstrating the critical role of digitization in ensuring business continuity, exposing vulnerabilities in global supply chains, and emphasizing the need for flexible, fast, and scalable organizational solutions (Biea et al., 2023). As a result, digital transformation has become one of the most influential forces shaping the contemporary business environment, redefining organizational processes, business models, and strategies for international market expansion.

Digital transformation enables firms to leverage emerging technologies to enhance decision-making, optimize operations, and strengthen their international presence. Technologies such as cloud computing, blockchain, big data analytics, and artificial intelligence (AI) have accelerated the pace of change, offering companies new tools to manage cross-border activities, improve transparency, and increase responsiveness to market dynamics (Vătămănescu & Dominici, 2024). At the same time, traditional managerial practices have undergone a profound transformation, shifting toward more agile, data-driven, and innovation-oriented approaches in order to meet the demands of the digital era. These developments have made internationalization more accessible to firms of various sizes, while also intensifying competition in global markets (Vătămănescu & Mitan, 2023).

In this context, companies face both challenges and opportunities in their internationalization efforts. While digital technologies reduce geographical and informational barriers, they also require significant investments in skills, infrastructure, and organizational change. Firms must develop the capabilities necessary to integrate digital tools into their core processes while aligning them with international growth strategies. The ability to manage digital transformation effectively has therefore become a key determinant of success in international markets.

Romanian companies, although often more conservative in adopting new technologies compared to firms from more developed economies, have increasingly begun to integrate digital solutions into their operations in response to changing market conditions (Ciuciuc et al., 2025). The pressure to remain competitive, coupled with growing exposure to international markets, has encouraged Romanian firms to embrace digital technologies to enhance efficiency, improve customer relationships, and support cross-border expansion. Digital transformation has contributed to reducing geographical constraints and facilitating access to global networks, while competition has become more intense than ever.

This evolution highlights that organizations capable of adopting modern management strategies supported by digital technologies are more likely to differentiate themselves and achieve sustainable competitive advantages. Organizational performance increasingly reflects the success of the internationalization process underpinned by digitalization and emerging technologies. By accessing new markets, optimizing supply chains, and adapting products and services to the diverse requirements of global customers, firms can improve both their operational efficiency and strategic positioning.

Ultimately, internationalization emerges not only as an opportunity for growth but also as a critical factor in strengthening long-term organizational performance. Understanding the interplay between digital transformation, internationalization, and performance is therefore essential, particularly in the context of business-to-business (B2B) markets, where technological capabilities and strategic partnerships play a decisive role.

Taking all these things into account, the research will focus on the B2B managerial strategies which support digital transformation with a view to a successful internationalization process. In this vein, a qualitative approach will be employed to scrutinize the viewpoints of 10 managers whose firms are operating abroad.

Keywords: Business-to-business strategies, Internationalization, Digital transformation.

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Sustainable Management Strategies in a Tech-Driven World: A Qualitative Inquiry into Romanian Managers' Perceptions

Victor-Emanuel Ciuciuc

PhD/University Lecturer, University of Bucharest, Romania.

Roxana-Maria Staneiu

PhD/Position, National University of Political Studies and Public Administration, Romania.

EXTENDED ABSTRACT

Digitalization and sustainability have become intertwined agendas in contemporary management, especially in emerging economies where firms are simultaneously catching up technologically and trying to respond to environmental, social, and regulatory pressures. In this context, Romanian organizations face a double challenge. They must master advanced technologies and new business models while also internalizing a multidimensional understanding of sustainable development that goes beyond a narrow economic focus. Prior research has shown that the social pillar of sustainability remains conceptually underdeveloped in both policy and practice, often reduced to vague references to equity or inclusion, with limited operational clarity for managers (Dempsey et al., 2011, Murphy, 2012). At the same time, newer debates stress the need to integrate a cultural pillar, emphasizing values, identity, and meaning-making as key to any sustainable societal transformation (British Council, 2020, Vățămanescu & Brătianu, 2021).

This research explores how middle and top managers in Romanian businesses conceptualize sustainable development and use the four sustainability pillars, economic, social, environmental, and cultural, as strategic lenses when they navigate innovation and organizational challenges in a tech-driven world. The study focuses on the qualitative component of a broader research program and investigates how managers interpret, negotiate, and operationalize sustainability in practice, in particular how they connect sustainability strategies to perceived organizational performance and reputation.

The research addresses three interrelated questions. First, how do managers in Romanian organizations understand and prioritize the four pillars of sustainable development in their strategic thinking. Second, how do they perceive the contribution of economic, social, environmental, and cultural management strategies to organizational performance and competitive advantage, in line with debates on sustainable business models and impact oriented innovation (Ulvenblad et al., 2018, Müller et al., 2022) . Third, how do they articulate the link between sustainability oriented strategies and corporate reputation in a context shaped by digital transparency and rising stakeholder expectations (Dewi, 2020, Dicuonzo et al., 2022).

Conceptually, the study rests on two strands of literature. The first is the body of work on sustainable development and the triple bottom line, that is, economic prosperity, social justice, and environmental quality, and its extensions that argue for a fourth, cultural pillar. The social dimension has been conceptualized as urban social sustainability and linked to issues such as social cohesion, equity, and quality of life, yet with persistent ambiguity when translated into managerial tools (Dempsey et al., 2011, Murphy, 2012). Emerging research on the cultural dimension frames it as a reservoir of values, identities, and narratives that condition how organizations interpret and enact sustainability in the digital era (British Council, 2020, Vătămănescu & Brătianu, 2021).

The second strand concerns sustainable business models, digital transformation, and innovation. Studies on sustainable business models in agri food and related sectors show that sustainability can be embedded through novel value propositions and reconfigured value creation and capture mechanisms, yet managers still struggle to translate broad goals into coherent managerial practices (Ulvenblad et al., 2018, Martín Ríos et al., 2021). Digital technologies add further complexity. Artificial intelligence, advanced analytics, and interconnected devices reshape value chains, stakeholder relationships, and data flows, opening both opportunities and tensions for sustainable development (Côrte Real et al., 2017, Di Vaio et al., 2020, Vodă et al., 2021, Biclesanu & Dima, 2021). In emerging economies, where institutional frameworks and infrastructures are still consolidating, this interplay between sustainability and digitalization is particularly salient (Vătămănescu et al., 2019, Nedelea et al., 2018).

Methodologically, the research adopts a Straussian grounded theory design in order to generate a theory that is closely anchored in managers' lived experience rather than imposed by pre existing conceptual models (Mohajan & Mohajan, 2023). Twenty three structured, in depth interviews were conducted with middle and top managers from diverse sectors operating on the Romanian market, all of them directly involved in strategic decision making and knowledgeable about sustainability related initiatives. The

interview guide was explicitly built around the four pillars of sustainable development and contained focused questions on economic, social, environmental, and cultural strategies and their perceived impact on performance and reputation across different business contexts .

Interviews were conducted via email, following an approach that has gained methodological legitimacy in the context of the Covid 19 pandemic and the wider turn toward digital qualitative research (Lobe et al., 2020, Teti et al., 2020, Dahlin, 2021). Email interviews offered several advantages in this setting. They enabled access to busy professionals in different locations, provided time for reflection on complex conceptual questions, facilitated detailed and carefully worded answers, and ensured safety during public health restrictions (Teti et al., 2020, Dahlin, 2021) . At the same time, the method preserved the depth and richness that the in depth interview tradition is known for, especially when the research explores managerial reasoning about complex constructs such as sustainability and innovation (Seet et al., 2015, Nedelea et al., 2018).

Data were analyzed with the support of Atlas.ti, in line with a wider movement toward the use of Qualitative Data Analysis Software to increase the transparency and rigor of coding, retrieval, and conceptual integration in qualitative projects (Schmider, n.d., Seet et al., 2015. Coding followed the sequence of open, axial, and selective coding consistent with Straussian grounded theory (Mohajan & Mohajan, 2023). During open coding, the analysis identified a large number of conceptually relevant segments associated with managers' definitions of sustainable development, the role of each pillar, and the perceived outcomes of sustainable strategies. Axial coding then grouped these codes into higher order categories that captured patterns across cases, such as awareness of sustainability, temporal horizons, perceived trade offs, and the relationships between sustainability and competitive dynamics. In the selective coding phase, a core category emerged around sustainable awareness as a strategic meta competence that organizes how managers mobilize the four pillars and align innovation efforts with sustainability goals.

The findings show that managers typically associate sustainability first with environmental and economic considerations, energy efficiency, resource use, cost savings, and compliance with environmental regulations, which echoes a well documented bias toward environmental and economic dimensions in both reporting and practice (Tan, 2021, Medeiros, 2020). Social and cultural dimensions enter the picture in a second step, often as perceived enablers of legitimacy, employer branding, and stakeholder engagement rather than as fully fledged strategic domains. This hierarchy of pillars reflects broader

debates in the literature on the relative under specification of the social pillar and the still emerging formalization of the cultural pillar (Dempsey et al., 2011, Murphy, 2012, British Council, 2020).

At the same time, the interviews reveal a gradual shift in managerial thinking in which social and cultural strategies are increasingly interpreted through the lens of innovation and competitive advantage. Managers describe investments in employee well being, inclusive work practices, and learning oriented cultures not only as ethical imperatives but also as drivers of adaptability, creativity, and resilience in highly dynamic environments, in line with recent research linking sustainability orientation to innovation performance (Malik et al., 2020, Longoni & Cagliano, 2016, Müller et al., 2022). Cultural strategies, such as articulating shared values around responsibility, authenticity, and openness to change, are seen as crucial to align digital transformation initiatives with sustainability goals, especially in organizations that operate in knowledge intensive or consumer facing sectors (Vătămănescu & Brătianu, 2021, Liyanage et al., 2022).

Another key finding concerns the way managers link sustainability strategies to organizational performance and reputation. Economic strategies related to cost optimization, green investments, and efficiency gains are directly associated with profitability and risk mitigation, in line with evidence that environmental regulation and green innovation can support long term performance (Ma et al., 2022, Mu et al., 2022). Environmental strategies, such as eco efficient operations, responsible sourcing, and waste reduction, are framed as both cost related and reputation related moves, consistent with research on environmental disclosure and corporate image (Dewi, 2020, Temiz, 2022).

Social and cultural strategies are predominantly connected with intangible outcomes. Managers report that trust, loyalty, and an enhanced external reputation emerge from sustained commitments to fair employment practices, community engagement, and transparent communication, which resonates with evidence that reputational capital is shaped by sustainability disclosures and stakeholder perceptions of authenticity (Dewi, 2020, Dicuonzo et al., 2022, Boon, 2022). Interviewees also emphasize the role of digital channels, social media, and online platforms in amplifying both positive and negative signals about the organization, reinforcing the need for coherence between espoused values and enacted practices in a tech driven environment (Vătămănescu et al., 2017, Côrte Real et al., 2017) .

Importantly, the study highlights how managers experience tensions and trade offs related to timing and resource allocation. For example, environmental investments are acknowledged as strategically important, yet often postponed or underfunded due to short term financial pressures or uncertainty about

regulatory trajectories, a pattern also documented in comparative studies of sustainability and corporate performance (Temiz, 2022, Suharto et al., 2021). Social and cultural strategies may be rhetorically endorsed but remain weakly institutionalized, especially in firms where digital transformation agendas are driven primarily by efficiency or competitive mimicry rather than by a deep rethinking of value creation and societal impact (Di Vaio et al., 2020, Vătămănescu & Brătianu, 2021).

From a theoretical perspective, the research contributes by proposing sustainable awareness as a core managerial capability that organizes how the four pillars are interpreted and prioritized. Sustainable awareness is not simply knowledge of sustainability standards or frameworks. It is a multidimensional competence that involves the ability to perceive interdependencies between economic, social, environmental, and cultural domains, to integrate long term temporal horizons into strategic decision making, and to recognize how digital technologies reshape these interdependencies. This construct connects debates on sustainability leadership and soft infrastructure (Çuhadar & Rudnák, 2022, Liyanage et al., 2022) with grounded insights into how managers in an emerging economy actually reason about sustainability in their day to day choices.

Practically, the findings suggest that organizations in tech driven contexts can strengthen their ability to navigate the waves of innovation by embedding sustainability more systematically into strategic management processes. First, firms can develop diagnostic tools that help managers map ongoing initiatives and investments against the four pillars, making visible the current balance between economic, social, environmental, and cultural strategies. Second, they can invest in training and reflective practices that enhance sustainable awareness, for instance through structured dialogues that connect sustainability goals, digitalization projects, and stakeholder expectations. Third, they can design performance and reporting systems that integrate financial, environmental, and social cultural indicators in a coherent way, aligned with both external standards and internal values (Dicuonzo et al., 2022, Tan, 2021).

For policy makers and higher education institutions, the study underscores the importance of addressing the social and cultural pillars more explicitly when promoting sustainable development and digital innovation. This includes curricular reforms that connect sustainability, ethics, and technology management and support the development of managers who can think systemically across pillars and disciplines (Crespo et al., 2017, Liyanage et al., 2022). In the Romanian context, where digital infrastructures and regulatory frameworks are evolving, such efforts could help align national innovation agendas with broader sustainable development objectives.

Overall, the research shows that managers in Romanian businesses are not indifferent to sustainability. They are actively trying to reconcile economic imperatives, social responsibilities, environmental constraints, and cultural expectations while navigating rapid technological change. Yet they often lack structured conceptual and organizational tools to balance these dimensions. By bringing together grounded qualitative evidence and contemporary sustainability debates, this study offers a framework that can support both scholarly reflection and practical action for mastering the challenges of innovation in a tech driven world.

Keywords: Sustainable development awareness, sustainable management strategies, organizational performance, organizational reputation, digital transformation, Industry 4.0, grounded theory, qualitative inquiry, Romania

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ORGANIZATIONAL CHALLENGES IN A TECH-DRIVEN WORLD

Public Organizations as Complex Adaptive Systems. Lessons from Co-Designing AI Virtual Assistants with Public Employees

Nicola Capolupo

Assistant Professor in Organizational Studies, San Raffaele Roma University, Italy

Angelo Rosa

University LUM Giuseppe Degennaro, Casamassima, Italy

EXTENDED ABSTRACT

The aim of this study is to investigate how public sector employees can co-design artificial intelligence (AI)–based virtual assistants to enhance user experience in service delivery, and how such participatory processes may be interpreted through the lens of Complex Adaptive Systems (CAS). Rather than configuring public administrations as rigid bureaucracies, the CAS perspective conceptualizes it as an evolving network of interdependent agents and stakeholders that cope and adapt to uncertainty, produce proactive and emergent behaviors, and contribute to reconfigure their services (Ahmad et al., 2024; Jalonen, 2024). The CAS theory depicts the evolutive scenario of Artificial Intelligence (AI) implementation when designed collaboratively with public servants. Literature, in fact, suggests that adopting co-design approaches for AI solutions in public sector could be read not only from a service efficiency perspective, but also from an organizational learning and adaptability view (Secchi et al., 2024).

The study employs a qualitative multiple-case design, structured around three focus groups conducted in different administrative contexts: a regional environmental agency, a university administrative office, and a local municipality. Each focus group consisted of public employees and facilitators, following a co-design protocol based on service design methodologies, scenario planning, and participatory prototyping. The process is constituted of three iterative stages: mapping service touchpoints from the user perspective, identifying tasks with high potential for automation, and developing profiles for Ai virtual assistants, including their functionalities, boundaries, interaction style, and escalation pathways

to human operators. This choice reflects the principles of the co-design in public service growing literature, that support the idea that participatory approaches improve the fit of technological innovations (Mintrom et al., 2024). Moreover, it responds to international calls for embedding transparency and citizen-oriented values into the design and governance of AI in public organizations (OECD, 2025; OECD/UNESCO, 2024).

The assistant was valued for accessibility, linguistic proximity, and usability, but employees flagged risks stemming from incomplete datasets and unpredictable demands requiring human judgment. In all three public contexts, employees converged on common design principles, like explicit boundaries of the assistant's competence, clear escalation channels to human staff, transparent decision-making logic, and ongoing governance mechanisms for content and data. The findings align with both participatory AI and human–AI collaboration research in public service (Melo et al., 2025; Yang & Al-Masri, 2025). Additionally, interpreted through the CAS framework, these results suggest how co-design may improve local interaction rules, feedback loops, and adaptive capacities within public organizations. The assistant should not be configured as a technical artifact but an intervention that transforms organizational bonds, decision-making authority, and fosters new collaborations. Nevertheless, it should be taken into account that transformations also carry risks typical of CAS, like path dependencies and potential erosion of trust if accountability and transparency are not granted. The CAS perspective suggests that public administrations must treat the deployment of AI assistants as iterative experiments, supported by monitoring mechanisms and feedback-driven adaptation.

Practically, the study highlights that embedding employee co-design as a structural phase in AI innovation processes enhances not only service efficiency but also the legitimacy and sustainability of technological adoption. It underscores the need for formal governance infrastructures—covering data quality, bias auditing, and escalation protocols—and for sustained investment in employee training, both technical and systemic. On a theoretical standpoint, this research contributes to the integration of CAS and co-design literature in public organizations, showing how adaptive governance can guide the responsible introduction of AI in the public sector. Lastly, co-designed AI assistants offer a pathway for public administrations to evolve into more learning-oriented and resilient systems, capable of leveraging emergent technologies without losing sight of foundational public values.

Keywords: Public Organization, Service co-design, Artificial Intelligence, Complex-Adaptive Systems.

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Beyond algorithms: Organizational Culture and Trust in the Digital Era

Emilia Romeo

Assistant Professor, San Raffaele Roma University, Italy.

Ciro Clemente De Falco

Assistant Professor, University of Naples “Federico II”, Italy.

EXTENDED ABSTRACT

The Digital transformation has become a central theme in contemporary debates across management, information systems, and public administration, often celebrated as a decisive driver of competitiveness and innovation (Leão and da Silva, 2021). Much of the discourse, however, has tended to emphasize its technological dimension, highlighting the potential of artificial intelligence, big data, and cloud solutions to optimize processes and create new forms of value (Romeo and Capolupo, 2022). Yet digital transformation cannot be reduced to the mere deployment of advanced technologies; it entails profound changes in how organizations operate, make decisions, and relate to their internal and external stakeholders.

However, existing research has primarily focused on technological adoption and performance outcomes, often overlooking the cultural and trust-related dynamics that determine the success or failure of digital transformation initiatives (Vial, 2019; Susanti et al., 2023).

Therefore, this study aims to advance a more comprehensive understanding of digital transformation by shedding light on the organizational and relational dimensions that shape its outcomes. To achieve this, the study investigates how different types of organizations (e.g., public, private, and hybrid) manage the challenges associated with cultural adaptation and trust-building in the context of digital transformation.

Adopting a comparative case study design, this research investigated three organizations: a public administration, a private company, and a hybrid utility operating under both public and private governance. A case study approach is particularly suited to this inquiry because it allowed for an in-depth

exploration of complex organizational processes and contextual factors that cannot be fully captured through large-scale quantitative analyses (Yin, 2018). Moreover, the comparison enabled the identification of both convergent and divergent patterns across organizational settings.

Data has been collected through semi-structured interviews with managers and employees, complemented by internal documents and secondary sources. This combination of qualitative methods ensured triangulation, thereby increasing the reliability and validity of the analysis. Interviews focused on participants' experiences, perceptions, and narratives of digital transformation, while documentary evidence provided additional insights into organizational strategies and formal policies.

The cases have been examined through thematic analysis to identify similarities and differences in how organizational practices have influenced employee engagement, openness to change, and confidence in digital technologies.

The comparative analysis of these cases provided the basis for generating context-sensitive insights into how different organizational forms confront the cultural and relational challenges of digital transformation.

Findings indicate that public organizations frequently encounter cultural barriers stemming from bureaucratic inertia, hierarchical decision-making, and resource constraints, which can slow down or fragment digital transformation efforts.

By contrast, private firms tend to frame digital transformation in terms of efficiency gains and opportunities for innovation. Yet, they often face challenges related to ethical concerns, workforce resistance, and sustaining employee confidence in technological change. Hybrid organizations, positioned at the intersection of public accountability and market-driven imperatives, emerge as particularly insightful cases: they function as laboratories for negotiating tensions between transparency, innovation, and stakeholder trust, thereby illustrating both the risks and opportunities inherent in digitally transforming complex governance structures.

From a theoretical standpoint, the study contributes to the literature on digital transformation by moving beyond a purely technological perspective and highlighting the organizational and relational dynamics that condition its success. In particular, it underscores the need to integrate organizations' cultural adaptation and employees' trust-building into paths of digital change (Hubbart, 2025), thereby enriching ongoing debates in organizational studies.

From a practical point of view, the findings provide actionable insights for managers and policymakers who are designing and implementing digital transformation strategies. By illustrating the distinct challenges faced by public, private, and hybrid organizations, the study offers guidance on tailoring interventions to strengthen employee engagement, address ethical concerns, and balance efficiency with accountability.

However, the research is subject to some limitations. The reliance on three case studies, while allowing for depth of analysis, restricts the generalizability of the findings. Moreover, the focus on managerial and employee perspectives may not fully capture the views of other stakeholders such as citizens, clients, or regulators.

Future research could expand the empirical scope by incorporating additional organizational types, adopting longitudinal designs to trace transformations over time, and integrating quantitative measures to complement qualitative insights. Such avenues would further advance a comprehensive understanding of how digital transformation unfolds across diverse institutional contexts.

Keywords: Organizational change, digital transformation, organizational behaviour, case study, trust.

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A Comprehensive Review of Studies Connecting Workforce Development and Business Success

Remus-Bogdan Besnea
PhD student, SNSPA, Romania,

EXTENDED ABSTRACT

This study presents a bibliometric analysis that explores the interconnections between three key domains: project management, education, and organizational performance. The paper synthesizes relevant bibliometric data, highlighting key aspects such as main sources, annual scientific production, prominent authors, evolution of source production over time, and significant affiliations or countries contributing to this research domain. The research method used is bibliometric analysis and the central research question is: "What are the emerging trends and key contributions in the academic literature at the intersection of project management, education, and organizational performance?"

The literature examined encompasses two main strands: one focused on project management, and the other on educational practices and organizational performance. The findings reveal a growing body of research at this intersection, highlighting the growing role of project management in educational contexts and its impact on improving organizational outcomes. The results show that, over time, project management practices have become an integral part of improving efficiency and productivity within educational institutions and organizations. The data also indicate that research interest is expanding, especially in countries with strong educational systems and dynamic organizational environments. These trends suggest that as both education and organizational performance evolve, the integration of effective project management practices will continue to be crucial for achieving long-term success, a trend supported by continued advances in technology and management tools that have made project management practices more accessible and adaptable to diverse organizational contexts.

Keywords: project management, education, organizational performance, bibliometric analysis, academic trends, productivity, efficiency.

AI-Augmented Hiring: Ethical Implications and Competency Shifts in HR Decision-Making

Mădălina-Elena Stratone

Teaching Assistant, National School of Political Science and Public Administration, Romania.

Mihaela Rusu

Associate Professor, National School of Political Science and Public Administration, Romania.

EXTENDED ABSTRACT

Artificial intelligence (AI) is drastically changing hiring and selection procedures, bringing about a significant change in how businesses find, assess, and choose talent. AI-powered CV screening, candidate ranking, interview scheduling, and automated video evaluation tools promise quicker, more reliable hiring decisions while lowering administrative burden. But these systems also bring up important moral questions about accountability, transparency, and fairness. In order to work meaningfully and responsibly with AI systems, HR professionals must acquire new competencies as their roles undergo a substantial transformation. Using a variety of literature streams in HRM, AI ethics, corporate learning, and organizational change, this paper provides an integrative and conceptual investigation of the ethical issues and competency changes related to AI-augmented hiring.

Even though AI-enabled hiring tools are frequently touted for their effectiveness, they present socio-technical challenges that cast doubt on long-held beliefs about hiring objectivity (Kalff & Simbeck, 2025). Biases pertaining to gender, age, ethnicity, disability, or socioeconomic status may unintentionally be reinforced by algorithms trained on historical data (Soleimani et al., 2025). The previous authors underlined data structures, training procedures, and classification logics of AI models can replicate injustices at scale, even when these models are designed to minimize human bias. Accountability is further complicated by the opaqueness of algorithmic decision-making, since candidates and recruiters might not comprehend the reasons behind the inclusion or exclusion of particular profiles (Fabris et al., 2023). These dangers raise important ethical concerns, such as how transparent AI hiring tools should be

(Mujtaba & Mahapatra, 2024). How can businesses prevent discrimination and guarantee justice? When AI makes a biased recommendation, who is at fault?

In this way, a growing conflict between the efficiency advantages of AI and the ethical responsibilities of organizations is highlighted in existing literature (Madanchian, 2024; Dadaboyev et al., 2025). However, ethical issues call for human judgment, organizational learning, and critical reflection in addition to technical solutions and regulatory compliance. This puts HR professionals in a new position where they need to acquire the skills necessary to evaluate, oversee, and control AI systems. AI literacy, data awareness, ethical reasoning, and systemic thinking must now be added to traditional HR skills, such as contextual understanding and interpersonal judgment, which are still crucial. Instead of depending solely on algorithmic outputs, HR professionals need to comprehend how AI systems work, how biases arise, and how to assess algorithmic outputs (Kassir et al., 2023). They also need capabilities in ethical deliberation: assessing whether algorithmic recommendations are fair, inclusive, and aligned with organizational values (Dastin, 2018).

In order to link the currently disparate research domains, this paper uses an integrative literature review approach. While research on AI ethics emphasizes bias, fairness, and accountability, studies on AI in recruitment focus on efficiency and predictive performance. AI's impact on decision-making roles, however, is rarely discussed in studies on corporate learning and HR competencies (Albaroudi, Mansouri & Alameer, 2024). The paper offers a conceptual model that connects ethical risks in AI-augmented hiring to the skills needed by HR professionals by combining these streams. Three crucial competency clusters are identified by the model: (1) AI and data literacy, which includes comprehending how algorithms process candidate information; (2) ethical and critical reasoning, which is necessary to challenge system outputs and assess fairness; and (3) systemic thinking, which enables HR professionals to comprehend AI as a component of a larger socio-technical system influencing candidate experience, organizational culture, and equity outcomes.

This conceptual approach contributes to the field in several ways. First, it emphasizes that integrating AI requires intentional capacity-building because it is not just a technological shift but also a human and organizational transformation. Second, rather than viewing HR professionals as passive users, it reframes them as active agents who must interpret, question, and contextualize AI recommendations. Third, it emphasizes the necessity of corporate education to assist HR teams in acquiring the skills required for responsible AI use. Ethical reasoning and AI literacy cannot develop naturally; they need cross-

functional cooperation between the HR, IT, legal, and learning and development departments as well as structured training and reflective practices.

HR departments are not the only ones affected. Organizations must set up governance frameworks that incorporate ethical considerations into hiring procedures as AI-augmented hiring becomes more common (Hunkenschroer & Luetge, 2022). HR professionals need to be prepared to identify algorithmic bias, challenge opaque scoring models, and step in when AI outputs violate fairness principles (Fisher et al., 2022). Education and training become essential tools for guaranteeing accountability. Additionally, competency-based training programs and micro-credentials that prepare present and future HR professionals for the realities of algorithmic hiring environments can be developed through collaborations between academic institutions, corporations, and technology providers (Dăniloia, 2024).

In conclusion, while AI-augmented hiring presents many opportunities, it also creates operational and ethical challenges that call for new types of expertise. This paper offers a conceptual understanding of the competencies required for responsible AI use in recruitment by synthesizing literature from HRM, AI ethics, and learning innovation. The trend toward AI-assisted decision-making necessitates HR specialists who can integrate systemic thinking, ethical sensitivity, and digital awareness. Businesses will be in a better position to create hiring procedures that are effective, equitable, and consistent with inclusive organizational values if they invest in these competencies.

Keywords: Artificial intelligence in HR; AI literacy; AI-augmented hiring; Algorithmic fairness; Ethical recruitment; HR competencies; Digital transformation in HR.

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**FINANCIAL MARKETS, BUSINESS MODELS
AND PUBLIC POLICIES
IMPLICATIONS OF TWIN TRANSITION**

Digital Novelties of Crypto Ecosystem: The Present and Future of Stablecoins

Eka Sepashvili

Associate Professor, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia

EXTENDED ABSTRACT

Today, one of the key components of the digital economy is the technologies underlying electronic money and digital payment systems. These systems are rapidly advancing. The emergence of a new type of financial innovation, such as stablecoins, poses a number of challenges for financial authorities worldwide. However, their potential must be considered adequately, including in the context of the development of central bank digital currencies and cross-border payments within them.

The case of stablecoins is quite relevant. Unlike cryptoassets, there are few researches devoted to explore their potential, practical importance, convenience and challenges they face to become more common in financial world. Notable examples include public reports from the International Organization of Securities Commissions, the Financial Stability Board, the G74 working group and studies by the Bank for International Settlements (Zetsche Dirk, Douglas Arner, Ross Buckley, Rolf H. Weber 2020).

The idea of stablecoins is not new. For example, European States' deposit banks, particularly the Bank of Amsterdam in the 17th century, had an economic structure similar to the operating principles of modern stablecoins (Frost J. et al., 2020). Parallels can be drawn between stored-value cards, exchange-traded funds, electronic money, some forms of mobile money and stablecoins. The global economy went through a period of fixed exchange rates, when the exchange rate of one currency was pegged to the value of another or to the value of a basket of currencies or assets. The central bank was responsible for supporting its currency in response to changes in supply and demand in the market. A similar system of asset backing is embedded in the concept of stablecoins.

Digital currencies, in addition to a number of basic characteristics of traditional money, offer open, cross-border payment systems free from control. However, they fail to meet the primary demand of the masses

(both individuals and professional financial market participants): stability. This was seen as the main obstacle to the development of cryptocurrencies.

The purpose of this paper is to characterize and analyze the development of stablecoins. The financial market has not yet formulated a precise definition of stablecoins, primarily due to the lack of formal laws and standards regarding them. In today's reality, stablecoins can be defined as cryptocurrencies, that seek to maintain a stable value relative to a specified asset, pool or basket of assets. They, like Bitcoin and other cryptocurrencies, are electronic money and are not issued by central banks. Coins are based on tokens, which determine their authenticity.

A stablecoin is a cryptocurrency developed to minimize price volatility. In 2012, American developer D. Willett published a paper describing a method for creating new tokens based on the Bitcoin blockchain. The idea was to allow end users to create their own cryptocurrency pegged to a commodity or fiat currency, thereby maintaining a fixed exchange rate. This protocol was named Mastercoin, and in 2014, the Realcoin cryptocurrency was launched based on it. It currently trades as Tether.

Stablecoins are designed to be non-volatile and to match or closely mimic so-called hard currencies such as the US dollar, euro, yen and Swiss franc. Stabilization mechanisms ensure that the value of digital assets is secured:

- money (in a single currency or a basket of currencies);
- securities and commodities, such as gold;
- cryptoassets;
- user expectations regarding future purchasing power.

To maintain a stable value relative to fiat currency, many stablecoins offer the prospect of being redeemable at par. However, there are no standards regarding the composition of a stablecoin's reserve assets and the information disclosed by the issuer regarding its reserve assets does not comply with all agreements regarding either its content or the frequency of its issuance. Stablecoins are distinguished by the riskiness of their reserve assets. Some stablecoin agreements involve keeping all reserve assets on deposit at insured depository institutions or in US Treasury bills, while others are backed by riskier reserve assets, including commercial paper, corporate and municipal bonds and other digital assets (Bullmann D. et al., 2020).

Thus, each token represents one unit of fiat currency (or another reserve asset). The funds are held by an intermediary (third party), such as a bank. For every unit of hard currency deposited in a bank account, the user receives a token representing ownership of the asset. Without short-term and long-term stability, using cryptocurrencies as a direct replacement for fiat or traditional assets is considered extremely risky. From a consumer perspective, using cryptocurrencies on a daily basis is risky and impractical. Stablecoins are the only form of cryptocurrency that eliminates the need to worry about the instability and volatility of cryptocurrency prices. They play an important role due to a number of factors. Stablecoins have the potential to help people living in countries suffering from high inflation, which ultimately reduces the purchasing power of money. This is usually the result of economic and political uncertainty. Simplicity and stability are the main advantages of this type of stablecoin. The fiat-backed structure is easy to understand. Fiat currency is a stable asset because it is legally backed by the government and the country's economy. This ensures that the underlying price will not fluctuate significantly. Disadvantages include centralization and therefore, some regulation. Tokenized funds are centralized structures subject to various risks (single point of failure, i.e., cascading system failure, bankruptcy of the central entity, moral hazard). External auditing is required to verify the accuracy of reporting. Furthermore, processes associated with the use of fiat currencies require greater oversight and regulation.

Keywords: Digital currencies, stablecoins, tokens, tokenized funds.

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Restructuring Imperatives of Georgia’s Financial Organizations in the Tech-Driven Era

Marine Tavartkiladze

Professor, Institute for Development Studies, Sulkhon-Saba Orbeliani University, Georgia

EXTENDED ABSTRACT

The global financial industry is experiencing an unprecedented transformation driven by rapid digitalization. Emerging technologies are fundamentally altering how financial institutions design their organizational structures, manage risks, and engage with customers (Chen, L. 2024). The transition from traditional banking to digital ecosystems is accelerating worldwide, with artificial intelligence (AI), big data analytics, robotic process automation (RPA), and cloud computing at the center of this change (World Bank, 2024).

In Georgia, banks and insurance companies have actively embraced digital transformation as a strategic priority. Leading institutions such as TBC Bank and Bank of Georgia have introduced multifunctional mobile platforms that integrate payments, credit services, insurance, and investment opportunities into a single customer experience (National Bank of Georgia, 2023). This shift toward digital ecosystems has strengthened accessibility and efficiency while increasing competitiveness in both local and regional markets.

Nevertheless, digitalization brings not only opportunities but also systemic vulnerabilities. The adoption of AI and RPA creates reliance on automated systems that, when disrupted, can result in significant operational losses (Uddin, M. H., Kabir, M. N., & Alam, M. S. 2023). These losses may stem from system outages, cyberattacks, internal process failures, or poorly executed technology implementations (PwC, 2023). As financial services migrate toward cloud infrastructures, data governance and regulatory compliance present additional challenges, particularly in jurisdictions with evolving digital legislation such as Georgia (IMF, 2023).

Operational risk has therefore become one of the most critical consequences of digitalization. International research emphasizes that financial institutions face growing threats of cybercrime, digital

fraud, and reputational damage, making resilience a strategic imperative (Engemann, K. J., & Witty, J. A. (2024). For Georgian financial institutions, addressing these risks requires more than technological upgrades: it demands comprehensive organizational restructuring, including the creation of specialized cybersecurity units, adoption of agile management practices, and continuous workforce reskilling to align with global best practices (Deloitte, 2022).

In this context, digital transformation in Georgia's financial sector should be understood not only as a technological modernization effort but also as a complex organizational journey that balances innovation, efficiency, and resilience. The article aims to analyze the restructuring imperatives of Georgia's financial sector in the context of digital transformation, focusing on technological integration, emerging risks, and operational losses. The objective is to analyze both the opportunities and the vulnerabilities that digitalization creates, with particular attention to organizational design, workforce adaptation, and regulatory compliance. Through the holistic approach in our research a qualitative, exploratory research design was applied, using a review of academic publications, World Bank and IMF reports, National Bank of Georgia regulations and comparative analysis of case studies from Georgian banks and insurers. Industry reports and press releases from leading financial institutions (e.g., TBC Bank, Bank of Georgia, Aldagi) were also analyzed to capture real-world implementation trends. The paper presents the results of qualitative analysis in the financial sector. Based on the research, several potential reasons for the increase in operational losses were identified:

- The more interconnected systems are, the higher the risk of system downtime or integration failure;
- Digital platforms expose institutions to ransomware, phishing, and digital fraud;
- Automated systems (e.g., AI-based credit scoring, RPA for transactions) reduce human oversight;
- Operational losses can arise from human error in using or supervising digital systems.

Findings reveal that Georgian financial institutions are advancing toward multi-functional digital ecosystems, with mobile banking platforms serving as central hubs for financial and lifestyle services. AI and RPA are increasingly utilized for credit scoring, fraud detection, and customer service, while big data analytics supports product personalization and strategic decision-making. However, challenges persist, including cybersecurity vulnerabilities, gaps in digital literacy among employees, and the regulatory complexities of hybrid cloud adoption. The study highlights the urgent need for organizational

restructuring—through agile management models, establishment of cybersecurity units, and continuous workforce upskilling.

Technological integration in Georgia's financial sector is not limited to the adoption of digital tools. It requires holistic transformation of business models, organizational culture, and regulatory alignment. Successful restructuring will determine not only the sector's domestic competitiveness but also its ability to integrate with global financial markets.

Keywords: Organizational restructure, digital era, financial sector operational losses.

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Teaching Methods Used in Financial Education

Liviu-Gelu Draghici

Romanian Academy, School of Advanced Studies of the Romanian Academy, Doctoral School of Economic Sciences, National Institute for Economic Research "Costin C. Kirițescu", Institute of National Economy

Marilena Drăghici

Romanian Academy, School of Advanced Studies of the Romanian Academy, Doctoral School of Economic Sciences, National Institute for Economic Research "Costin C. Kirițescu", “Victor Slăvescu” Centre for Financial and Monetary Research

Isabelle-Margareta Oprea

Romanian Academy, School of Advanced Studies of the Romanian Academy, Doctoral School of Economic Sciences, National Institute for Economic Research "Costin C. Kirițescu", Institute for World Economy

EXTENDED ABSTRACT

This Financial literacy refers to both possessing and applying financial knowledge. This knowledge is acquired through financial education, which encompasses a variety of methods, techniques, and tools designed to help individuals gain relevant information.

In recent years, these methods have been generally grouped into two main categories: personal-based methods and technology-based methods. Common personal-based methods include group training sessions (either in-person or virtual), one-on-one education, and individual coaching. On the other hand, technology-based methods involve online learning, mobile app learning, continuous electronic education, and education delivered through social media or marketing platforms.

Each of these categories offers its own advantages and disadvantages. Therefore, to ensure the effectiveness of a financial training program, it is advisable to combine methods from both categories. In practice, this integration happens naturally, as most training programs blend personal and technological approaches to maximize learning outcomes.

Ultimately, the goal of these methods is to enhance individuals’ financial knowledge, taking into account participants’ specific needs and their access to technology.

In conclusion, financial literacy is developed through financial education, which relies on a combination of personal-based and technology-based methods and techniques.

Keywords: financial education, financial literacy, learning methods.

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Coal phase-out in Romania: risks, trade-offs, and pathways forward

Răzvan Gh. V. Ionescu

Romanian Academy, School of Advanced Studies of the Romanian Academy, Doctoral School of Economic Sciences, National Institute for Economic Research "Costin C. Kirițescu", Institute of National Economy, Romania.

EXTENDED ABSTRACT

When taking into account both air pollutants and greenhouse gas emissions, coal is widely regarded as the most polluting major source of electricity. The burning of coal releases the highest amount of CO₂ per unit of electricity among fossil fuels, as well as large amounts of sulfur dioxide, nitrogen oxides, and particulate matter, with long-lasting consequences for the environment and human health. By comparison, natural gas produces about 50% - 60% less CO₂ per kWh than coal, while renewables generate little to no direct emissions. While Romania's coal capacity has been slowly decreasing over the years, the country's energy sector still relies on electricity produced by burning coal, especially during periods when renewable output is low. The phasing out of coal plants that Romania has agreed to appears to be, at least for now, unrealistic. The Romanian authorities are currently trying to negotiate an extension to the phase out timeframe and are looking to delay shutting down 2.6 gigawatts of coal fired generation by at least five years. And while investments in renewable energy projects as well as modern gas powered turbines have picked up in recent years, there is still an ongoing debate on whether the country will be able to give up coal entirely in the near future. As coal still plays a significant role in Romania's energy mix, a rushed shutdown of the plants might result in an energy price shock caused by the need to resort to costly imports or risk outright electricity shortages. This lingering uncertainty highlights the importance of carefully balancing environmental objectives with the country's pressing need for energy security and economic stability.

This paper aims to analyze the implications of coal phase out for Romania's economic stability, energy security, and environmental commitments, while also looking at potential pathways for replacing coal with cleaner alternatives. By examining the role of coal in the current energy mix as well as the progress of renewable integration, the study seeks to highlight the trade offs between sustainability targets and

energy reliability. Ultimately, the goal is to provide a comprehensive perspective on whether Romania can realistically achieve a transition away from coal without undermining its energy resilience or burdening consumers with excessive costs.

Keywords: coal, energy sector, renewable energy, climate change.

The Artificial Intelligence Revolution in Finance: Systemic Transformation, Inclusion and Governance Imperatives

Marian Cătălin Voica

PhD/Lecturer, Petroleum-Gas University from Ploiești, Romania

Mirela Panait

PhD/ Professor, Petroleum-Gas University from Ploiești, Romania

Irina Rădulescu

PhD/ Professor, Petroleum-Gas University from Ploiești, Romania

Alina Brezoi

PhD/ assoc. prof. Petroleum-Gas University from Ploiești, Romania

EXTENDED ABSTRACT

The evolution of Artificial Intelligence (AI) is reshaping the global financial industry. Its integration is generating an important transformation in every sector like operations, customer interaction, and investment strategies. AI becomes an opportunity to diversify financial services, to grow financial inclusion and to deliver financial products to parts of underserved populations. This progress generates new systemic risks, including increased market volatility, algorithmic bias, and a concentration of power within a small number of technology suppliers. This generates the need for new governance and ethical frameworks.

The New Frontier of Financial Inclusion

AI is fundamentally changing the sector of financial inclusion by transforming the effort to deliver products to unbanked populations from a costly activity into a commercially viable business model, especially in the emerging markets. The principal mechanism behind this transition is the remodeling of creditworthiness. Conventional credit scoring methodologies have historically depended on a limited scope of historical data, which has systematically marginalized billions from the opportunity to secure credit. Artificial intelligence-augmented credit scoring methodologies alleviate this challenge by

utilizing machine learning algorithms to gather and analyze an extensive array of alternative data, which encompasses utility payment records, mobile communication usage patterns, e-commerce transactions, and even psychometric assessments, thus enabling a thorough evaluation of credit risk. This transformation permits financial institutions to assess individuals with limited or no credit histories, modifying the framework from a history-oriented financial identity to one based on behavioral metrics. For example, platforms like Upstart and Zest AI specialize in evaluating borrowers with limited credit histories, and one study noted that the implementation of a single AI model led to a 40% increase in credit approvals for women and people of color. Furthermore, AI enables hyper-personalization, allowing Financial Service Providers (FSPs) to move beyond one-size-fits-all products to design customized micro-savings plans, insurance policies, and targeted loans that align with the unique circumstances of low-income individuals. Prominent examples include embedded finance solutions for inventory financing based on sales data, and AI-powered chatbots offering financial advice in local dialects, effectively overcoming literacy and language barriers. This deep personalization is economically feasible for the first time due to AI's analytical power, paving the way for services so contextualized they function as a seamless utility. The principal drive for this transformation is the operational efficiency boosted by artificial intelligence, which automates many tasks from customer service interactions facilitated by chatbots to complex back-office procedures such as compliance assessments. This automation engenders a reduction in operational expenditure, thereby allowing Financial Services Providers (FSPs) to profitably engage with economically disadvantaged demographics and manage transactions of minimal value that were previously deemed economically impractical. Financial inclusion is becoming a key element of corporate strategy rather than just a Corporate Social Responsibility (CSR) project because to this economic justification. There are many moral problems with integrating AI into the finance industry. Because AI models created utilizing historical datasets tend to learn, replicate, and amplify pre-existing societal biases, leading to discriminatory outcomes. Algorithmic bias is the main cause for concern. This creates an insidious paradox: the tool designed to eliminate human bias may create more digital discrimination. The "black box" artificial intelligence models exhibit a significant deficiency in transparency, which complicates adherence to regulatory mandates and undermines consumer confidence, thereby hindering individuals' ability to contest unfavorable determinations such as the denial of loans. To lower these risks, it is urgent to create comprehensive governance frameworks, incorporate diverse training datasets, and commitment to ethical design principles.

AI in Capital Markets and Risk

AI is exerting a structural influence on global capital markets, driving the evolution from High-Frequency Trading (HFT) toward new forms of algorithmic intelligence. The field is evolving through Generative AI (using Large Language Models or LLMs) which extracts trading signals from vast quantities of unstructured texts such as news, regulatory filings, and social media sentiment—incorporating qualitative data at an unprecedented scale. The next wave is Agentic AI, which are autonomous AI systems that can independently plan and execute complex, multi-step trading strategies without direct human supervision. This marks a fundamental shift from technology serving as decision support to acting as a platform for decision automation. Market leadership is rapidly shifting away from reliance on the most skilled human analyst toward the deployment of the most sophisticated and adaptive autonomous AI agent. Furthermore, AI is fundamentally reinventing financial risk management, enabling a crucial shift from a reactive to a proactive, predictive posture. AI systems ingest and analyze massive, heterogeneous datasets in real-time, greatly improving fraud detection by identifying subtle anomalies in transaction patterns, enhancing credit risk assessment, and allowing for market risk analysis through the simulation of thousands of complex stress scenarios. Risk management thus evolves into a continuous, dynamic analysis of financial data, defined by informational superiority and algorithmic agility. However, the widespread adoption of AI introduces significant and new risks to market stability. The potential for herding behavior is a primary concern; if numerous participants deploy AI systems trained on similar data, they may react identically and simultaneously to market signals. This algorithmic homogeneity dramatically amplifies volatility and increases the risk of "flash crashes". This creates a potent new systemic risk, where the danger stems from the algorithmic interconnectedness of trading systems, necessitating that regulators develop and deploy their own "Sup-Tech" (Supervisory Technology) to monitor the diversity of algorithms in the market.

Transformation of Investment Analysis

AI is revolutionizing the core disciplines of investment analysis. In the realm of Fundamental Analysis, Natural Language Processing (NLP) facilitates the automation of the cumbersome task of deriving insights from unstructured textual information, including SEC filings and transcripts of earnings calls. NLP engages in sentiment analysis to methodically assess and quantify the affective tone present in executive discourse or media reports. Advanced applications go further, combining NLP with psycholinguistics to analyze vocal tone and speech patterns during earnings calls to infer executive

confidence or deception. At its core, AI facilitates the "quantification of the qualitative", generating numerical scores for subjective factors like "CEO sentiment" that can be backtested and correlated with future stock returns. For Technical Analysis, deep learning models elevate the discipline to a data-driven science. Models like Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks are applied directly to price data to identify complex chart patterns and trading signals that are often imperceptible to the human eye, processing thousands of securities simultaneously. This automated pattern recognition, combined with the ability to backtest historical success rates under varied conditions, systematically removes the human biases inherent in traditional technical analysis. The future of generating "alpha" will depend on hybrid models that synthesize data from fundamental, technical, and alternative sources (like sentiment). These integrated models uncover complex, multi-dimensional relationships that are missed when analyzing data in isolation. This structural change implies that the "siloed" analyst will be replaced by "quantamental" teams or advanced AI systems capable of generating holistic investment theses across all three domains.

The Retail Investor and the Need for Governance

The proliferation of AI is democratizing access to sophisticated tools for retail investors. Robo-advisors offer low-cost, automated portfolio management based on risk tolerance. Newer platforms are moving toward active, AI-driven strategies that enable momentum investing and tactical sector rotation, blurring the lines between retail and institutional tools. AI also functions as a "co-pilot" for self-directed investors, augmenting decision-making through personalized recommendations, sentiment analysis, and portfolio optimization. However, this accessibility introduces significant risks, primarily over-reliance. General-purpose AI chatbots, not trained on verified financial data, are prone to "hallucinations" providing incomplete or dangerously incorrect advice with persuasive confidence. This low-quality output, termed "work slop," contributes to a high corporate failure rate for AI investments. For novice investors, this psychological appeal can lead to a dangerous abdication of critical thinking; one survey noted that nearly one in five people who acted on financial advice from a chatbot lost money. To successfully harness AI, stakeholders must establish robust governance frameworks. Financial institutions must invest in Explainable AI (XAI) to demystify "black box" models and implement strong data privacy protocols. Regulators must develop agile frameworks to manage AI-specific risks like algorithmic bias and herding behavior, potentially through the deployment of Sup-Tech. For investors, education is paramount to ensure these powerful new technologies are used as decision aids, not infallible oracles. Ethical AI is not

optional but a prerequisite for building long-term trust and ensuring the viability of the AI-driven financial sector.

Keywords: Artificial Intelligence, financial industry, financial inclusion, retail investor, governance frameworks.

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Production and Use of Biofuels and their Impact on The Environment and Agriculture

Mirela Panait

Faculty of Economic Sciences, Petroleum-Gas University of Ploiești, Romania
Institute of National Economy, Romanian Academy, Bucharest, Romania

Ștefan Virgil Iacob

Faculty of Economic Sciences, Petroleum-Gas University of Ploiești, Romania
Institute of National Economy, Romanian Academy, Bucharest, Romania

Cătălin Voica

Faculty of Economic Sciences, Petroleum-Gas University of Ploiești, Romania
Institute of National Economy, Romanian Academy, Bucharest, Romania

Adrian Neacșa

Faculty of Mechanical and Electrical Engineering, Petroleum-Gas University of Ploiești, Romania

EXTENDED ABSTRACT

This research focused on the production and use of biofuels. Biofuel production involves a set of technological processes by which biological materials (biomass) are transformed into fuels usable for transport, heating or energy production. Consequently, one objective of this research was to attempt to quantify the extent to which the production and use of biofuels affect agriculture and the environment. On the one hand, the cultivation of species used in biofuel production can favor the maintenance of healthy soil and can contribute to the prevention of erosion, when sustainable agricultural techniques are adopted, and on the other hand, the use of agricultural land for biofuel production is detrimental to the food production necessary for the world's populations. On the other hand, at a global level, although there are important concerns about reducing greenhouse gas emissions and green energy production technologies are being developed, fossil fuels still represent 84% of their energy mix. At a European level, efforts to reduce greenhouse gas emissions have resulted in lower consumption of energy produced from traditional sources (oil, gas and coal) and increased use of energy from renewable sources. In this regard, the EU directive (2023) on renewable energy established mandatory targets for the share of renewable energy in the transport sector, including maritime and aviation, in the sense that by 2030,

European Union countries must either reach a share of 29% of renewable energy in transport or reduce the intensity of transport fuel emissions by 14.5%, as well as a combined sub-target for renewable hydrogen and advanced biofuels of 5.5%. The European Union is the largest player in the world in terms of public investment in research and development in biofuels, and the leading countries of the European Union in terms of investment in this sector are Spain, Germany and France. In order to highlight both the evolution of the variables under consideration and the correlations between them, a series of statistical-econometric methods and models were used, such as graphical and tabular analysis, comparative and dynamic study, the index method, the multivariate analysis method and others. The research highlights the complex role of biofuels in the current context of the energy transition and highlights the fact that despite technological advances and increased interest in renewable energy sources, fossil fuels continue to dominate the global energy mix. Statistical-econometric analysis allowed us to outline the developments and relationships between variables, thus providing an integrated perspective on the impact of biofuels on the environment and agriculture. Overall, the research emphasizes the need for a balance between sustainable development and the protection of agricultural resources for feeding the population, in parallel with accelerating the transition efforts towards a cleaner and more efficient energy system..

Keywords: conventional/advanced biofuels, agriculture, environment, developments.

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AI-Enabled Circular Business Models in the Context of the Twin Transition: Implications for Financial Markets and Public Policy

Jianu Daniel Mureșan

*Associate Professor PhD/Business Administration Department, Faculty of Economic Sciences,
Petroleum-Gas University of Ploiesti, Romania.*

Andreea Maria Șopea-Iordache

PhD Student, Valahia University of Târgoviște, Romania

Mircea Constantin Duica

*Professor PhD Habil./Management-Marketing Department, Faculty of Economics, Valahia University
Of Târgoviște, Romania.*

Mirela Panait

*Professor PhD Habil./Department of Cybernetics, Economic Informatics, Finance and Accounting,,
Faculty of Economic Sciences, Petroleum-Gas University of Ploiesti, Romania.*

Irina Gabriela Rădulescu

*Professor PhD/Business Administration Department, Faculty of Economic Sciences, Petroleum-Gas
University of Ploiesti, Romania.*

Alina Gabriela Brezoi

*Associate Professor PhD/Business Administration Department, Faculty of Economic Sciences,
Petroleum-Gas University of Ploiesti, Romania.*

Ștefan Virgil Iacob

*Associate Professor PhD Habil./Department of Cybernetics, Economic Informatics, Finance and
Accounting,, Faculty of Economic Sciences, Petroleum-Gas University of Ploiesti, Romania.*

EXTENDED ABSTRACT

The ongoing shift toward a greener and more digitally integrated European economy is transforming the strategic foundations of firms and redefining how financial markets interpret long-term competitiveness. Within this context, this paper examines the role of Artificial Intelligence in supporting the emergence and consolidation of circular business models. These models, which include reuse, repair, refurbishment, product-as-a-service arrangements and resource-efficient production systems, require accurate

information flows, operational optimization and advanced decision-support tools. The analysis positions AI as a core enabler of these requirements, providing capabilities such as material-flow tracking, predictive maintenance, quality assessment and process optimization. Through these functions, AI strengthens the economic viability of circularity and supports the transition from linear value chains to closed-loop, regenerative systems.

The paper further explores how this technological and environmental convergence affects financial markets. Organizations that integrate circular practices with advanced digital technologies tend to restructure their value creation processes, shifting from one-time product transactions to service-based or performance-based revenue models. These transformations increase the importance of data governance, operational transparency and long-term resource planning. As a result, investors increasingly consider indicators related to digital maturity, circularity potential and organizational resilience when evaluating corporate performance. This evolving perspective influences capital allocation decisions and encourages firms to adopt strategies that align with both environmental objectives and digital innovation trajectories.

From a policy standpoint, the study highlights the significance of European regulatory frameworks that simultaneously promote sustainability, digitalization and responsible technology adoption. Requirements related to sustainability reporting, digital governance and technology risk management create incentives for firms to implement systems capable of supporting traceability, accountability and efficient resource use. These policies form an institutional environment that reinforces the interdependence between green and digital transitions, shaping corporate investment decisions and strengthening the coherence between public objectives and private sector strategies.

By integrating conceptual insights from circular economy research, digital transformation studies and management theory, the paper offers a structured examination of how AI-supported circular models are becoming a defining feature of the Twin Transition. It emphasizes the strategic relevance of aligning technological capabilities with resource-efficient business practices and identifies the implications for firms seeking competitiveness in rapidly evolving markets. The paper concludes by outlining several areas in which companies, investors and policymakers can act to enhance the development of resilient, sustainable and innovation-driven business ecosystems.

Keywords: circular economy, artificial intelligence, sustainable finance, twin transition, financial markets.

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UNDERSTANDING AI'S INFLUENCE ON CONSUM-ER BEHAVIOR IN A TECH- DRIVEN WORLD

The Effect of AI-Generated Content on Customer Knowledge Management and Customer Satisfaction

Andreea Bianca Camara

*National University of Political Studies and Public Administration (SNSPA)
Bucharest, Romania*

EXTENDED ABSTRACT

The development and evolution of artificial intelligence are inevitable. It touches more and more aspects of our lives, from simplifying repetitive work tasks to generating complex communication campaigns, creating texts, and implementing them. This new reality presents numerous challenges related to paradigm shifts, including knowledge management and knowledge dynamics. Regarding Knowledge Management (KM), Artificial Intelligence (AI), and new digital technologies are positioned as an enhancer, enabling the automation of cumbersome processes involved in processing knowledge, data, and multi-directional information (Camara, 2024). Furthermore, AI enhances the potential of KM in the new work environment, where the speed of absorbing and integrating new knowledge and market trends determines a company's sustainability.

Current studies highlight how AI enhances KM processes through its advanced automation that extracts, captures, and processes large volumes of information (Bag et al., 2021), enabling better knowledge creation, dissemination, and use within organizations (Duan et al., 2019). Artificial intelligence revolutionizes how knowledge is managed and how organizations organize, process, and utilize knowledge flows in decision-making (Rezaei et al., 2024a; Jarrahi et al., 2023). The concept of artificial knowledge (Brătianu, 2025), along with the dichotomy between tacit and explicit knowledge in relation to AI (Sanzogni et al., 2017), continues to be a subject for analysis and discussion.

AI technologies provide opportunities to improve internal processes, making many tasks less time-consuming and offering a new perspective on decision-making processes (Cockburn et al., 2018; Botega & da Silva, 2020; Zbucea et al., 2019). They can also facilitate easier and more secure knowledge sharing between departments, resulting in faster knowledge utilization. The emergence of GenAI has

significantly advanced knowledge application by enabling quicker and more consistent access to information stored within organizations (Alavi et al., 2024).

Current studies in the field analyze the conceptual relationship between KM and multilateral AI. However, they are insufficient in demonstrating the impact that this synergy of processes has on consumer perception, especially on how consumers interact, engage, and develop loyalty. This paper aims to fill this significant gap in the literature by examining how content generation from digital platforms influences customer knowledge management processes, thus facilitating the transfer of knowledge from, for, and about consumers. We believe that these technological developments and the increasing use of AI-generated content in consumer communication alter trust and satisfaction reports by mimicking and imitating human knowledge. Therefore, this paper seeks to answer the following research questions: Q1) What is the actual impact of AI-generated content on consumer communication? Q2) Does using AI in consumer communication processes improve CKM processes?

To answer these questions, this work uses a combined methodology for analyzing data obtained from social networks in a case study. The case study will include an A/B test campaign on a Facebook page. The campaign's objective will be the same, but the communication elements—such as image, text, and video—will consist of both AI-generated and human-generated sets. Additionally, we will analyze the interaction rate, consumer responses, and satisfaction levels for each campaign, comparing automated AI responses with those from humans. These indicators will provide initial data for understanding consumer behavior and assessing the impact of AI-generated content. To further enrich the data, we will organize a focus group with consumers to review each campaign's messages and gather feedback on their effectiveness.

Among the main results of the study, we note that the evolution of ChatGPT as a language for learning and communication enables understanding prompts based on the knowledge base learned from the user. Therefore, it becomes not only an assistant in acquiring knowledge but also a potential interpreter and creator of knowledge. It is essential to note that knowledge generated solely by AI must be verified, as AI can only mimic the human mind and may generate unrealistic knowledge (Ghasemaghahi & Calic, 2020).

These developments demonstrate how AI, especially generative AI, has transformed KM from a static, storage-focused function into a dynamic, interactive capability (Sumbal & Amber, 2025). Similarly, it highlights ChatGPT's ability to serve as a real-time knowledge assistant, enabling faster decision-

making, improved collaboration, and continuous learning across all organizational levels. These advancements show how AI, particularly generative AI, has reshaped KM into a more active and interactive process. AI systems no longer merely support KM processes; they actively influence how knowledge is created, shared, and applied in real time, fundamentally redefining the scope and potential of KM in modern organizations. Regarding CKM processes, AI improves data and knowledge capture from users, detects trends and behaviors, and analyzes consumer actions. It facilitates the development of self-service capabilities, increasing satisfaction for specific customer groups and personalizing the content offered.

Keywords: Knowledge, Customer, Customer Knowledge Management, Knowledge Management, Artificial Intelligence, Machine Learning, Customer Satisfaction.

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Exploring the Nexus of AI tool usage and green orientation on purchase intention through an analytical review of the Hospitality industry in Eastern Europe

Charles Randy Afful

PhD Student, Faculty of Management and Economics, Tomas Bata University, Czech Republic.

EXTENDED ABSTRACT

There has been a surge in purchase intentions due to the increasing use of artificial intelligence (AI) on digital platforms, influencing consumers' decisions worldwide. While some consumers are swayed by price, quality, and availability, others are persuaded by reviews and comments using AI tools. In purchase decisions, some consumers view these digital review comments as superficial or algorithmically generated, while others accept them as consumers' real-time experiences in purchase intention decisions. This research aims to explore the impact of AI tool usage and green orientation on purchase decision intention through an analytical review of the hospitality industry in Eastern Europe. The hospitality sector in Eastern Europe is characterised by substantial expansion, attracting considerable investment and tourism, particularly in prominent cities such as Prague, Budapest, and Warsaw. Technological advances and environmental concerns are shifting tourist tastes and preferences. The industry is experiencing heightened demand for distinctive, customised, and opulent accommodations, propelled by genuine travel experiences and the area's abundant cultural legacy and ecotourism sites. (Dutta, 2024). According to Arachchi et al. (2025), technological readiness has a favourable moderating effect on the impact of AI-related sentiments on customer purchase intentions in an AI-driven retail environment. Recently, the hospitality sector has relied on AI algorithms to ensure facility rankings based on pricing, location, greener serenity, amenities, and services as a guide for consumer choice. AI usage is catalysing a transition from scepticism to enthusiasm among Hospitality marketers, and consumers are progressively utilising AI-based services, indicating a notable increase in engagement (Gkikas et al., 2022). Consequently, marketers are incorporating AI technologies to improve user experiences and interfaces

(Roslan and Ahmad 2023). Moreover, customers are experiencing significant improvements in efficiency, efficacy, time conservation, and overall engagement (Puntoni et al., 2021).

The growing diverse perspective in terms of consumer decision-making has been likened to the differences in generations and their exposures to modern technology. Some perceive a greener and floral environment as a means of therapeutically relieving their stress and drawing them closer to appreciating nature, while others attach strong significance to historical sites to de-stress them from the work environment over the year. The research aims to investigate the relationship between AI and the green environment on consumer purchase decisions. The study utilises a quantitative approach and SEM to explore the relationships and contribute to the management of the hospitality sector using inferences from the sustainable development goals perspective.

Keywords: Purchase Intentions, green orientation, Artificial Intelligence, sustainability, hospitality.

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The Digital Divide: Analyzing the Tension Between AI Personalization Effectiveness and Consumer Autonomy

Serghei Moscalenco

PhD Candidate, Faculty of Economics and Business Administration, Babes-Bolyai University Cluj-Napoca, Romania.

Mich Diana Alexandra

PhD Candidate, Faculty of Economics and Business Administration, Babes-Bolyai University Cluj-Napoca, Romania.

Dan-Cristian Dabija

Professor, Babeş-Bolyai University, Cluj-Napoca, Romania.

EXTENDED ABSTRACT

The rise of Artificial Intelligence (AI) has dramatically redefined modern retail, transforming the consumer journey from a linear path into a dynamic, hyper-personalized ecosystem. Success in e-commerce is now critically dependent on a firm's ability to leverage Customer Journey Analytics (CJA) data to deliver perfectly timed, tailored offers. This pursuit of algorithmic efficiency—exemplified by cutting-edge solutions like AI Pallet that use Generative AI and Big Data to predict and create new products—has proven to boost conversion rates and drastically increase speed to market. However, this aggressive deployment of AI, fueled by vast behavioral datasets, creates a substantial and growing ethical challenge. The core problem addressed by this research is the tension between AI personalization effectiveness and the consumer's right to decisional autonomy. While AI-driven personalization is empirically proven to optimize performance, the aggressive implementation of such techniques risks crossing the line into psychological manipulation and inducing negative Customer Experience (CX) outcomes such as perceived pressure, fatigue, or regret.

The aim of the research is to unveil, by means of a systematic literature review, this tension by developing a robust Conceptual Framework for Responsible AI in digital marketing. Although existing literature has explored the efficiency of CJA techniques (such as those based on Google Analytics) and the ethical

concerns regarding Generative AI separately, a crucial methodological gap persists: there is no unified, data-driven framework that links AI personalization effectiveness to its psychological cost on consumer autonomy. This study seeks to deepen these dimensions, shedding light on the distinct ways in which consumer freedom of choice is affected by algorithmic influence.

To bridge this gap, the main methodology for the initial phase is a Systematic Literature Review (SLR) conducted according to the internationally recognized PRISMA guidelines, utilizing strict inclusion and exclusion criteria. The expected contribution is the development of a diagnostic tool that will integrate the analysis of behavioral data (CJA, collected via tools such as Google Analytics) with established psychological models of autonomy. The findings of this study will be a useful resource for companies seeking to adapt their personalization approaches to changing consumer needs, ensuring that AI-driven efficiency is balanced with consumer well-being and trust.

Keywords: AI Ethics, Consumer Autonomy, Customer Journey Analytics, Personalized Recommendations, Generative AI.

From Consumer Behavior to Stakeholder Loyalty: Marketing Communications in the Non-Profit Sector

Leonardo-Mihai Mărincean
Phd. candidate, UBB - FSEGA, Romania

EXTENDED ABSTRACT

This research investigates the distinct strategic marketing challenges (STP: Segmentation, Targeting, Positioning) faced by Non-Profit Organizations (NPOs), focusing on how these strategies influence stakeholder loyalty among donors, volunteers, and beneficiaries. The study is grounded in the critical tension between the NPO sector's dependence on low-cost, high-volume volunteer content creation and the urgent necessity for data-driven consumer behavior insights and the strategic application of AI integration. Initial qualitative findings, based on interviews with 25 NPO representatives, confirm a significant structural gap in organizational capacity: NPOs rely heavily on volunteers (68% for creative content) but overwhelmingly measure communication success superficially (76% rely on reach), failing to accurately track vital behavioral units like purchase intention for donations or deeper behavioral impact and long-term loyalty outcomes. The resulting theoretical model posits that Non-Formal Education (NFE) for volunteer content creators is a key, overlooked mechanism for enhancing communication quality and perceived authenticity. This professionalized, NFE-driven approach allows NPOs to better implement sophisticated STP strategies, utilize AI-driven targeting more effectively by providing actionable data inputs, and ultimately maximize resource efficiency for securing sustained stakeholder engagement. The research provides a crucial framework for transitioning NPOs from output-focused communication to impact-driven behavioral marketing.

Keywords: Non-Profit Marketing Strategy, STP (Segmentation, Targeting, Positioning), Volunteer Engagement, NPO Marketing Strategy.

From Innovation to Illusion: How Technology-Mediated Scarcity Cues Create Collective Illusions and Redefine Consumer Choice

Erisa Mañcellari

Assistant Professor, Faculty of Economics, University of Tirana, Albania.

Enis Elezi

Senior Lecturer in Management, Westminster Business School, UK

Gentjan Çera

Senior Lecturer, Faculty of Economics and Agribusiness, Agricultural University of Tirana, Albania

EXTENDED ABSTRACT

Digital platforms deploy demand-based scarcity cues—signals like “selling fast”, “X people are viewing this item—to drive purchases. Yet consumers cannot verify whether these signals reflect authentic demand or platform manipulation. This creates vulnerability to collective illusions: systematic false perceptions of what others value. This paper develops a conceptual framework that explains how artificially engineered scarcity cues generate collective illusions, activating FOMO and social proof, and ultimately driving consumer herding behavior. Drawing on pluralistic ignorance, information asymmetry, and social proof theory, we propose that collective illusions are the primary mechanism through which technology-mediated signals distort consumer choice and reduce autonomy. The framework identifies six research propositions and two moderators (digital literacy, platform trust), specifying boundary conditions. We argue that as technology amplifies behavioral biases, understanding collective illusions becomes critical for ethical platform design, regulatory policy, and consumer protection in digital markets, navigating the wave of innovation.

1. Introduction

A consumer browsing an e-commerce platform encounters a product listing displaying the message: “Selling fast: 56 people have purchased this in the last 24 hours”. The consumer has no prior interest in

this product category. Yet, such signals trigger a sense of urgency and fear of missing out (FOMO), prompting an immediate purchase. This perceived social demand often draws consumers in, not because the product truly meets their needs, but because they assume it must be worth wanting if everybody else does. The dynamic reflects the classic bandwagon effect (Leibenstein, 1950), driven by the motivation to align with what appears popular.

However, in digital marketplaces, these perceptions may not always reflect actual demand. Instead, they can be engineered through technology-mediated scarcity cues—messages such as “only 3 items left in stock”, or “33 people are viewing this item”—to stimulate urgency and social proof (Ku et al., 2013; Van Herpen et al., 2009), encouraging consumers to conform. These signals are ubiquitous, yet their effect in reducing consumers’ autonomy is not highlighted. Such demand-based scarcity cues can create collective illusions, defined here as false perceptions of what others think, want, or value (Rose, 2022). Collective illusions are grounded in the same psychological mechanism as social proof—people’s tendency to follow perceived majority behavior (Cialdini, 1984; Cialdini & Goldstein, 2004)—but differ in that perceived popularity may be artificially constructed, rather than reflecting real behavior or consensus. On social media, these effects are further reinforced by platform dynamics—including user interactions, content visibility, and distribution patterns—which make the products appear overwhelmingly popular, creating perceptions of majority preference. Together, deliberate scarcity manipulation and social media amplification transform engineered signals into powerful collective illusions, influencing consumer behavior even when real demand is low.

With the rise of digital platforms, scarcity tactics have shifted from reflecting genuine product limitation (Cialdini, 1984; Lynn, 1991) to being algorithmically engineered strategies (Schilling & Turrey, 2025). While extensive research confirms the persuasive effectiveness of scarcity (Aggarwal et al., 2011; Gupta & Gentry, 2019; Roy & Sharma, 2015; Teubner & Graul, 2020), a critical gap remains: how do artificially engineered demand cues create collective illusions that corrupt market signals and reduce consumer autonomy?

To address this gap, the present paper examines how technology-mediated demand-driven scarcity cues foster collective illusions (Rose, 2022), thereby redefining consumer choice and autonomy in digital environments. Drawing on theories of social proof (Cialdini & Goldstein, 2004) and FOMO-driven behavior (Przybylski et al., 2013), this paper develops a conceptual model linking technology-mediated scarcity cues to collective illusions. While social proof and FOMO have been studied separately, this

paper posits that they are better understood as emotional and cognitive consequences of collective illusions. Specifically, when inflated demand-based scarcity cues create collective illusions—false perceptions of majority preference—these illusions activate both emotional urgency (FOMO) and social proof validation through cognitive heuristics, which drive herding behavior and rapid decision-making.

The paper adopts a conceptual and integrative approach synthesizing findings across marketing, digital ethics, and behavioral science to identify the mechanisms through which scarcity appeals transform from persuasive messages into collective illusions. Accordingly, this paper addresses the following research question: How demand-based digital scarcity cues create collective illusions—false perceptions of majority preference—that activate FOMO and social proof, ultimately driving consumer herding behavior in digital marketplaces?

By clarifying how collective illusions form through artificially scarcity signals, this paper provides foundations for three critical areas: (1) theoretical advancement in understanding when engineered consensus differs from authentic social proof; (2) practical implications for marketers and digital platforms; and (3) ethical frameworks for consumer protection policy.

2. Conceptual framework and research propositions

2.1 Framework overview and theoretical integration

In the previous section, we established that artificially created demand-based scarcity cues are pervasive in digital marketplaces. However, existing research lacks a clear explanation of how these signals create collective illusions that undermine consumer autonomy and distort market efficiency. To address this gap, we propose a conceptual framework that clarifies the causal pathways through which engineered demand signals construct false perceptions of consensus and trigger consumer herding behavior.

The central premise of our framework is that collective illusions serve as the primary explanatory mechanism—not a mediator between competing constructs, but the main psychological phenomenon through which artificially created scarcity cues influence behavior. Unlike previous research that treats scarcity, FOMO, and social proof as separate phenomena, we propose an integrated model showing that:

1. Demand-based scarcity cues trigger collective illusions through information asymmetry—consumers cannot verify signal authenticity, making false consensus perceptions possible.

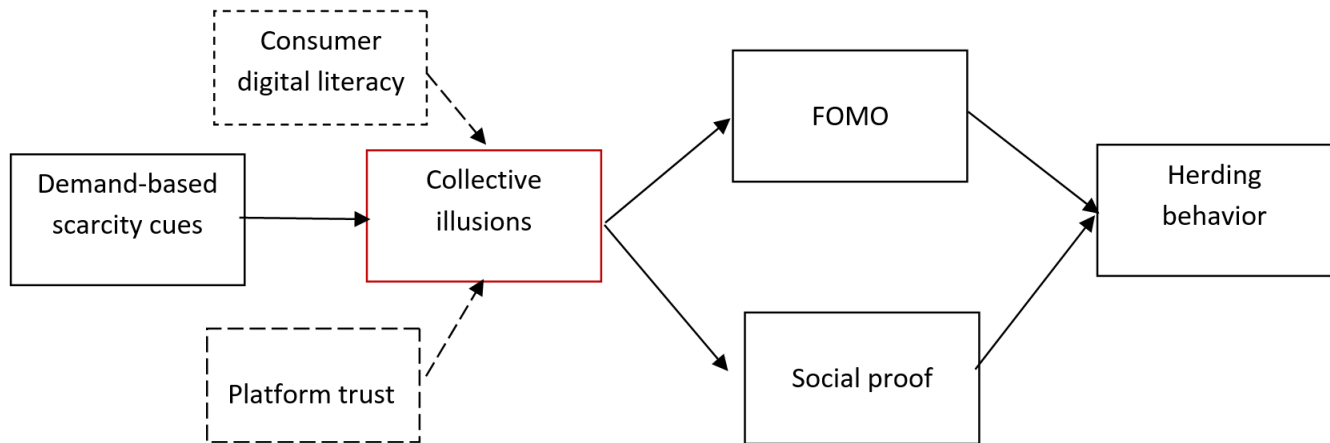
2. Collective illusions activate emotional and cognitive consequences: when consumers believe (falsely) that many others want a product, they experience both emotional urgency (FOMO) and cognitive validation (social proof confirmation).
3. These emotional and cognitive states jointly drive herding behavior—purchasing decisions based on majority preference rather than authentic individual need.
4. Consumer digital literacy and platform trust moderate the cue-to-illusion relationship.

This framework advances theory by clarifying that FOMO and social proof are better understood as consequences of collective illusions, not independent causes of behavior. This distinction is theoretically important because it identifies the intervention point for reducing manipulative consumer behavior: preventing the creation of collective illusions themselves, rather than attempting to manage emotional responses after misperceptions have formed.

The framework synthesizes three interrelated theoretical perspectives: (1) collective illusions theory (Rose, 2022) which builds on pluralistic ignorance (Prentice & Miller, 1996), and explains how systematic misperceptions of collective preferences form and persist; (2) social proof theory (Cialdini & Goldstein, 2004) which explains how perceived consensus shapes behavior; and (3) information asymmetry theory (Akerlof, 1978) that explains how unequal access to information prevent consumers from verifying the authenticity of demand signals in digital markets.

By integrating these theoretical perspectives, we develop a clear and cohesive conceptual model that addresses the specific gap in consumer behavior literature: how do engineered demand signals create false consensus perceptions that drive herding?

Figure 1: Conceptual framework: How artificially-created demand-based scarcity cues create collective illusions and drive consumer herding through FOMO and social proof activation. Consumer digital literacy and platform trust moderate the cue-to-illusion relationship.



2.2 Secondary research questions

While our primary research question addresses the core mechanism, four secondary research questions guide the development of our framework and identify directions for future empirical research:

SQ1: What specific features of digital platforms create information asymmetry that enables collective illusions? How do design choices (e.g., showing viewer counts vs. hiding them, displaying recent vs. aggregated purchases) determine whether consumers can verify signal authenticity?

SQ2: How do consumer characteristics—particularly digital literacy, platform trust, and prior experience with scarcity tactics—moderate susceptibility to collective illusions? Which consumer segments are most vulnerable to engineered demand-based scarcity signals?

SQ3: What distinguishes genuine collective behavior (authentic demand reflecting real consumer preferences) from engineered collective illusions (fabricated signals designed to manipulate)? How can consumers reliably differentiate these phenomena?

SQ4: How do collective illusions evolve over time? Does repeated exposure to manipulative cues lead consumers to become more skeptical and resistant, or does it instead strengthen false beliefs by reinforcing herding behavior?

These secondary questions reflect that collective illusions created from artificially demand-based scarcity cues are not static phenomena but dynamic processes shaped by platform design, individual characteristics, and temporal exposure. Our framework addresses these questions by outlining the underlying mechanisms and the conditions that moderate their effects.

2.3 Research propositions

Our framework generates six focused research propositions that can guide future empirical investigation. Each proposition is grounded in the theoretical logic of the framework and addresses a specific causal relationship or a moderating condition.

P1: Artificially created demand-based scarcity cues increase consumer perception of product popularity and majority preference, triggering the formation of collective illusions.

P2: Collective illusions—false perceptions of majority preference—increase consumers' fear of missing out (FOMO) and emotional urgency.

P3: Collective illusions increase the activation of social proof heuristics, where perceived majority preference serves as a cognitive justification for purchase.

P4: FOMO and social proof validation jointly drive consumer herding behavior—purchasing decisions based on perceived majority preference rather than authentic individual need.

P5: Consumer digital literacy negatively moderates the relationship between demand-based scarcity cues and collective illusion formation. Higher digital literacy reduces susceptibility to collective illusions and attenuates herding.

P6: Platform trust moderates the relationship between demand-based scarcity cues and collective illusion formation. Higher platform trust increases illusion formation, and lower platform trust reduces it.

Keywords: technology-mediated scarcity, collective illusions, digital marketing, demand-based scarcity cues, consumer autonomy, social proof, information asymmetry, FOMO.

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Leveraging AI for Relationship Marketing in Banking

Andreia Gabriela Andrei

Professor, PhD. Alexandru Ioan Cuza University of Iasi, Romania

Corina Pelau

Professor, PhD. Bucharest University of Economic Studies, Romania
corina.pelau@fabiz.ase.ro

Dragos Florentin Mariciuc

Associate Assistant, PhD. Alexandru Ioan Cuza University of Iasi, Romania

EXTENDED ABSTRACT

The financial services industry is undergoing a profound transformation, evolving from product-centric operations to a customer-centric paradigm driven by artificial intelligence (AI).

This paper explores how AI technologies are redefining relationship marketing in banking by enabling hyper-personalized, proactive, and data-informed customer engagement strategies.

AI empowers banks to anticipate customer needs through predictive analytics, sequential pattern modeling, and real-time behavioral insights, thereby transitioning from reactive interventions to proactive advisory roles. Through advanced recommendation engines and dynamic segmentation, banks can deliver timely, context-aware solutions that enhance satisfaction, loyalty, and trust. A comprehensive 360-degree customer data platform—integrating structured and unstructured sources—serves as the foundation for intelligent customer relationship management. The incorporation of AI-powered chatbots, virtual assistants, and intelligent interfaces extends service availability, ensuring individualized support and rapid responses. These systems also enable early detection of churn signals, fraud patterns, and financial distress indicators, strengthening both risk management and relationship continuity. However, the advancement of AI in relationship marketing necessitates responsible governance. Ethical AI deployment demands adherence to privacy laws (e.g., GDPR), algorithmic transparency, and bias mitigation to maintain public trust - the cornerstone of banking. The paper proposes a responsible AI

framework emphasizing explainability, accountability, and human oversight as strategic pillars to ensure that innovation in relationship marketing aligns with sustainable and ethical principles.

Keywords: AI-powered virtual assistants, banking chatbots, customer service chatbots, customer engagement, relationship marketing

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Latent Risks Associated with the Use of Generative AI in Marketing Research and Business Decision-Making

Rareş Mocanu

Associate Professor, National University of Political Studies and Public Administration, Romania

Andreea Mitan

Associate Professor, National University of Political Studies and Public Administration, Romania

Flavia Anghel

Senior Lecturer, National University of Political Studies and Public Administration, Romania

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EXTENDED ABSTRACT

The rapid integration of Generative Artificial Intelligence (GenAI) into business, communication, and research ecosystems has sparked both excitement and concern, indicating a major technological shift (Moens, 2023). OpenAI’s ChatGPT, Google Gemini, Anthropic’s Claude, and Stability AI’s diffusion models have transformed how knowledge is created and shared (Brynjolfsson et al., 2023). However, these innovations allow for latent risks such as biases in training data, model opacity, and epistemic fragility to manifest (Washington, 2025; Li et al., 2025; Uddin et al., 2025). The implications go beyond technical errors, affecting strategy, marketing analytics, and the correct identification of consumer insights, meanwhile raising important ethical questions (Chuan & Zhang, 2024). The false sense of accuracy and objectivity in AI outputs can mislead decision-makers, who often assume algorithmic neutrality (Mittelstadt, 2019), although it has been noted that these systems frequently reproduce cultural, demographic, and linguistic biases present in their training data (Cranor et al., 2025; Heidari et al., 2025).

AI has evolved from predicting outcomes (Wiener, 1948) to creating content (Goodfellow et al., 2014), to acting independently, which increases both its power and the associated risks (Marcus, 2020; Search, 2025). Predictive AI analyzed past data to make forecasts about the future. Generative AI produces new

content. Agentic AI acts on its own to achieve goals (Kiran et al., 2024). Each stage enhances AI's capabilities but also introduces more uncertainty. This leads to the emergence of tensions between the speed of the technological development adoption and the reliability of AI-generated content, which highlights the major implications of trusting AI's answers when making decisions (Parker et al., 2024; Mokyr, 2018; Wohlsen, 2020). As more and more companies use AI to develop and shape their strategies, evaluating the impact of the hidden risks associated with the use of AI and mobilizing forces to mitigate these risks become exceedingly important, as AI may obscure human judgment, leading to potentially dramatic business losses (Thornhill & Dunn, 2024).

The literature classifies the risks associated with the use of AI in five categories: technical failures, such as data bias or hallucination (Li et al., 2025, Surbakti, 2025), sociotechnical failures, such as misuse or automation bias (Cranor et al., 2025, Uddin et al., 2025), epistemic failures, such opacity or synthetic truth (Washington, 2025, Parker et al., 2024), organizational failures, such as economic bias, governance gaps or data monocultures (Washington, 2025, SAS, 2025), and systemic failures such as structural inequity, or misinformation (Li et al., 2025, Surbakti, 2025, Paul et al. 2024).

Drawing from the empirical patterns reported by Li et al. (2025) and Washington (2025), the study interprets GenAI risk through a causal-relational lens. Bias and inconsistency are not isolated phenomena but reciprocal variables, therefore bias drives inconsistency by narrowing representational diversity, while inconsistency reinforces bias by rewarding high-probability token paths that replicate existing data hierarchies (Cranor et al., 2025). In business research, these processes manifest as selective amplification of dominant market voices, underrepresentation of marginal consumers, and false confidence in synthetic correlations.

The empirical focus is confined to knowledge-intensive business processes, particularly in marketing analytics, consumer-insight generation, and strategic communication planning. The study does not test hardware-level vulnerabilities or cybersecurity breaches; these are treated as exogenous variables. Instead, it concentrates on *interpretive risk*—the danger that an organization misreads synthetic data as empirical truth (Washington, 2025). This approach situates the research at the intersection of computational sociology, business analytics, and digital ethics, an emerging interdisciplinary field concerned with algorithmic accountability in commercial ecosystems.

The empirical endeavor aims at exploring the following three questions:

RQ1. *How do algorithmic and data biases embedded in generative AI systems influence the reliability and representational validity of marketing and consumer-insight research?*

RQ2. *To what extent do output inconsistency and epistemic opacity in GenAI reduce organizational trust in AI-generated business insights, and how can human-in-the-loop mechanisms mitigate these effects?*

RQ3. *How do cumulative GenAI risks (bias, inconsistency, opacity) manifest in business outcomes such as ROI misestimation, reputational exposure, and ethical compliance in marketing research organizations?*

Given the multidimensional nature of GenAI risk like spanning technical, epistemic, and organizational domains, this study adopts a qualitative interpretive methodology grounded in the constructivist paradigm (Creswell & Plano Clark, 2023; Braun & Clarke, 2023), which views Generative AI (GenAI) as a socially embedded epistemic phenomenon rather than a purely computational artifact. Unlike positivist approaches that treat AI outcomes as objectively measurable, this study assumes that the meanings, risks, and interpretations of AI systems are constructed through discourse, organizational culture, and professional practice (Zhao et al., 2024).

The objective is to explore how business and marketing professionals make sense of GenAI's reliability and risk, and how these interpretations intersect with broader theoretical insights from recent literature (Abdusalomov et al., 2023; Rychly & Li, 2024). As such, the research design follows a reflexive thematic and comparative synthesis, combining empirical depth (expert interviews) exploring the human interpretations of risk, trust, and decision confidence and intertextual breadth (triangulation with external qualitative and mixed-method studies). Together, these methods capture the interplay between objective system performance and subjective managerial perception, which is central to understanding GenAI's hidden business risks (Washington, 2025; Li et al., 2025). This orientation aligns with the growing recognition in AI research that the "truth value" of generative systems must be examined within sociotechnical contexts—where data provenance, user interpretation, and institutional behavior are co-constitutive (Li et al., 2025; Washington, 2025; Paul et al., 2024).

The study followed an exploratory qualitative design structured in three stages: empirical exploration through semi-structured interviews (24 professionals), comparative triangulation using secondary qualitative findings from eight major 2023–2025 studies, interpretive synthesis that integrated themes across organizational, epistemic, and ethical domains. The interviews were processed using NVivo14.

One of the main results that emerged during the discussions with the 24 professionals was the acknowledgement that GenAI produces information abundance but knowledge scarcity. The extant literature confirms this finding, pointing that AI offers simulated insights for business proposals, that decision-making becomes self-referential while using AI, and that AI-generated assumptions only confirm AI-generated data (Buolamwini & Gebru, 2018; Eubanks, 2018; Narayanan, 2021; Roth, 2023). Another key finding is that GenAI analytics have a black-box nature, as vendors restrict access to training documentation, citing proprietary protection, even in the case of premium clients. Trust is thus performative, not evidential, as other recent studies posit (Akhtar, 2023; Edwards, 2024; Epstein et al., 2023; Igbinenikaro & Adewusi, 2024). Furthermore, participants discussed about the institutional myopia which prevents companies nowadays to foresee the long-term epistemic consequences of short-term gains. Not surprisingly, similar observations have been made by recent studies such as the report published by SAS Institute (2025), which shows that only 34% of marketing organizations conduct AI bias audits, yet 89% claim improved performance.

Based on the exploratory results and on the reviewed literature, the study recommends creating cross-functional AI integrity boards that include marketing, IT, ethics, and social science experts. Unlike traditional compliance committees, these boards should assess interpretive reliability, not just data security. For business and marketing research, the future requires a shift from automation to accountability, from performance to provenance, and from intelligence to integrity. The human-in-the-loop approach is the proposed solution.

The contributions of this study are multifold. First, from an academic point of view, it develops a unified model linking epistemic risk and business-performance volatility, filling a documented research gap between AI ethics and marketing science (Uddin et al., 2025). Second, it advances a methodological contribution, introducing a hybrid evaluation framework combining qualitative perception analysis (expert interviews) with quantitative reliability testing of GenAI outputs. Third, the study offers decision-makers a taxonomy-based audit checklist for assessing the reliability of AI-generated insights before strategic adoption, thus creating a bridge between the theoretical approaches, and the practical relevance of the endeavour.

Keywords: Business Decision-Making, Epistemic Opacity, Generative AI, Human-in-the-loop, Knowledge Reliability.

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Evaluating the Impact of Reminders from Social Media Systems with Artificial Intelligence on Consumer Behavior of Outpatient Appointment Attendance Among Diabetes Patients Using Continuous Glucose Monitors

Joshua Fogel

PhD/Professor, Department of Management, Marketing, and Entrepreneurship, Brooklyn College of the City University of New York, Brooklyn, NY, USA.

Sadaf Hossain

MD/Physician, Department of Medicine; Division of Endocrinology, Diabetes and Metabolism, Nassau University Medical Center, East Meadow, NY, USA.

Bishal Tiwari

MD/Physician, Department of Medicine, Nassau University Medical Center, East Meadow, NY, USA.

David S. Rosenthal

MD/Physician, Department of Medicine; Division of Endocrinology, Diabetes and Metabolism, Nassau University Medical Center, East Meadow, NY, USA.

EXTENDED ABSTRACT

People with diabetes need to monitor their blood glucose levels to better manage their disease.¹ The most common approach is fingerstick monitoring which is typically done four times each day.² Continuous glucose monitors (CGMs) offer several advantages over fingerstick monitoring including its ability to automatically collect data without requiring patient intervention and to provide real time feedback which can serve as a motivational tool for patients to adopt healthier eating habits and lifestyle changes.^{3, 4}

A common challenge for diabetes patients is non-attendance with outpatient follow-up appointments. There are different approaches to encourage diabetes patients to attend outpatient appointments that include phone call reminders⁵ and text message reminders.⁶ Social media may be useful for reminding diabetes patients to attend their outpatient appointments. Social media reminders are more than just text message reminders. Social media communication systems such as WhatsApp and Facebook have artificial intelligence (AI) of Meta AI. Once patients receive a reminder, patients may want to use this

feature to ask if it is important to attend the follow-up appointment, and may even ask for more information about the specialized topic of a CGM device.

We explore the novel idea of whether a social media reminder system with artificial intelligence (AI) of Meta AI is associated with better consumer adherence to attend an outpatient follow-up appointment in patients with diabetes who initiate use of a CGM. We retrospectively compared attendance rates of patients using a social media reminder system versus the previously used traditional scheduling approach.

This is a retrospective analysis comparing use of social media appointment reminders to no such use among 171 diabetes patients receiving a CGM at a public hospital in suburban New York City in the United States. The old patient reminder approach from December 2022 through July 10, 2024 consisted of writing the date and time of the follow-up outpatient appointment scheduled two weeks later on a paper that was given to the patient by the physician at the initial CGM outpatient appointment. The new patient reminder approach from July 11, 2024 through March 2025 was for the physician to obtain the preferred social media contact information at the initial CGM appointment from the patient and then a reminder with the hospital name was sent to the patient two days before the follow-up outpatient appointment scheduled for two weeks later. The multivariate logistic regression analysis for the outcome of attendance at an outpatient follow-up visit adjusted for demographic and health variables.

The study found that the social media reminder group (88.2%, n=60/68) had a significantly ($p<0.001$) greater percentage for attendance at the follow-up appointment than the traditional reminder group (60.2%, n=62/103). Almost all from the social media reminder group used WhatsApp (98.5%, n=67) and one person using Facebook. Multivariate logistic regression analysis showed significantly increased odds of social media appointment reminders for attendance (OR:4.35, 95% CI: 1.70, 11.16, $p=0.002$).

In conclusion, social media reminders were associated with increased consumer behavior of outpatient appointment attendance for diabetes patients using CGMs. We recommend wider use of social media platforms by healthcare facility managers for their reminder systems, especially of WhatsApp, in order to improve diabetes patient outpatient appointment attendance.

Keywords: consumer behavior, office visits, no-show patients, healthcare, social media.

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CONSUMER ENGAGEMENT STRATEGIES FOR INNOVATIVE PRODUCTS

Between silence and crowds: digitalization and tourism development in Italian Internal areas

Simone, Luongo

Research Fellow, Dipartimento di Economia, Management Istituzioni, Università degli Studi di Napoli Federico II, Italy

Fabiana, Sepe

Junior Lecturer, Dipartimento di Economia, Management Istituzioni, Università degli Studi di Napoli Federico II, Italy

Giovanna, Del Gaudio

Senior Lecturer, Dipartimento di Economia, Management Istituzioni, Università degli Studi di Napoli Federico II, Italy

Mario, Tani

Associate Professor, Dipartimento di Economia, Management Istituzioni, Università degli Studi di Napoli Federico II, Italy.

Gianpaolo Basile

Full Professor, Department of Economics, Statistics and Business, Universitas Mercatorum, Italy

EXTENDED ABSTRACT

Tourism is widely acknowledged as a driver of economic and social development, yet its impacts are uneven across geographical contexts (Ursache, 2015) as it is a service industry that relies on local resources (Luongo et al., 2023) to attract foreign investments (de la Mata and Llano-Verduras 2012; Shayakhmetova et al., 2020), and favor innovation transfers (Weidenfeld 2013).

In dealing with tourism-led development processes, metropolitan areas and internationally renowned destinations need to overcome the overtourism challenges of overtourism, and the related studies (Chaney & Séraphin, 2023; Santos-Rojo et al., 2023) stress the risks of congestion, environmental degradation and community resistance when destinations exceed their carrying capacity.

On the contrary, peripheral and internal regions struggle with cultural, natural and social capital (Wu et al., 2022) under-utilization. Academic literature highlights several dimensions of tourism-led development in internal and rural areas. Scholars have examined tourism's capacity to stimulate local

economies, revitalize traditions and foster community identity (Bramwell & Lane, 2011; Tabatabaei et al., 2025). Research on peripheral tourism emphasized its vulnerability, due to limited infrastructure, seasonality and restricted visibility in global markets (Bennike & Nielsen, 2024; Biddulph, 2015). In 2025, Kumar, Argawala and Kumar, in their systematic literature review, studying 277 publications (1990-2023), found that the need for a stronger integration of local community in tourism, helping a sustainable resource utilization (Basile & Tani, 2024), is advocated but only rarely implemented and that communities are marginal change actors.

On the contrary, scholars have found rural, or inner, areas to benefit from tourism-led development (Torabi et al., 2023), when they are able to leverage their social capital (Tomay & Tuboly, 2023).

Relevant factors in explaining tourism-led development are the digital technologies (Pencarelli, 2020), even in rural areas (Lapuz, 2023), but some found that, in order to get their benefits, the local areas should already have a some-what high level of technology-related education and skills (Salemink et al., 2017). Furthermore, on the one hand, digital technologies (platforms, social media and so on) help in increasing peripheral destination visibility and strengthen community participation (Sigala, 2018). On the other hand, those technologies can expose fragile areas to reputational risks and sudden shifts in demand. For example, a single negative review or the communication of closure of an activity through social media may rapidly discourage tourists (Siegel et al., 2023), undermining fragile local economies. Conversely, viral digital exposure can generate unsustainable spikes in demand, exacerbating risks of massification even in areas traditionally considered peripheral (Kamarulzaman et al., 2025). Thus, digitalization emerges as a double-edged sword for internal areas: it offers unprecedented opportunities for inclusion in global tourism networks, but it also heightens their exposure to volatility and uneven development.

In this paper we propose to investigate if, and how, digital technologies are helping rural areas to create a tourism-led development process. In particular, we will compare the development process, from the perspective of the residents, in small cities in four different Italian Regions, two in the Southern part of Italy and two in the northern Italy.

In Southern Italy we will focus on Campania and Basilicata as they are able to exemplify the resource paradox; specifically, they are endowed with rich heritage and landscapes but their inner areas remain marginal ones (Aria et al., 2023; Moliterni et al., 2025). In Northern Italy we looked into two well-known regions. In particular, to match the Campania Region, we selected the Veneto Region, as both share a well-developed tourism sector based on seaside attractions, cultural heritage, and food-and-wine products, while also presenting several underdeveloped inner areas. To draw a parallel with Basilicata,

we selected South Tyrol, as both regions are landlocked and predominantly rural. Nevertheless, their development trajectories have diverged considerably: in Trentino–South Tyrol, and particularly in the Dolomites, even peripheral areas are experiencing the pressures of mass tourism, raising important concerns about sustainability and long-term resilience (Branduini & Carnelli, 2021).

In this study we want to understand this duality, investigating the potential of tourism as an engine for local development in internal areas, while acknowledging the differentiated challenges of under- and over-tourism and how they are linked to the new digital technologies. By comparing regions that experience under-tourism with those already facing massification, the study seeks to generate nuanced theoretical insights on the ambivalence of digital platforms in shaping tourism-led development. Specifically, it examines how local actors perceive and manage digitalization and how these practices influence destination visibility, attractiveness and sustainability.

We think that this research is particularly original as there are no studies, to the best of our knowledge, that have compared the internal areas facing scarcity of flows and those experiencing massification, particularly in the Italian context. Moreover, the gap we are trying to address is particularly relevant given the increasing role of digital technologies in shaping tourism dynamics. In this regard, digitalization represents a critical yet ambivalent force.

Our research adopts a qualitative methodology to capture the lived experiences and perspectives of local stakeholders. Semi-structured interviews will be conducted with representatives of local Pro Loco associations, which play a crucial role in promoting and coordinating tourism initiatives in internal areas. These organizations represent a valuable vantage point, as they mediate between local communities, visitors and broader destination management structures (Capriello, 2020). Interviews will focus on themes such as: strategies of digital communication, perceptions of tourism's role in local development, challenges of under- or over-exposure and adaptive responses to digital risks. Data will be systematically coded and analyzed using qualitative data analysis software, enabling the identification of recurring patterns and emergent theoretical categories. The iterative coding process will ensure methodological rigor and allow for theory building grounded in empirical evidence.

This research is expected to generate three main contributions. First, it should help advance the theoretical understanding of tourism as a development engine for internal areas by integrating the dual lens of under- and over-tourism within a single comparative framework. Second, it extends the literature on digitalization in tourism by conceptualizing it as an ambivalent force: one that can enhance resilience and visibility but also exacerbate fragility and volatility in peripheral destinations. Third, it provides

empirical insights specific to the Italian context, contributing to the broader debate on sustainable tourism management in Europe.

From a practical perspective, the findings will inform policymakers, destination managers, and local associations on how to strategically leverage digital technologies while mitigating associated risks. For Southern regions such as Campania and Basilicata, this may involve capacity-building initiatives to strengthen digital skills and visibility strategies tailored to sustainable growth. For Northern contexts like the Dolomites, insights may guide the development of digital governance tools to monitor and manage flows, prevent overcrowding, and balance community well-being with tourism demand.

Ultimately, this study underscores the strategic role of tourism in reimagining the future of internal areas, highlighting digitalization as both a challenge and an opportunity. By bridging perspectives from under- and over-touristed regions, it aspires to contribute to the advancement of tourism management theory and to provide actionable knowledge for fostering resilient, inclusive, and sustainable territorial development.

Keywords: Inner Areas, Digital Technologies, Development, Tourism, Rural Areas.

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Consumer Behaviour and Perceptions Toward Sustainable Fashion: A Marketing Perspective

Sabo Evelyn-Maria

PhD Candidate, Faculty of Economics and Business Administration, Babes-Bolyai University Cluj-Napoca, Romania

EXTENDED ABSTRACT

Sustainability is becoming more and more important in the modern world, influencing both consumer behaviour and marketing tactics in the fashion industry. The purpose of this research is to determine how consumers perceive the value of sustainable practices and what patterns of behaviour they allow themselves to be influenced by.

To implement this research question, a survey based quantitative research was implemented. The online questionnaire comprised a wide range of topics related to Romanian consumers perceptions towards fashion sustainability, responsible consumption in fashion, sustainable fashion social media trends and production, fashion marketing, sustainable fashion price perception etc. Data was operationalised according to literature and analysed by means of structural equations modelling in SmartPLS. Most of respondents were full-time employed women, aged between 18 and 24, with a bachelor's degree.

The findings demonstrate that fashion sustainability for young women represents a relevant yet differently rated criterion when choosing to buy sustainable fashion products. Although factors like responsible consumption and sustainable production are positively valued, price remains a key factor in women choice about their preferred fashion items. The impact of social media on purchasing decisions is also clearly apparent.

The research demonstrates that while sustainability in the fashion industry still represents a significant motivator enhancing consumption, women take consumption decisions based also on further factors, such as price sensitivity, brand image, social influence, emotional attachment to products, and individual lifestyles. From a managerial perspective, the research shows how companies can learn how to

effectively combine different consumer-based strategies to foster consumption of sustainable fashion items and strengthen long-term brand loyalty among environmentally conscious consumers.

Keywords: Fashion industry, Consumer behaviour, Marketing strategies, Sustainable consumption, Brand loyalty, Eco-friendly fashion, Ethical fashion, Green marketing, Lifestyle factors, Social influence, Price sensitivity, Brand image.

Marketing traditional Oaş clothing in Negrești-Oaş: between cultural identity and adaptation to the modern market

Mich Diana Alexandra

PhD Candidate, Faculty of Economics and Business Administration, Babes-Bolyai University Cluj-Napoca, Romania

Serghei Moscalenco

PhD Candidate, Faculty of Economics and Business Administration, Babes-Bolyai University Cluj-Napoca, Romania

EXTENDED ABSTRACT

The Țara Oașului – this path of the Romanian people, one of the oldest and most picturesque ethno-folkloric areas in Romania – has preserved, like an island of ethnic archaism, traces of a cultural, social, and economic life that seems to be trapped in an hourglass of time. In a global context marked by unexpected developments, cultural uniformity, and mass consumption, traditional Oaş clothing represents a unique landmark of indigenous Romanian identity, a standard-bearer of national culture, and a living treasure of this area. However, the preservation and promotion of this material and symbolic heritage increasingly depend on the ability of local craftsmen to adapt to the demands of a modern and competitive market, characterized by the multifaceted behavior of consumers, who prefer simplicity over the preservation of traditions. In Negrești-Oaş, traditional dress is not only an aesthetic expression, but also a form of cultural resistance, a living testimony to the connection between tradition, family, and community.

This research aims to investigate how local artisans in Negrești-Oaş manage to maintain the relevance of traditional clothing items in a socio-economic context marked by turbulence and instability, by analyzing their marketing strategies, economic challenges, and the degree to which they adapt their offerings to new consumer trends and contemporary societal challenges. This analysis aims to identify the balance between cultural authenticity and the need to respond to the demands of the modern market without compromising the symbolic value of traditional products.

The research is based on a qualitative method, using semi-structured interviews conducted among local craftsmen involved in the production of traditional clothing in Negrești-Oaș. The opinions, perceptions, and information obtained are interpreted in relation to the literature on cultural marketing, ethnic branding, and sustainability in the creative industries. Thematic analysis of the data allows for the development of a conceptual framework for the sustainable marketing of traditional products, capable of integrating cultural values with the principles of modern economics.

By combining cultural dimensions with marketing analysis, this research offers a new perspective on how traditions can be preserved and passed on to future generations, not only as museum objects, but as living products that convey identity and economic value. In this way, traditional Oșenesc clothing becomes a symbol of cultural continuity and an example of responsible adaptation to the demands of contemporary society.

Keywords: Cultural marketing, Sustainable heritage, Traditional crafts, Oaș clothing, Local entrepreneurship, Consumer perception, Authenticity.

Between inspiration and advertising: the relationship between influencer discourse and consumer perception

Andreea-Mihaela Ciomag

PhD Candidate, Faculty of Economics and Business Administration, Babes-Bolyai University Cluj-Napoca, Romania.

EXTENDED ABSTRACT

The importance of influencers in the contemporary digital marketing landscape is constantly growing. They have a significant impact on consumer behavior, influencing purchasing decisions and have become crucial mediators between companies and consumers. The objective of this research is to examine how influencers' audience perceive their promotional content and how these perceptions influence the consumer behavior and the loyalty towards the influencers.

To respond to this research question, a survey based quantitative approach was considered. The questionnaire was distributed online and covered a variety of topics related to Romanian consumers trust in influencers they follow, their skepticism towards the promotional content, the parasocial interaction, the perceived positive emotional characteristic of influencer content, the perceived influencers' sincerity, the buying behavior and consumers' loyalty towards the influencers. The data was processed in accordance with the existing literature and analyzed using R's structural equation modeling. Most of respondents were women, aged between 19 and 25, with a bachelor's degree.

The findings underline that parasocial interactions are important for the young, women dominated audience. Young women tend to perceive the influencers they follow as trustworthy and sincere, yet they show an important level of skepticism. Influencers are perceived as being passionate about the products they promote and having a flattering promotional discourse.

The research demonstrates that consumers take into consideration the authenticity and the sincerity of influencers. They think about what influencers express in their marketing texts and what feelings these texts generate. Although consumers tend to remain loyal to the influencers they follow and to buy the endorsed products, they do not make a buying decision or change their buying decision, only based on their perception on influencers and marketing

content. From a managerial perspective, the research unveils the need for influencer marketing based on authentic communication, transparency and value matching to maintain consumer trust and interest in the medium term.

Keywords: Influencer Marketing, Marketing Strategies, Buying Behavior, Digital Marketing, Advertising Discourse.

Gender-based differences in online travel review behavior and preferences

Uroš GODNOV

*University of Primorska, Faculty of Mathematics, Natural Sciences and Information Technologies,
Slovenia*

Maja MEŠKO

University of Maribor, Faculty of Organizational Sciences, Slovenia

Tjaša REDEK

University of Ljubljana, School of Economics and Business, Slovenia.

EXTENDED ABSTRACT

This study offers an expanded examination of how gender shapes both the content and engagement patterns of online reviews for tourism attractions and hotels. Prior research consistently shows that consumer behavior in e-WOM contexts follows gender-specific tendencies (Rahimi et al., 2022). Men and women often differ in their preferences, motivations, and communication styles when interacting with tourism-related information online (Saidani et al., 2023). For example, gender moderates the influence of electronic word-of-mouth on destination trust and revisit intention, with men generally reacting more strongly to such cues (Abubakar et al., 2017). Women, on the other hand, tend to rely more heavily on social media for travel planning, which suggests that they may engage with and produce online reviews differently from men (Wibisono & Lale, 2024).

Drawing on this background, the study explores whether these behavioral differences also extend to the qualitative and quantitative characteristics of user-generated review content. Previous findings indicate that male reviewers may prioritize factual, utilitarian, or “helpful” aspects, while female reviewers often emphasize authenticity, social interaction, and emotionally rich experiences (Hurdawaty et al., 2025). Such divergence highlights the need to examine how gender influences both the structure and content of tourism-related online communication (Hervás-Cortina et al., 2024).

The dataset comprises 50,000 online reviews covering 166 tourism attractions and hotels across diverse global regions. Analyses were performed in R (version 4.4.1) using RStudio (2024.12.1 Build 563). Data processing relied on tidyverse (Wickham et al., 2019), readxl (Wickham & Bryan, 2025), ggstatsplot (Patil, 2021), janitor (Firke, 2024), and arsenal (Heinzen et al., 2021). The review dataset, stored in an Excel file (tm.xlsx), was imported via readxl.

Statistical summaries were generated using the tableby function from the arsenal package, providing detailed descriptive measures for numerical variables and frequency-based measures for categorical variables. ANOVA tested differences between genders for numerical variables, while Chi-squared tests evaluated differences in categorical measures. Significance was assessed at the 95% confidence level, with the Benjamini–Hochberg adjustment applied to correct for multiple testing. Visualizations including statistical annotations were created using ggstatsplot.

The analysis was stratified by gender (Female N = 26,463; Male N = 25,094) and included age-based comparisons. Most variables showed highly significant gender differences after BH correction ($p < 0.001$). Male reviewers produced a higher number of reviews and received substantially more “helpful” ratings (mean 65.7) compared with female reviewers (mean 46.6). Men also accumulated considerably more travel points, suggesting broader engagement with travel or with the platform itself. Sentiment analysis revealed that women expressed slightly more positive emotion in their reviews, a finding supported by transformer-based polarity classification showing a higher proportion of positive sentiments among female-authored content. Gender patterns also emerged across various interest categories: women tended to show stronger interests in shopping and beach-related activities, whereas men were more inclined toward urban exploration and thrill-seeking.

Taken together, these results demonstrate that gender plays a meaningful role in shaping how travelers create and interact with online review content, reinforcing the importance of accounting for gendered patterns in e-WOM analyses within the tourism domain.

Keywords: Gender differences, electronic word-of-mouth, user-generated content, online reviews, tourism behavior.

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**WORLDS IN MOTION
SOCIOTECHNICAL CHANGE AND POSSIBLE
FUTURES**

Different views of international scientific mobility and collaboration. The case of three peripheral countries in the Southern Cone: Argentina, Chile and Uruguay

José Miguel Zegarra

Centrum PUCP Business School, Lima, Peru

Ivan de la Vega

Centrum PUCP Business School, Lima, Peru

EXTENDED ABSTRACT

Purpose

The purpose of this study is to analyse the various facets of local and international scientific mobility, as well as the collaboration dynamics arising from co-authorship among scientists across different institutions and/or countries. The study will examine the mobility and collaboration patterns of three Southern Cone countries (Argentina, Chile and Uruguay) by analysing changes in the reported affiliations of authors associated with these countries who published during the period 2000–2025.

Design/methodology/approach

A bibliometric analysis will be conducted using Scopus data on articles authored by researchers with at least one affiliation in Argentina, Chile or Uruguay during 2000–2025. The first step will be to extract Scopus metadata by country in order to construct the universe of authors who published during the study period and reported at least one affiliation in any of the three countries. The affiliations recorded in each document will then be analysed to trace mobility flows and the international collaboration arising from co-authorship; following the protocol described in the manuscript, yearly classifications will be derived by comparing the last reported affiliation in each year with that of the previous year. Authors will be uniquely identified using the Scopus Author ID, which facilitates the tracking of outputs and affiliation

changes over time and helps to reduce problems caused by name variants and multiple affiliations (Aman, 2018; Visser et al., 2021).

Research limitations/implications

The study recognises several limitations typical of bibliometric analyses. One concerns the use of non-standardised author names, which necessitates applying name-disambiguation techniques. In recent years, the use of persistent author identifiers has expanded, allowing the integration of name variants and longitudinal adjustment in line with the design of this study (Aman, 2018; Visser et al., 2021). Potential cases of double or triple affiliation will also require additional consideration, particularly where affiliations correspond to different countries or persist over time. Given the data volume required for a longitudinal, country-level analysis focused on individual trajectories, computational tools are needed to support classification and indicator generation. In practice, this includes large-scale extraction via the Scopus API, the construction of co-authorship networks with VOSviewer, and complementary graphs and maps with Scimago Graphica and Python, which together improve traceability and comparability across records (van Eck & Waltman, 2010; Hassan-Montero et al., 2022). More broadly, the progressive adoption of persistent identifiers for authors and institutions in specialised databases such as Scopus strengthens the interpretability of mobility and co-authorship trajectories and opens further avenues for research

Originality/value

The comparative analysis of scientific mobility and collaboration will reconstruct mobility trajectories for three Southern Cone countries during a formative period in the development of their scientific production systems (1990–2025). It will provide a comparative reading of mobility flows and international co-authorship networks, identifying countries with higher levels of researcher emigration and their principal destinations. This longitudinal evidence, based on comparable bibliometric metrics, will contribute empirical grounding to refine narratives of brain drain, brain gain and brain circulation in the Southern Cone region (Johnson & Regets, 1999; Lee, 2009; Giannoccolo, 2009). In addition, the study sets out a country-reproducible analytical protocol that integrates advanced computational analysis, large-scale bibliographic data with persistent identifiers, and explicit criteria for classifying mobility through year-to-year changes in reported affiliations (Aman, 2018). Co-authorship networks will be constructed at country level and complemented with visualisations to characterise collaboration patterns over time.

Keywords: International scientific collaboration, scientific mobility, brain circulation, brain gain, brain drain, bibliometric indicators, Scopus

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Safeguarding Human Rights with efficacy and leveraging Artificial Intelligence: a quandary?

Claudia Pretto

Independent researcher, Italy

EXTENDED ABSTRACT

Today, effectively protecting human rights is caught up not only in the eternal dilemma of balancing individual, community, and State rights but also in the question of how to use Artificial Intelligence in a way that is both legally acceptable and does not violate or deny human dignity. One example of the misuse of AI is its use to control and repress dissident movements within certain legal systems. Over the last years, AI has become available on the tools used by lawyers and judges for investigations and data analysis to prevent and combat crime. But what are the limits, if any, and how should they be set? In the context of monitoring specific rights, such as those of detainees and consumers, protection agencies, judges assessing the risk associated with the repatriation of asylum seekers, criminal networks, and legal researchers use AI tools without understanding the concrete interactions these tools lead to. AI is involved in processes that assess the effectiveness of human rights protection. It is part of these processes and is used by both observers and those being observed. In the context of human rights, artificial intelligence demonstrates that effectively protecting human rights today likely requires third-order cybernetics perspective. This is already a reality, and the complexity it generates merits specific observation. Nonetheless, it remains opaque whether regulatory frameworks can adequately capture the extensive and consistent scope of AI implementation. A dichotomy persists between the beneficial and indispensable utilization of AI and its deleterious application, attributable to the inconsistency and lack of precision in regulatory frameworks.

Keywords: Human Rights Effectivity, Rule of Law, Artificial Intelligence- AI, Cybernetic orders

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Techno-nationalism and the Strategic Role of Critical Minerals in Modern Trade War

Nino Papachashvili

Professor, Director of the Institute for Development Studies, Sulikhan-Saba Orbeliani University, Georgia

EXTENDED ABSTRACT

Introduction: The Emerging Arena of Technological Sovereignty

The global geopolitical landscape is undergoing a profound shift, where traditional ideological and economic disputes are increasingly supplanted by a fierce competition for technological supremacy. In this evolving context, trade wars have transcended conventional tariffs and barriers, centering instead on the control of critical technological foundations.

Building on our previous research into the drivers of contemporary neo-protectionism, we found that technological control is the cornerstone of modern protectionist strategies. Nations -particularly the United States and China - are pursuing technological sovereignty through innovation policies in which critical minerals play a pivotal role (Papachashvili & Mikaberidze, 2025).

This paper focuses on Critical Minerals (CMs) - including Rare Earth Elements, Lithium, Cobalt, and Graphite - which are essential to the energy transition and advanced defense technologies. These resources underpin key sectors such as 5G/6G networks, artificial intelligence hardware, and the electric vehicle industry.

Recent data highlights the concentrated and fragile nature of global supply chains for these minerals. China commands over 80% of refined magnet rare earths and more than 60% of lithium chemicals (IEA, 2024–2025), and nearly monopolizes battery-grade graphite processing (approx. 99%). For the U.S., which imports over 80% of many critical minerals, this concentration presents serious economic and national security concerns (USGS, 2025).

The supply chain configuration is a central battleground in the broader U.S.-China techno-economic rivalry (Luo, 2024; Williams, 2025). China strategically employs its dominance as a techno-nationalist tool to assert geopolitical influence and pursue technological self-reliance (Ibata-Arens, 2019). Export controls imposed between 2023 and 2025 on gallium, germanium, and select rare earths exemplify this strategy, creating chokepoints in response to U.S. semiconductor restrictions (ORF America, 2025). These actions intensify market volatility and underscore the risks of overdependence on a single supplier. Western nations have adopted assertive industrial policies aimed at diversification and resilience. The U.S. CHIPS and Science Act (2022) and the Inflation Reduction Act (IRA, 2022) channel substantial subsidies into domestic production of semiconductors and clean energy components (Stiglitz et al., 2025; Bipartisan Policy Center, 2022). These initiatives mark a departure from liberal globalization toward a more state-directed industrial model (Rodrik, 2018), with the goal of mitigating strategic risks in a fragmented technological landscape.

This paper explores the following **research question**: How has control over the critical mineral supply chain become a central instrument of techno-nationalism?

Methodology

This research employs a qualitative methodology grounded in policy analysis and geopolitical theory. It synthesizes data from official reports (USGS, IEA), legislative documents (the CHIPS Act, the IRA), and scholarly literature to examine how control over critical minerals functions as a strategic instrument of techno-nationalism. Comparative case studies of U.S. and Chinese industrial policies illustrate divergent approaches to technological sovereignty. The core analysis integrates empirical supply chain data with theoretical frameworks of techno-nationalism and resource weaponization, enabling a nuanced understanding of the geopolitical and economic implications for Western states pursuing diversification and resilience. This study provides a critical account of how the current trade war has transcended conventional tariffs, centering instead on the control of critical technological foundations.

Techno-nationalism as a Theoretical Framework

Techno-nationalism, as a conceptual framework, fuses nationalist imperatives with economic and technological policy instruments (Luttwak, 2019). It extends beyond classical mercantilism, which emphasizes trade balances, by prioritizing control over strategic technological capabilities (Breznitz &

Zysman, 2019). In its modern form, techno-nationalism is characterized by substantial state subsidies for domestic innovation, the cultivation of national champions, and the imposition of non-tariff barriers.

Critical Minerals (CMs) provide a tangible dimension to this framework. Often described as a “geopolitical bottleneck” (Humphreys, 2020), control over CMs directly influences a state's industrial and military trajectory. Scholarly literature underscores the concept of Resource Weaponization as a core element of techno-nationalist strategy, wherein economic advantages are leveraged to achieve geopolitical objectives (Krass, 2021). Ownership and control of CMs thus become strategic assets - not only enabling the slowdown of rival technological development but also allowing the dominant power to shape global standards.

Critical Minerals as Instruments of Techno-nationalism

1. China’s Dominance and Strategic Leverage

The empirical analysis reveals a stark asymmetry in the global CMs supply chain. Although the geological distribution of these minerals is relatively widespread, China maintains dominance not only in extraction but - more critically - in processing and refining. For example, China controls over 60% of global Rare Earth Element supply and 85% of processing capacity (USGS, 2024), granting it substantial strategic leverage.

Techno-nationalism is operationalized through:

- ✓ **State Subsidies and Vertical Integration:** China has systematically invested in the entire CMs value chain, from raw extraction to the production of high-performance magnets. This vertically integrated model aligns resource utilization with national technological priorities, exemplified by the “Made in China 2025” initiative.
- ✓ **Export Control Mechanisms:** Export restrictions serve as a visible tool of techno-nationalist policy. The suspension of Rare Earth exports during the 2010 Japan dispute and the more recent curbs on Germanium and Gallium (2023) illustrate how CMs are weaponized to disrupt foreign technological advancement - particularly in semiconductor production - while reinforcing China’s technological autonomy.

2. Geopolitical and Economic Risks for the West

Western economies, particularly the U.S. and EU, face layered risks stemming from their dependence on CMs:

- ✓ **Economic Vulnerability:** Disruptions in supply or price manipulation threaten the viability of high-tech manufacturing and the Green Transition, which relies heavily on lithium and cobalt.
- ✓ **National Security Exposure:** CMs are integral to defense technologies such as radar systems and guided missiles. Foreign reliance on these minerals introduces direct risks to national security, reinforcing their strategic importance in techno-nationalist competition.
- ✓ **Technological Lag:** Control over CMs enables dominant states to influence technological standards and potentially delay innovation in rival economies.

Techno-nationalism and the Strategic Trade War

Modern protectionism reflects a structural transformation in global economic policy, shifting from traditional tariff-based measures to multifaceted strategies rooted in techno-political rivalry and national security imperatives. This evolution is best understood through the lens of techno-nationalism.

The strategic competition between the United States and China exemplifies this new wave of neo-protectionism. Far from a transient trade dispute, it represents a deep-seated techno-economic contest (Zhang, 2025; Bello, 2023). The trade war that began in 2018 - initially focused on tariffs affecting over \$360 billion in Chinese exports - quickly escalated into a broader confrontation over technological leadership.

Under techno-nationalist logic, trade policy instruments increasingly serve strategic, non-commercial objectives. The United States has implemented export controls targeting advanced semiconductor equipment, AI-enabling software, and other critical technologies. In response, China has enacted its own countermeasures, including export restrictions on rare earths, gallium, and germanium - minerals essential for chip manufacturing and defense applications (Reuters, 2025).

Technological control increasingly underpins contemporary protectionist frameworks. Legislative measures such as the CHIPS and Science Act and the Inflation Reduction Act (IRA) reflect efforts to reduce foreign dependency while revitalizing domestic industrial capacity in strategic sectors, including semiconductors and clean energy (Bown & Irwin, 2022). These initiatives seek to reassert technological sovereignty and address concerns over a perceived erosion of innovation leadership (Rodrik, 2018).

This contest also extends into the realm of digital sovereignty. Policies mandating data localization and the exclusion of Chinese firms like Huawei and ZTE from Western 5G infrastructure are interpreted as covert market barriers designed to mitigate national security risks. Collectively, these actions signal a fundamental realignment: trade policy has become a strategic instrument of statecraft, reshaping global value chains and reinforcing national resilience in an increasingly decentralized global order.

Policy Implications

Western responses to techno-nationalist control largely center on diversification strategies designed to counter resource-based geopolitical leverage.

These include:

Friend-shoring and Partner-shoring: Strengthening mining and processing capacities in allied nations such as Australia, Canada, and select African countries. Yet these efforts face limitations, as the dominant power retains control over key technologies and infrastructure.

Domestic Production Incentives: Government subsidies - such as those provided under the U.S. Inflation Reduction Act - aim to establish national supply chains. This approach reflects reciprocal techno-nationalism, reinforcing strategic autonomy.

Recycling and Material Innovation: Long-term resilience depends on reducing mineral dependency through R&D in alternative materials and circular economy models (e.g., sodium-ion batteries as substitutes for lithium).

Conclusions

In sum, securing access to critical minerals has evolved beyond economic planning - it now plays a decisive role in shaping global power dynamics and technological sovereignty. Critical minerals form the material backbone of techno-nationalist strategy. Control over their supply chains enables states to convert economic dependency into geopolitical influence. Within the context of the current trade war, this dynamic exacerbates global tensions and heightens risks to energy security, technological progress, and economic stability.

It is clear that control over critical minerals provides strategic leverage, enabling dominant states to weaponize dependencies in pursuit of national security objectives. This underscores the urgent need for Western nations to diversify sources, expand domestic processing, and coordinate industrial policies.

However, these initiatives must carefully balance security priorities with the principles of open trade and international cooperation. Failure to do so risks deepening fragmentation in the global technological order, marked by volatility, mistrust, and slowed innovation.

Ultimately, techno-nationalism represents more than a temporary policy trend - it signals a structural shift. As states increasingly equate technological control with sovereignty, the global economic system must adapt to a new paradigm in which strategic resources such as critical minerals are central to both industrial policy and geopolitical strategy.

Keywords: Techno-nationalism; Critical minerals; Technological sovereignty; Trade war; Neo-protectionism; Supply chain geopolitics.

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SHAPING LEARNING AND WORK SKILLS FOR A TECH DRIVEN WORLD

Generative AI in Business Education: Toward a Scalable Model for Transformative Learning

May Portuguese-Castro

Professor and Researcher, CENTRUM Católica Graduate Business School, Perú.

EXTENDED ABSTRACT

In the context of digital disruption and growing sustainability imperatives, business education must evolve to prepare professionals capable of leading responsibly in complex, uncertain environments. Business schools are increasingly pressured to move beyond traditional models focused solely on profit maximization and adopt new paradigms that prioritize ethical leadership, responsible management, and value creation (Portuguez-Castro, 2024). This transformation is urgent, as conventional educational models tend to emphasize theoretical knowledge over practical competencies, leaving graduates underprepared to respond effectively to the complex and interconnected issues shaping today’s global landscape (UNESCO, 2022). In this rapidly changing context, future professionals must be equipped with critical and innovative thinking, adaptability, and the ability to collaborate across disciplines and cultures.

This urgent shift demands not only new tools, but also new questions. In a world obsessed with speed and optimization, are we educating future business leaders to think—or to delegate thinking to technology? The challenge is no longer just integrating AI into pedagogy, but ensuring that business education remains a space for critical judgment, ethical reflection, and human-centered innovation.

Complex thinking has emerged as a key metacompetency, enabling learners to navigate uncertainty, analyze interdependencies, and co-create sustainable solutions rooted in both local and global realities (Vázquez-Parra et al., 2024). As a result, business education must integrate active learning strategies, experiential learning opportunities, and digital tools that support reflective practice and real-world engagement (Portuguez-Castro & Ramírez-Montoya, 2025). Among these tools, generative artificial intelligence (GenAI) offers powerful potential—not only to enhance efficiency and creativity, but also

to promote ethical reflection, critical dialogue, and systemic thinking. Rethinking how we teach and learn in business programs requires pedagogical approaches that meaningfully incorporate GenAI technologies to foster transformative learning and innovation.

Despite increasing recognition of the value of active learning methodologies and emerging technologies such as AI, there remains a significant gap in the literature regarding comprehensive pedagogical models that effectively combine GenAI with active learning. While connections between agile methodologies, complex thinking, and transformative economic principles have been explored in recent years—and several authors have highlighted the potential of GenAI to enhance agile learning models (Montefusco & Angeli, 2024)—empirical research on the intentional and structured integration of AI in educational settings, especially in business education, remains limited. This lack of robust models hinders a full understanding of the impact and transformative potential of such tools. Moreover, existing studies suggest that the adoption of these integrated approaches is often neither explicit nor systematic in higher education institutions (Patiño et al., 2023), underscoring the need for further exploration of how these strategies can be consistently implemented within academic programs. Longitudinal research is also needed to assess the long-term effects of GenAI integration on student competencies and professional performance.

This study presents the results of a pedagogical proposal based on a large-scale experience conducted at a Peruvian graduate business school. The initiative aimed to integrate generative AI tools into MBA programs to develop future-ready competencies. The proposed model followed a six-phase framework that combined GenAI tools with sustainability education and active, challenge-based learning. More than 400 MBA students participated, working in interdisciplinary teams to address real-world challenges aligned with the Sustainable Development Goals (SDGs).

The experience was then systematized into a scalable pedagogical model structured around four pillars: (1) complex thinking development, (2) critical integration of GenAI as a cognitive partner, (3) sustainability-centered challenges, and (4) reflexive and ethical evaluation. Rather than using AI simply for content generation, the model promotes its use to deepen analysis, foster divergent thinking, and support responsible innovation.

The study employed a mixed-method research design. Quantitative results from the e-Complexity instrument showed significant improvement in dimensions related to critical, innovative, and scientific thinking, reflecting students' ability to approach problems from multiple perspectives and engage in

structured, reflective reasoning. Qualitative analysis of student deliverables, reflection journals, and collaborative digital activities revealed that GenAI tools supported creativity, accelerated ideation, and enhanced collaborative learning. Students reported using AI to simulate stakeholder dialogues, refine business pitches, and test assumptions in real time, thus improving both engagement and the depth of their proposals.

Findings also highlight ethical concerns voiced by students, including overreliance on AI-generated content, questions of authorship, and the need for human judgment and interpretive responsibility. These insights reinforce the importance of embedding GenAI within guided, ethical frameworks that align with pedagogical objectives and institutional values.

Ultimately, this proposal offers an evidence-based, transferable model for embedding GenAI into business education in ways that foster innovation, sustainability, and complex thinking. It contributes to a culture of lifelong learning while bridging digital competencies with ethical leadership development. The model holds practical relevance for educators, curriculum designers, and corporate trainers seeking to align teaching strategies with the demands of a tech-driven, sustainability-focused future.

More importantly, it invites us to reclaim the pedagogical space as one where technology enhances—not replaces—human agency, ethical reasoning, and systemic insight. Rather than delegating thought to technology, this model empowers students to think more deeply, question more critically, and lead more responsibly in an increasingly automated world, within a process that remains guided by the educator.

Keywords: Generative AI, business education, complex thinking, sustainability, MBA, active learning, transformative pedagogy.

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The role of AI in fostering innovation behavior of employees in different workplace contexts

Diana-Maria Cismaru
Professor, Ph.D., SNSPA Bucharest.

Ionuț Munteanu
Associate Lecturer, SNSPA Bucharest

EXTENDED ABSTRACT

Artificial intelligence (AI) is rapidly transforming the landscape of organizational innovation, not only through technological advancement, but by reshaping how employees engage with creative and problem-solving processes at work (Babashi et al., 2024). Recent studies showed that AI applications not only automate routine tasks but also support innovation development by improving decision-making, and problem-solving capacities (Gama & Magistretti, 2025). The AI use contributes to improving the feedback loops, enabling the adaptive learning, and as a consequence, increases of the frequency of innovative behavior (Cockburn, Henderson & Stern, 2019). This change is also reflected in behavioral and environmental metrics of workplace innovation, measured across four interrelated domains: individual initiative, team collaboration, organizational support, and innovation climate (McMurray et al., 2023).

This paper investigates the role of AI in supporting the innovation behavior of employees across diverse workplace contexts, emphasizing the AI's dual function in the workplace: as an *enabler* (through the infrastructure and cultural support) and as an *enhancer* (stimulating the creative outputs and accelerating innovation cycles). Also, it is discussed how perceived AI support and trust influence employee willingness to experiment and innovate, among other factors as digital literacy and task autonomy. Integrating insights from the Innovation Support Inventory (Lukes & Stephan, 2025) and the Innovation Potential Scale (Souza et al., 2025) in a survey on more than 100 employees in different organizational contexts, the paper explores the influence of AI applications in employee-driven innovation, thus shaping

a more agile and innovative workforce. The data were collected from different organizations, in the private and public sector in order to identify also the differences between different contexts.

This paper contributes to the study of AI-human collaboration by articulating the behavioral impacts of AI on employees' innovation trajectories. The findings have practical implications for managers aiming to cultivate AI-empowered innovation cultures that prioritize human creativity, autonomy, and learning

Keywords: artificial intelligence, innovation behavior, workforce

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Shaping Future-Ready Entrepreneurs: Resilience and Digital Competencies in Times of Disruption

(The Case Study from Georgia’s Business Marathon Initiative)

Tamta Mikaberidze

Professor, Institute for Development Studies, Sulkhan-Saba Orbeliani University, Georgia

EXTENDED ABSTRACT

Introduction

The 21st century has been marked by overlapping crises and rapid technological transformation. From the COVID-19 pandemic to geopolitical instability, economic recessions, and climate-related challenges, young people today are growing up in environments of persistent disruption. At the same time, the acceleration of artificial intelligence (AI), automation, and digital technologies is reshaping work, education, and entrepreneurship at an unprecedented pace (Brynjolfsson & McAfee, 2017; Schwab, 2016). These dynamics create both opportunities and vulnerabilities: while technology enables new forms of business creation and collaboration, it also disrupts traditional industries, intensifies inequalities, and demands skills that many education systems struggle to provide (World Economic Forum, 2020).

Entrepreneurship education is uniquely positioned to address these dual challenges of disruption and technological change. By cultivating adaptability, creativity, and resilience, entrepreneurship programs can prepare youth not only to navigate crises but also to leverage digital tools to create innovative solutions (Ratten & Jones, 2021). Yet for entrepreneurship education to remain relevant, it must transcend classical theoretical frameworks and incorporate experiential learning, systemic thinking, and the digital competencies required for a tech-driven economy.

This extended abstract presents a case study of the **Business Marathon** initiative at Sulkhan-Saba Orbeliani University, faculty of Business and Technologies, Georgia. Launched in 2020, the program provides a compelling example of how structured, community-based entrepreneurship education can

foster resilience among youth while simultaneously strengthening their digital competencies. The study examines the initiative's design, outcomes, and challenges, offering insights into how entrepreneurship education can be reimaged in times of disruption.

The research pursues two interconnected objectives:

1. To analyze how entrepreneurship education, when structured around community engagement and experiential learning, can strengthen resilience among youth during crises.
2. To explore how technological trends, particularly the growing prominence of digital and AI-driven projects, redefine the skills, knowledge, and educational frameworks required for future-ready entrepreneurship.

By focusing on the Business Marathon as a single case, the study seeks to illuminate how educational innovation can simultaneously address socio-economic disruption and technological transformation.

Background and Context

The **Business Marathon** was launched in 2020 in direct response to the COVID-19 pandemic, which disrupted education systems and youth opportunities across Georgia. The Faculty of Business and Technology at Sabauni recognized an urgent need to provide a platform for experiential learning, community collaboration, and entrepreneurial creativity that could help young people cope with uncertainty while preparing for the future of work.

Over five years (2020–2025), the Business Marathon evolved into a national initiative with the following key features:

- Structured training modules introducing participants to entrepreneurship, innovation management, and business development.
- Professional mentorship networks involving academics, entrepreneurs, and industry experts.
- Competitive ideation processes where participants generate, refine, and pitch business solutions.
- Multi-level integration bridging schools, local communities, and universities,
- Sustained alumni engagement, with systematic tracking of long-term outcomes.

The program engages both secondary school pupils and university students from across Georgia, including rural and underserved regions. Importantly, it highlights how youth entrepreneurship education

can serve as a vehicle for resilience and inclusivity while addressing the growing importance of digital skills.

Methodology

The study adopts a single-case study methodology (Yin, 2018) with a mixed-methods approach to capture the complexity of the Business Marathon initiative.

- Quantitative data: participant numbers, demographic profiles, and thematic classification of projects over five years.
- Qualitative data: participant surveys, semi-structured interviews, mentor reflections, and content analysis of project proposals.
- Triangulation: combining institutional records, alumni tracking, and narrative accounts to validate findings.

This design allows for an in-depth understanding of the program's evolution, its impact on participants, and its implications for entrepreneurship education in disrupted and digitally transforming contexts.

Findings

Growth and Inclusivity

Participation in the Business Marathon grew from approximately 60–70 students in its first year to more than 300 participants in later editions. Significantly, the geographic scope expanded to all regions of Georgia, ensuring inclusion of rural areas and marginalized groups. This growth illustrates the initiative's scalability, affordability, and replicability in other emerging economies.

Shifting Project Themes

One of the most striking findings concerns the evolution of project themes. Early cohorts emphasized traditional business concepts—small retail, tourism services, or community-based social enterprises. By 2023–2025, however, projects increasingly involved:

- Digital platforms for education, commerce, and healthcare.
- AI applications, such as chatbots for customer service or analytics tools for agriculture.
- Sustainability-oriented technologies, including clean energy and waste management solutions.

This shift demonstrates both rising digital literacy among youth and the increasing centrality of technological skills in entrepreneurship. It also underscores the pressure on educational systems to integrate digital competencies into their curricula (OECD, 2021).

Impact on Competencies

The Business Marathon enhanced participants' competencies in several domains:

- Resilience-building: students reported greater confidence in navigating uncertainty and disruption.
- Entrepreneurial mindset: alumni pursued business ventures, with several establishing SMEs.
- Digital skills: the proportion of technology-based projects grew steadily, reflecting improved competence in coding, digital design, and platform management.
- Collaboration and systemic thinking: interdisciplinary teamwork promoted creative problem-solving and holistic perspectives.

Challenges

The research also revealed significant challenges for youth, educators, and education systems:

1. For new generations: Balancing creativity with technical proficiency in AI and digital innovation; Navigating ethical issues such as data privacy, bias, and algorithmic fairness (Cath et al., 2018); Coping with career uncertainty in volatile labor markets.
2. For educators: Integrating entrepreneurship with digital literacy and ethical reflection; Reskilling to teach rapidly evolving technologies; Developing new assessment models that capture resilience, creativity, and collaboration.
3. For education systems: Bridging the digital divide between urban and rural learners; Ensuring equitable access to tools, mentorship, and opportunities; Designing flexible curricula that can adapt quickly to technological change; Building cross-sector partnerships among academia, business, and government (Etzkowitz & Leydesdorff, 2000).

Conclusions

The Business Marathon illustrates that resilience-based, tech-conscious entrepreneurship education is both achievable and impactful. The findings lead to several conclusions:

- Entrepreneurship education strengthens youth resilience when built on experiential learning, mentorship, and community engagement.
- The growing share of technology-based projects underscores the urgent need to integrate digital and AI competencies into education.
- Future-ready programs must combine entrepreneurial, digital, and systemic skills to prepare youth for complex, uncertain environments.
- Cross-sector collaboration is essential for inclusivity and sustainability.
- Educational institutions must adopt agile, adaptive, and interdisciplinary approaches to remain relevant in a disrupted, tech-driven world.

This case study demonstrates how entrepreneurship education can be redesigned to address both disruption and technological transformation, highlighting the opportunities of AI and digital innovation while acknowledging the ethical and systemic challenges they pose.

By examining a replicable initiative in an emerging economy, the study offers practical insights for policymakers, educators, and organizations worldwide. It shows that when entrepreneurship education combines resilience, digital literacy, and ethical awareness, it not only prepares youth for the future of work but also contributes to building more sustainable and inclusive societies.

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DIGITALIZATION IN SUSTAINABLE FINANCE: ESG AND PERFORMANCE RELATIONSHIP

The impact of ESG performance on financial performance and M&A of listed SMEs and B Corps

Stefano Amelio

Associate Professor, Department of Economics, University of Insubria, Italy.

Patrizia Gazzola

Full Professor, Department of Economics, University of Insubria, Italy.

Daniele Grechi

Assistant Professor, Department of Law, Economics and Cultures, University of Insubria, Italy.

Luca Ruggiero

Expert in the field, Department of Economics, University of Insubria, Italy.

EXTENDED ABSTRACT

The European Union, following the inclusion of the fight against climate change in its agenda and the consequent profound regulatory push implemented within the broad and ambitious European Green Deal, has highlighted the pre-eminence of the concepts of sustainability and sustainable development. Environmental policies, in addition to responding to current and future climate needs, must preserve the environment in accordance with generational interests. Green finance also plays a fundamental role today as a key player in the economic system, with the aim of directing capital towards activities that, in addition to generating economic added value, are capable of ensuring greater environmental protection, a reduction in the exploitation of available natural resources, well-being and the enhancement of social capital. In an international context that is largely short-sighted when it comes to implementing environmental policies capable of mitigating climate change, the European Union has taken the lead with an important green policy that has led to the enactment of various regulations and directives on the subject. The aim of this paper is to assess whether there are positive correlations in Italy between sustainability performance and medium/long-term corporate financial performance, and between ESG performance and the volumes and values of M&A deals involving B Corp companies and Italian listed

SMEs subject to the reporting requirements imposed by the Corporate Sustainability Reporting Directive (CSRD). In particular, the two research questions we seek to answer are: i) whether or not there is a positive correlation in Italy between certified ESG performance (i.e. ESG scores and indices) and the corporate performance variables (ROA, ROE) of B Corp companies and Italian listed SMEs (the latter subject to the reporting requirements imposed by the CSRD) and ii) whether or not there is a positive correlation between the same certified ESG performance and the volumes and values of M&A deals completed by Italian listed SMEs. ESG factors play an increasingly important role in extraordinary management operations, as well as a significant and noteworthy role in ESG due diligence and the evaluation phase of target companies, and in the assurance of sustainability reporting published by companies, with particular reference to B Corp certification. To this end, for the period 2017–2023, the authors adopted ESG scores (using the REFINITIV platform for SMEs and the Big Four internal database for B Corps) that measure the green performance achieved by the companies in the sample, ROA and ROE levels (via the AIDA platform) as indicators of their business performance; and finally, the volumes (i.e. the number) and countervalues of M&A deals (via the REFINITIV platform) concluded by Italian listed SMEs. Following the collection of this data, the research is characterized by the implementation of Pearson's correlation analysis to determine the direction (positive or negative) and significance of the correlations between changes in ESG ratings, changes in corporate performance indicators (ROA and ROE) and changes in the volumes and values of M&A deals. With regard to the volumes and values of M&A deals, despite the fact that the target company's high ESG performance makes it a more financially attractive target for a possible merger or acquisition by a bidder company according to the doctrine and literature examined, the experiment, given the lack of a positive correlation between the finalization of such transactions and the ESG performance of Italian listed SMEs, does not allow us to affirm that a bidding company with high ESG performance is also more likely to conclude extraordinary management transactions in greater numbers and value. Meanwhile, with regard to the correlation between ESG scores and the corporate financial performance variables ROA and ROE, the experiment confirms the positive impact of sustainability performance on long-term corporate financial performance for both Italian listed SMEs and B Corp-certified companies belonging to the B Corp Community in Italy.

Keywords: B Corps, ESG performance, financial performance, M&A, SMEs.

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ESG Performance and Relational Capital: The Impact on knowledge-intensive organizations

Fabio Nappo

University of Cassino and Southern Lazio, Italy

Giuseppe Russo

University of Cassino and Southern Lazio, Italy

Federico Schimperna

University of Cassino and Southern Lazio, Italy

Alberto Manzari

Link Campus University, Italy

Sara Gigli

University of Cassino and Southern Lazio, Italy

EXTENDED ABSTRACT

Purpose: Environmental, social, and governance (ESG) factors have become increasingly important in various industries, with stakeholders (e.g. consumers, investors, suppliers, employees, public powers, and nongovernmental organisations) demanding sustainable practices and responsible management of resources (Kolk and Tulder 2010; Duque-Grisales and Aguilera-Caracuel 2019; Schimperna et al., 2022). Thus, companies need to be proactive and show their commitment to face sustainability and social issues to survive, legitimize their business activities to stakeholders, and get a competitive advantage (Allais et al., 2017; Lingnau et al., 2022; Lombardi et al., 2022). In this scenario, companies are taking into account ESG factors by i) reframing their identity; ii) codifying the new identity; iii) building a supportive organisational culture; and iv) communicating their performance through non-financial disclosure (Eccles et al., 2012; Russo et al., 2022; Lombardi et al., 2022).

The professional football industry, with its massive global following and influence, is no exception. The literature pointed out how sports clubs consider ESG factors in their decisions and noted that sometimes

they could be associated with IC components. According to Lacchini and Trequattrini (2012), the intellectual capital (IC) of football clubs can be divided into three main components: i) first-team players (human capital); ii) the club brand (relational capital); and iii) the right to participate in sports competitions (structural capital).

Focusing on the environmental perspective, football clubs are trying to minimize their carbon footprint and promote eco-friendly practices, such as using renewable energy, waste reduction, and optimizing the use of resources in sports facilities (impact on structural capital) (McCullough et al., 2016; Lucas et al., 2017; Bunds and Casper, 2018; Orr and Inoue, 2019; Dingle and Stewart, 2020; Daddi et al., 2021). From a social point of view, sports clubs have begun to recognize the importance of diversity and inclusion (Cunningham, 2019). This includes hiring diverse staff, implementing equality training programs, and promoting an inclusive work environment (impact on human capital). Additionally, fan engagement and community outreach programs ensure that clubs maintain a strong bond with their supporters (impact on relational capital) (Senaux, 2008; Liu et al., 2019; Aksoy et al., 2022; Wilby et al., 2023). Lastly, governance in sports clubs has become a central theme, emphasizing transparency, accountability, and ethics (Walzel et al., 2018; Geeraert, 2019).

However, the current literature does not address the possible relationship between the ESG performance of a professional football club and its IC. Thus, this paper aims to understand the impact of ESG performance on one of the three components of IC – the relational capital – in the professional football sector.

Design/methodology/approach: The research question is answered through a quantitative approach (Hair et al., 2003) based on a correlation analysis between the variation in ESG performance (observed between 2024 and 2023) and the variation in brand value (observed between 2024 and 2023) of a sample composed of 17 European football clubs. Particularly, the ESG performance relied on the ESG performance indicator derived from the 2024 and 2023 Global Sustainability Benchmark in Sports (GSBS) report, while for the quantification of the brand value we relied on Brand Finance. Findings: The findings of this study provide insights into the role of ESG performance in shaping the relational capital of professional football clubs, showing a moderate positive correlation between the selected variables.

Implications for research and practice: These findings are valuable for club managers, investors, academics, and policymakers, as they help them understand the potential benefits of integrating ESG considerations into the strategic decision-making process. Additionally, the results can contribute to the

growing body of literature on ESG performance and relational capital, particularly in the context of the sports industry.

Originality/value: The research paper proposes a new model to analyze the impact of ESG factors on relational capital in the professional football sector, contributing to filling a current gap in the literature.

Keywords: ESG; sustainability; relational capital; brand; knowledge-intensive organizations

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ESG, Financial Performance and Digitalization: An empirical analysis of European firms

Ludovica Adduci

Assistant Project Manager, Barci Engineering S.p.A., Italy

Giovanni Baldissarro

Ph.D. student, University of Calabria, Italy

Gianpaolo Iazzolino

Associate Professor, University of Calabria, Italy

Donato Morea

Associate Professor, University of Cagliari, Italy

Elisa Farinelli

Research Fellow, University of Cagliari, Italy

EXTENDED ABSTRACT

1. Introduction

In today's rapidly changing economic landscape, companies encounter various sustainability challenges that are both strategic and ethical. These challenges necessitate a careful evaluation of the trade-offs between costs and long-term benefits, which can be complex yet are crucial for sustainable growth. Regulatory frameworks have emerged, mandating companies to meet specific sustainability objectives. In Europe, the Green Deal aims for climate neutrality by 2050. However, as noted by Veugelers et al. (2024), while this initiative emphasizes climate goals, it does not adequately address the economic and social sustainability aspects of the "Green Transition". Sustainability is guided by three pillars: environmental, social, and governance (ESG) (Eccles et al., 2014). Over recent decades, corporate ESG performance has steadily improved, with companies across various sectors striving to outperform their

competitors (Tawiah et al., 2021). However, enhancing a company's ESG score often requires significant investment in one or more pillars, typically incurring high initial costs and presenting uncertain returns (Fatemi et al., 2018). The growing interest in ESG factors has raised numerous unanswered questions within the financial market (Starks, 2021). Current literature predominantly highlights the positive impacts of ESG investments on economic performance, illustrating their potential economic benefits for companies (Ferrell et al., 2016; Huang, 2021). Conversely, some studies indicate that a company's commitment to particular social and environmental issues can lead to heightened costs and diminished share value (Hillman and Keim, 2001; Brown et al., 2006; Di Giuli and Kostovetsky, 2014). This study aims to enrich the existing literature by examining how the costs associated with sustainability practices influence corporate finances. Specifically, we will analyze the relationship between the EBITDA margin and ESG score, focusing on the negative coefficients estimated. Additionally, we will introduce the Digital Economy and Society Index (DESI) as a moderating variable to assess the impact of digital innovation on the relationship between corporate sustainability and performance, emphasizing the positive coefficient observed in the interaction variable. As Yoon et al. (2018) discuss, technological innovation is continuously transforming industries and economies, making it essential to explore its potential moderating role.

2. Relevance of the research

The literature has explored the financial performance of companies in various contexts. While ESG scores are frequently analyzed for their impact on non-financial performance, recent studies have examined their influence on financial stability and systemic risk, revealing both positive and negative implications. A study by Nollet et al., (2016) indicates a negative relationship between Corporate Social Performance (CSP) and Return on Capital, alongside a long-term positive effect on Corporate Financial Performance (CFP), suggesting that CSR can enhance financial performance only after surpassing a specific investment threshold. Li et al. (2024a) and Shixian Ling et al. (2024) address the issue of disagreement in ESG assessments, which not only stifles corporate innovation but also increases financial constraints and the cost of debt; both studies advocate for the standardization of these assessments. Similarly, Billio et al. (2021) links the controversy surrounding ESG metrics to financial performance, concluding that this disagreement neutralizes any positive effects on financial outcomes. In contrast, Amarna et al. (2024) provide a different perspective, highlighting that ESG disclosure in European companies is viewed positively by lenders but negatively by investors. An analysis of companies listed on the Istanbul Stock Exchange by Aras et al. (2010) found no significant correlation between corporate

social responsibility and financial performance or profitability. Zhou et al. (2022) report a positive impact of ESG on market and operational performance but a negative effect on profitability, based on a sample of Chinese companies. Sectoral analyses by Hasan et al. (2022) and Jitendra Nenavani et al. (2024) reveal that companies in consumer goods, services, and engineering experience positive effects, while those in energy, public utilities, and healthcare face negative relationships. Nenavani et al. (2024) focus on the logistics sector, finding no positive connection between ESG and performance, suggesting improvements may only manifest in the long term. Sun et al., (2024) present significant findings from an ESG investment optimization model, demonstrating that high regulatory compliance costs may deter companies from investing in ESG initiatives.

Based on this analysis, we propose the following hypothesis:

H1. Companies' ESG scores affect their financial results.

Numerous studies in the literature examine the relationship between digitalization and ESG factors, focusing on how digital technologies influence ESG management and how ESG policies can be integrated using digital tools. Some research also investigates the connection between digitalization and companies' financial performance. For instance, Ren et al., (2023) analyze the impact of digital finance, as measured by the Digital Finance Inclusion Index (DFIIC), on ESG performance, highlighting its positive effects, particularly on environmental and social aspects. Similarly, Zhao and Cai (2023) focus on Chinese companies with high pollution rates, finding that digitalization has an even greater positive impact on their ESG performance. Moreover, (Feng and Nie, 2024; Zhong et al., 2023; Fang et al., 2023) examined a sample of listed Chinese companies and developed digitization indices based on digital patents, text mining, and keywords. Their findings indicated a positive correlation between digitization and ESG performance. Zeng et al. (2022), also studying listed Chinese companies, demonstrated that digitalization strongly enhances financial performance. The research by Fu and Li (2023) is particularly valuable as it links ESG to financial performance while considering the moderating effect of digital transformation. Their results show that ESG significantly and positively affects corporate financial performance, with digital transformation amplifying this effect. A similar study by Eriandani and Winarno (2023) reached comparable conclusions regarding the positive influence of ESG on performance, although it found no significant moderation effect from digitalization. Additionally, Li et al. (2024b) provide a different perspective, showing that digital transformation can serve as a strategic tool to mitigate ESG-related greenwashing.

Based on these findings, we propose the following hypothesis:

H2. The level of digitization in countries moderates the relationship between ESG and EBITDA Margin of companies.

3. Contribution

This study, grounded in the theoretical framework linking sustainability, firm performance, and technological innovation, investigates how the adoption of ESG practices influences the operational efficiency of European firms from 2017 to 2022, as measured by the EBITDA Margin. It also examines how the level of national digitalization, represented by the DESI index, moderates this relationship. The research adds to the literature on both ESG and digital transformation. The findings reveal that while ESG engagement can negatively impact financial performance in the short term, higher levels of digital maturity at the country level can help mitigate this adverse effect. This provides new evidence of the enabling role digital technologies play in effective sustainability management. By analyzing a large sample of European firms across various regulatory and institutional contexts, the study highlights how digitalization enhances firms' ability to integrate ESG practices efficiently. The cross-country perspective enhances the robustness of the results and offers insights into the conditions under which sustainability-oriented strategies can yield economic benefits. Additionally, the study outlines several practical implications, underscoring the strategic significance of digitalization as a means to boost the effectiveness of ESG initiatives and improve firms' operational performance in an increasingly competitive and regulation-driven environment.

4. Methodology

The analysis examines a sample of 469 European firms across 14 countries, observed from 2017 to 2022. Financial data and ESG scores were obtained from Refinitiv Eikon, while national digitalization indicators (DESI) were sourced from the European Commission's official portal. Firm performance is measured by the EBITDA Margin, a dependent variable that ranges from 0 to 1. Control variables include Size, represented as the logarithm of Total Assets, and Age, defined as the difference between the observation year and the firm's year of incorporation. The primary independent variable is the overall ESG score, with the DESI index serving as a moderating variable to examine how national digitalization levels impact the ESG–performance relationship. The DESI index aggregates four equally weighted dimensions: connectivity, digital human capital, integration of digital technologies in firms, and digital public services. Panel data regressions were conducted using the *plm* package in R. The Breusch-Pagan

test indicated that OLS models were unsuitable ($p < 0.05$). For each specification, fixed-effects and random-effects models were compared using the Hausman test, which favored the use of fixed-effects models ($p < 2.2e-16$). Additional Breusch-Pagan tests identified heteroskedasticity in the residuals, which was addressed by applying robust standard errors. While the coefficient estimates remained unchanged, adjustments were made to the standard errors and related statistics.

5. Results

The results of the first regression model indicate that a higher ESG score is linked to a lower EBITDA Margin, showing a decrease of 0.002305% for each unit increase in the ESG index. This finding contrasts with previous studies that report positive relationships between ESG performance and financial indicators (Carnini Pulino et al., 2022). This discrepancy may stem from the initial costs associated with implementing sustainable practices - such as investments in green technologies, compliance activities, and specialized human resources - which can temporarily reduce operating margins. The result aligns with evidence from El Khoury et al. (2023) and theoretical contributions suggesting that a high ESG rating does not always yield immediate or tangible benefits (Brammer et al., 2006; Auer and Schuhmacher, 2016). The control variables, `total_assets_log` and `Age`, further reveal that firm size positively influences operational performance, while firm age negatively impacts it. The second model introduces the `DESI` and `DESI_ESG` variables, facilitating an analysis of the role of digitalization in the relationship between ESG and EBITDA Margin. In this model, ESG retains a negative coefficient (-0.0042), while `DESI` demonstrates a significant negative effect, implying that higher levels of national digitalization may correlate with reduced profitability in the short term due to the costs and pressures associated with digital transformations. However, the interaction term `DESI_ESG` shows a positive and significant coefficient, indicating that firms in more digitalized contexts are better equipped to integrate ESG practices and mitigate their adverse effects on operating margins. This evidence supports existing literature (Camodeca and Almici, 2021; Zhong et al., 2023), which suggests that digitalization enhances operational efficiency and facilitates the adoption of enabling technologies, thereby improving a firm's ability to benefit from ESG initiatives. Overall, the study demonstrates that ESG practices may negatively impact financial performance in the short term, but it also emphasizes the crucial moderating role of digitalization—firms in more digitally advanced countries appear better positioned to integrate sustainability without significant economic drawbacks. These findings have both theoretical and practical implications: they contribute to the ongoing discussion on the ESG-performance nexus and suggest that

companies should view digitalization as a strategic lever to maximize the benefits of ESG practices. Additionally, policymakers should encourage technological investments and infrastructure development to relieve the operational costs associated with the transition to sustainability.

Keywords: ESG, Financial Performance, Digitalization, Regression model, Europe.

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THE CHALLENGES OF EDUCATION IN THE AGE OF AI AND DIGITAL TRANSFORMATION

The Future of Employment: Forecasts and Assumptions

Ineza Gagnidze

Associate Professor, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia

EXTENDED ABSTRACT

The ongoing Fourth Industrial Revolution and the digital transformation of the global economy are expected to eliminate many jobs while creating new ones. International organisations such as the World Economic Forum, the European Commission (Directorate-General for Employment, Social Affairs and Inclusion; European Skills, Competences, Qualifications and Occupations - ESCO), the International Monetary Fund, the OECD, the McKinsey Global Institute, the International Labour Organization (ILO), and the U.S. Bureau of Labor Statistics, among others, have offered predictions and commentary on this development.

This abstract focuses on the research produced by these major organisations. Their forecasts are likely to reflect reality fairly closely for several reasons, including their wide international networks of researchers and their long-term experience with global data analysis. These institutions have carried out studies on issues like competitiveness across dozens of countries and have published indices that offer insight into economic performance. Their outputs rely on input from highly trained and experienced professionals (Gagnidze, 2024). In contrast, smaller national organisations, including universities with international partnerships, research teams, and long-term academic projects, often lack the resources or reach to carry out large-scale studies on this topic.

Let us briefly consider the forecasts made by several organisations regarding anticipated changes in the labour market.

According to the World Economic Forum (FoJ, 2025, p. 18), over the next five years (2025–2030), 170 million jobs are expected to be created while 92 million are projected to be displaced, resulting in a structural churn affecting 22% of the 1.2 billion formal jobs studied. This represents a net employment increase of 7%, or 78 million jobs.

A report by Cazzaniga et al. (2024, p. 2) notes that in advanced economies, around 60 percent of jobs are susceptible to AI due to the predominance of roles focused on cognitive tasks. While workers with university-level education are better positioned to transition from at-risk roles to those that complement AI, older employees may be more vulnerable to these changes.

McKinsey & Company (2025) suggests that in the near future, individuals will increasingly work alongside AI agents in the workplace.

According to the ILO (2024, p.1) “the investments to achieve universal broadband coverage and net zero carbon emission through the energy transition are expected to create 23.5 million and 37.2 million more jobs than the business-as-usual scenario, respectively. When these investments are integrated, they can create as many as 57.6 million more jobs than the business-as-usual scenario”.

The reports also highlight a significant reduction in operational costs for many IT firms, driven by digital transformation. This trend has implications for income distribution across social groups. In response to job losses, there is growing consideration of reducing working hours and transitioning to a four-day working week, which may help to mitigate the expected volatility in labour markets.

The World Economic Forum’s 2025 report outlines several occupations projected to experience the fastest net growth according to surveyed employers. Among the leading roles are big data specialists, expected to grow by 100 percent; FinTech engineers; AI and machine learning specialists, with an 80 percent increase; and software and applications developers, anticipated to grow by 50 percent. Other professions forecasted to expand by more than 40 percent include security management specialists, data warehousing specialists, autonomous and electric vehicle specialists, UI and UX designers, light truck or delivery service drivers, and Internet-of-Things specialists (WEF, FoJ, 2025, p. 19).

By contrast, the same report identifies the ten roles most likely to experience a decline. These include Postal Service clerks and bank tellers, each expected to reduce by 30 percent or more; data entry clerks by at least 25 percent; and cashiers, ticket clerks, administrative assistants, and executive secretaries, all projected to decline by approximately 20 percent. A range of other occupations is also expected to diminish, albeit to a lesser degree, including printing and related trades workers, accounting and payroll clerks, material-recording and stock-keeping clerks, transportation attendants and conductors, as well as door-to-door sales workers and street vendors (WEF, FoJ, 2025, p. 19).

The European Commission's Directorate-General for Employment, Social Affairs and Inclusion has proposed key occupational categories likely to define future labour market trends across the EU. These encompass: armed forces occupations (Commissioned Armed Forces Officers; Non-commissioned Armed Forces Officers; Armed Forces Occupations, Other Ranks), managerial and (Chief Executives, Senior Officials and Legislators; Administrative and Commercial Managers; Production and Specialized Services Managers; Hospitality, Retail and Other Services Managers), professional roles (Science and Engineering Professionals; Health Professionals; Teaching Professionals; Business and Administration Professionals; Information and Communications Technology Professionals; Legal, Social and Cultural Professionals); technicians and associate professionals (Science and engineering associate professionals; Health associate professionals; Business and administration associate professionals; Legal, social, cultural and related associate professionals; Information and communications technicians), clerical support (General and keyboard clerks; Customer services clerks; Numerical and material recording clerks; Other clerical support workers) and service-sector positions (Personal Services Workers; Sales Workers; Personal Care Workers; Protective Services Workers), skilled agricultural (Market-oriented skilled agricultural workers; Market-oriented skilled forestry, fishery and hunting workers; Subsistence farmers, fishers, hunters and gatherers) and trades-based work (Building and Related Trades Workers (excluding electricians); Metal, Machinery and Related Trades Workers; Handicraft and Printing Workers; Electrical and Electronics Trades Workers; Food Processing, Woodworking, Garment and Other Craft and Related Trades Workers), plant and machine operation (Stationary Plant and Machine Operators; Assemblers; Drivers and Mobile Plant Operators), and elementary occupations (Cleaners and Helpers; Agricultural, Forestry and Fishery Labourers; Labourers in Mining, Construction, Manufacturing and Transport; Food Preparation Assistants; Street and Related Sales and Services Workers; Refuse Workers and Other Elementary Workers) (<https://esco.ec.europa.eu>).

In the United States, the Bureau of Labor Statistics has published projections for the fastest-growing occupations between 2023 and 2033. The list features wind turbine service technicians, solar photovoltaic installers, nursing practitioners, data scientists, information security analysts, medical and health services managers, physician assistants, computer and information research scientists, physical therapy assistants, and operations research analysts.

In addition to the findings presented by major international organisations, this study draws upon contributions from individual researchers. Nickolaus (2023), for instance, identifies ten professions likely to be in high demand in the future. His analysis highlights the importance of both technical and soft skills,

informed by the Crimson Education experience. The roles cited include renewable energy technicians, healthcare professionals, data scientists and analysts, AI and machine learning specialists, biotechnologists, agricultural innovators, mental health practitioners, cybersecurity experts, urban planners, and water resource specialists.

A separate approach to assessing future job prospects involves ranking occupations by income level. On this basis, deBara (2024) suggests that high-paying roles are likely to remain in demand, such as nurse practitioners, data scientists, information security analysts, medical and health services managers, physician assistants, computer and information research scientists, operations research analysts, actuaries, financial examiners, and veterinarians.

To contextualise current projections, it is helpful to revisit earlier research. In 2013, Oxford University scholars published a widely referenced study on the susceptibility of various occupations to computerisation. Among nearly 700 roles analysed, the ten occupations deemed least vulnerable - each with a probability of 0.66 percent or lower-included recreational therapists, first-line supervisors of mechanics and repairers, emergency management directors, mental health and substance abuse social workers, audiologists, occupational therapists, orthotists and prosthetists, healthcare social workers, oral and maxillofacial surgeons, and fire service supervisors. Notably, many of the remaining low-risk roles were concentrated in healthcare, education, and human resource management.

Taken together, these studies suggest that future employment opportunities are likely to favour those involved in technology and equipment management, emergency and safety services, and the healthcare and education sectors. Moreover, large-scale research consistently emphasises the central role of educational institutions in preparing for these transitions - whether through introducing new disciplines, supporting retraining, or facilitating career changes.

Given that digital transformation impacts virtually all domains of life, the future appears to belong to comprehensive universities that offer instruction across the STEAM disciplines (Science, Technology, Engineering, Arts, Mathematics). It is also worth emphasising that only large universities possess the agility and resources to respond effectively to rapid societal and technological change (Dominici & Gagnidze, 2021; Vesperi et al., 2024).

Keywords: Jobs, labour market, emerging technologies, University.

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Integration of artificial intelligence in educational settings and the main challenges

Natalia Kharadze

Associate professor, Ivane Javakhishvili Tbilisi State University, Georgia

Dea Pirtskhalaishvili

Assistant professor, Ivane Javakhishvili Tbilisi State University, Georgia

EXTENDED ABSTRACT

The modern, rapidly changing environment cannot ignore technological advancements, which can have a fundamentally significant impact on various fields, including education. Undoubtedly, the use of artificial intelligence in education, along with its numerous benefits, comes with various challenges. Artificial intelligence allows us to consider the unique characteristics of each student and develop a personalized learning plan. Furthermore, it is possible to develop cases that will generate the next step and situation based on the student's response. It is also worth emphasising that the effective use of artificial intelligence tools by students in the learning process can significantly enhance their motivation level and the quality of their learning (University Canada West, 2025). On the other hand, the integration of artificial intelligence into the learning process can significantly decrease the time spent on administrative tasks. It enables academic personnel to automate student grading, which increases the likelihood of achieving objective assessment (Klein, 2025). According to the 2025 Student Generative AI Survey, the percentage of students using artificial intelligence has increased to 92%, which is a substantial increase compared to the previous year (2024 - 66%). Notably, the survey found that half of the students reported using artificial intelligence in the learning process to save time and enhance the quality of their work (Higher Education Policy Institute, 2025). According to The Digital Education Council's 2024 Global AI Student Survey, the majority of students (69%) use AI to find information, 42% to check grammar, and 33% to summarise a document. (Digital Education Council, 2024). It is important to emphasise that 18% of respondents reported that they leave information generated by artificial intelligence untouched, which raises some concerns.

According to a study conducted by “ACT Research” (ACTR) in 2025, 71% of social media users in Georgia actively employ various AI tools. It is worth noting that compared to Tbilisi, which is the capital of Georgia, artificial intelligence is used less in the regions (Tbilisi 79%, regions 68%) (ACTR, 2025). It is evident that in the future, the impact of artificial intelligence, as in other areas, will increase in the field of education. Rapid technological advancements are accompanied by significant challenges and may cause some concern within the educational community. The successful integration of artificial intelligence has the potential to increase the efficiency of students and professors. However, each step should be planned and implemented with great caution and prudence. The main challenges are the issue of personal data confidentiality. For the effective functioning of artificial intelligence tools, detailed information about students may be required. Accordingly, there is a risk that such information will leak from the system. The mentioned issue is regulated to some extent by the "Law of Georgia on Personal Data Protection" (Law of Georgia on Personal Data Protection, 2023). However, it should also be noted that the legislative framework lacks a separate document related to artificial intelligence, with relevant regulations and a framework, as well as a strategy and development plan for future integration (IDFI, 2024). Along with these challenges, one of the main problems, both for university staff and students, is the dependence on artificial intelligence. A student's complete reliance on technology may reduce their ability to think independently. In addition, in some cases, students directly use the information they have found, which increases the likelihood of plagiarism (University Canada West, 2025).

Interestingly, a large number of students have not received any training on how to utilize artificial intelligence in the learning process to gain maximum benefit while remaining ethical. On the other hand, academic staff have some fears that artificial intelligence may completely replace their work. When integrating artificial intelligence into the educational process, it is important for universities to use its benefits as effectively as possible. According to the Digital Education Council (DEC) Global AI Faculty Survey 2025, which was conducted at 52 institutions in 28 countries, 39% of respondents have not utilized artificial intelligence in the educational process. The majority of respondents (75%) use artificial intelligence to create educational materials, 58% - in administrative tasks, and 45% use it to increase student engagement in the classroom. It is noteworthy that when asked why they do not use artificial intelligence in the educational process, respondents cite various reasons, including lack of time, lack of information about how to use it in the educational process, potential negative consequences, etc. 82% of faculty members are concerned about students becoming overly reliant on AI tools. More than half of

them (55%) identified this issue as a significant concern, and 80% of faculty claimed there is a lack of clarity on how AI can be applied in teaching within their institutions (Digital Education Council, 2025).

According to a 2024 survey conducted by the American Association of Colleges & Universities (AAC&U) and Elon University's Imagining the Digital Future Center, 59% of higher education leaders believe that cheating has increased since the widespread use of artificial intelligence (AACU, 2025). It is worth noting that artificial intelligence, when used effectively, can have a significant positive impact. However, without the proper policies, training, and education for students and academic staff, academic integrity is at risk. 54% of students surveyed by BestColleges believe that the use of artificial intelligence during exams and assignments is plagiarism and cheating (Nam, 2023). It is clear that the relevance of artificial intelligence will increase day by day. It is likely that in the future, artificial intelligence will significantly change the form of education. The educational system must be prepared to meet the mentioned challenges. From the point of view of students, it is important to deepen their awareness and teach them how to use artificial intelligence in the learning process in order to increase their effectiveness. It is worth noting that according to the AI Preparedness Index (API), which assesses the level of artificial intelligence preparation in 174 countries, Georgia is in 57th place (0.53 points). According to the above data, Georgia is ahead of Azerbaijan, Armenia, and Ukraine (0.47, 0.48, and 0.51). However, it lags behind Russia and Turkey. The leading places are occupied by Singapore (0.8), Denmark (0.78), the United States, and the Netherlands (0.77) (International Monetary Fund, 2023). According to the Government AI Readiness Index 2023, Georgia ranks 99th. (Total score - 41.27, Government Pillar - 41.96, Technology Sector Pillar - 30.33, Data & Infrastructure Pillar - 51.50). It is noteworthy that India (total score 62.58) and Türkiye (total score 60.5) occupy leading positions in the region (Oxford Insights, 2023). Additionally, academic staff, in some cases, fear that they will be replaced. They express concerns about bias, plagiarism, addiction, information confidentiality, and other important issues. According to Ellucian's second annual AI survey report, the use of artificial intelligence in the education sector is growing. However, it is characterized by a number of challenges. However, leaders in the field of education believe that the implementation of artificial intelligence can have many benefits. Despite the above, 49% of respondents expressed concern about bias in AI models. The mentioned result increased compared to the figure in 2023 (2023 - 36%). Concern associated with data privacy is also increasing (59%). Meanwhile, 78% of administrators believe AI can harm academic integrity, while 53% worry about its effect on students' critical thinking (Ellucian, 2024).

Fear of novelty is a natural phenomenon. Despite the obvious benefits, the introduction of artificial intelligence is associated with some concerns. This could be partly due to the lack of awareness among academic staff and students, who frequently struggle to understand how to employ artificial intelligence tools effectively, and as a result, we get negative results. Furthermore, the lack of a regulatory framework or a clear strategy may heighten the fear factor. It is also worth noting that, according to a survey conducted in Georgia in 2025 by the ACTR, 52% of respondents use AI specifically in the learning and research process (ACTR, 2025). That is why it is crucial for students to have the knowledge on how to appropriately employ artificial intelligence to increase performance while avoiding undesirable negative consequences. In light of the challenges discussed, it is essential to briefly touch upon ChatGPT Edu, which enables the creation of custom versions of ChatGPT and their sharing within university workspaces. It has Robust security, data privacy, and data is not used to train OpenAI models. (Douglas, 2024).

The university should provide retraining for professors so that they have a clear idea of the benefits of artificial intelligence. In addition, they should figure out in what form and with what tools it is possible to integrate artificial intelligence into the educational process, so that their productivity increases and artificial intelligence has a supporting function. The development of a policy for the integration of artificial intelligence in the educational sector by the state will simplify this process. After a detailed strategy, methods, and deepening of knowledge, we believe that academic staff will have less fear of innovations. In addition, increasing student awareness will significantly help them effectively use artificial intelligence tools. Based on the findings of research and reports, we can conclude that the use of artificial intelligence is expanding in various fields. According to numerous reports, the use of artificial intelligence tools by students and academic staff in educational settings is increasing every year. Many respondents believe that artificial intelligence can considerably improve the learning process and bring benefits to both students and academic staff. However, it is worth noting that the dispute regarding its negative aspects is not resolved. We believe that with the right regulations, legislative framework and appropriate training, it is possible to overcome the existing challenges and transition to a new format of the educational process, which is a complex and long-term process, but ultimately it will make it possible for lecturers to manage the process more effectively, and for students to benefit much more from the learning process based on artificial intelligence than with traditional methods.

Keywords: artificial intelligence, technological advancement, university, information confidentiality, educational process

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Educational Challenges in Georgia: From the Soviet Era to the Present

Lia Charekishvili

Professor, European University, Tbilisi, Georgia

EXTENDED ABSTRACT

Education in Georgia is deeply rooted in the country’s cultural identity. The Georgian alphabet, one of the world’s oldest unique scripts, facilitated early literacy and scholarship. During the Soviet period (1921–1991), education became centralized and highly standardized, emphasizing technical knowledge, ideological conformity, and widespread literacy. Georgia achieved high rates of school attendance and literacy under Soviet rule, yet innovation, creativity, and autonomy were limited. After regaining independence in 1991, the country faced economic collapse, civil unrest, and institutional breakdown, which severely affected schools and universities. Throughout the 1990s, underfunding, outdated infrastructure, and corruption weakened the education sector. Beginning in the early 2000s, a series of ambitious reforms was launched, with support from international organizations, to modernize curricula, decentralize governance, and align the system with European standards.

Policy Reforms and Modernization Efforts since the early 2000s, Georgia has embraced reforms aiming to modernize and Europeanize its education. Key measures have included:

- ✓ Introduction of the Unified National Examinations (2005): Credited with drastically reducing nepotism and bribery in university admissions.
- ✓ Curriculum Reform: Shifting from rote memorization to competency-based learning, emphasizing critical thinking, creativity, and digital skills.
- ✓ Teacher Professional Development: Establishing a tiered teacher certification system and continuous professional training programs.
- ✓ Decentralization: Strengthening school autonomy and parental involvement while balancing centralized quality control.

✓ **Internationalization:** Active participation in the Bologna Process and Erasmus+ programs, fostering mobility and recognition of Georgian degrees abroad.

Despite these advances, reforms have often been unevenly implemented, with rural-urban disparities and limited resources hindering outcomes.

Challenges and Current Issues Georgian education system continues to face several persistent challenges:

✓ **Quality and Relevance:** While enrollment rates are high, learning outcomes remain below international averages, as shown by PISA assessments. Alignment of curricula with labor market demands is ongoing.

✓ **Equity and Access:** Rural areas, ethnic minority communities, and children with disabilities encounter barriers in accessing high-quality education.

✓ **Teacher Workforce:** Many teachers are aging, underpaid, and insufficiently trained in modern pedagogical methods. Attracting young professionals to the teaching profession remains a struggle.

✓ **Infrastructure and Resources:** Although significant investments have been made, many schools, especially in remote regions, lack modern facilities, digital equipment, and teaching materials.

✓ **Higher Education Challenges:** Brain drain, limited research funding, and the uneven quality of universities hinder the competitiveness of Georgian higher education institutions.

The education system of Georgia reflects both the nation's rich intellectual traditions and the complex legacies of Soviet governance and post-independence reforms. Considerable progress has been made in ensuring access, reducing corruption, and aligning with European standards. Nonetheless, structural inequalities, resource limitations, and the need for stronger teacher and institutional capacity remain pressing issues. With sustained investment, international cooperation, and a focus on equity and innovation, Georgia has the potential to build an education system that meets the needs of its citizens and positions the country as an active participant in the global knowledge economy.

Table 1: **POPULATION AGED 15 AND OLDER BY AGE GROUP AND EDUCATIONAL ATTAINMENT, 2024** (thousand)

	Primary/ basic education	Complete general education	Primary vocational	Secondary vocational	Higher education	No education
15-19						
Women	70.0	29.6	0.3	0.0	0.1	70.0
Men	71.8	27.5	0.4	0.0	0.3	71.8
20-29						
Women	5.3	52.4	7.9	33.8	0.6	5.3
Men	5.4	63.8	5.7	24.5	0.5	5.4
30-39						
Women	6.3	34.0	16.4	43.0	0.3	6.3
Men	6.0	51.0	8.8	33.7	0.4	6.0
40-49						
Women	6.0	35.3	18.3	40.0	0.4	6.0
Men	7.3	47.6	8.6	36.0	0.5	7.3
50-59						
Women	3.1	34.2	26.0	36.4	0.3	3.1
Men	2.9	46.8	18.0	32.1	0.2	2.9
60+						
Women	8.1	37.9	26.3	27.1	0.6	8.1
Men	5.9	40.9	23.7	29.2	0.2	5.9

Source: GeoStat.

Government expenditure of Georgia on education as % of GDP (%) was about 4.0 % in 2024 (preliminary data) and Expenditure on education as % of total government expenditure (%) was about 13%. [Statistical Data Base. www.unesco.org].

Artificial intelligence (AI) is rapidly changing the landscape of higher education, ushering in an era of unprecedented possibilities for enriching and personalizing the student learning experience. While the concept of AI in education is not new (Chen et al., 2020), its practical applications and integration into learning environments have accelerated significantly in recent years, fueled by advancements in computing power, data availability, and algorithmic sophistication. Early explorations into the potential of AI in education can be traced back to visionary work on intelligent tutoring systems (ITS) (Carbonell, 1970; Sleeman & Brown, 1982), which laid the groundwork for computer-based systems capable of

providing personalized instruction and feedback to learners. Further advancements led to the development of cognitive tutors (Koedinger & Corbett, 2006), sophisticated ITS rooted in cognitive science principles, demonstrating the potential of AI to enhance learning aligned with human cognition.

The role of artificial intelligence in the education system is important. Demis Hassabis (DeepMind) said that “learning how to learn” will be among the most essential future skills, because with AI’s rapid pace, people need to continuously adapt. Geoffrey Hinton, a pioneering AI scientist, has expressed concern over mass unemployment, inequality, and that AI might rob people of dignity if misused. He also sees both great promise and great risk. Sal Khan (Khan Academy) is optimistic that AI can help improve outcomes and scale education, but stresses that it should augment teachers, not replace them. UNESCO warns that AI adoption in schools is happening fast, often without adequate regulation, and that there is a danger of neglecting broader educational goals (like critical thinking, citizenship).

We are standing at the threshold of a new chapter in human history—a chapter shaped by artificial intelligence. Just as the printing press revolutionized the spread of knowledge and the internet connected us beyond borders, AI is now transforming the very foundations of education.

The classrooms of tomorrow will not look like those of yesterday. Education will no longer be confined to textbooks, schedules, or even physical spaces. Instead, AI will enable learning that is personal, adaptive, and lifelong. Each learner will have a path uniquely designed for their strengths, their pace, and their dreams. But let us be clear: AI will not replace the teacher. The role of educators will become more vital than ever. Freed from routine tasks, teachers will guide students in the areas where machines cannot lead - inspiring curiosity, nurturing creativity, and teaching the values that define our humanity. AI will break barriers of language, disability, and distance, giving every learner the chance to thrive. Education in the AI era will not be about memorizing facts—machines can do that better than us. It will be about wisdom, ethics, resilience, and the courage to remain human in a digital world.

Keywords: Education, Artificial Intelligence, Statistics.

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Structured Integration of Generative AI: Implications for Teaching Practice and Policy in Higher Education

Mariné Aghekyan

Associate Professor, California State University, Long Beach, USA

Marie Botkin

Associate Professor, California State University, Long Beach, USA

EXTENDED ABSTRACT

Generative AI tools such as ChatGPT, Copilot, Grammarly, Claude, etc. are rapidly transforming the way how students approach creative and analytical work in higher education. These systems allow quick generation of ideas and written drafts, which can support deeper exploration and more efficient learning when used appropriately. However, research results remain mixed in terms of its impact on learning effectiveness. Some studies report that AI-assisted learning can improve performance and engagement, while others note that unguided or excessive reliance on AI may hinder comprehension and originality. This means, that also the question of what the appropriate use of AI tools in higher education remains unanswered.

These inconsistent findings highlight an emerging gap in academic policy and instructional practice. Both educators and students frequently lack clarity about what constitutes responsible AI use in coursework to stay in compliance with academic integrity. Without clear institutional, department, or course-level guidance, ethical boundaries can become ambiguous, leading to inconsistent applications of academic integrity standards. The present research study addresses this challenge by examining the educational and ethical outcomes of structured AI integration in a project-based upper-division business course. The research also explores how such structured practices can inform broader policy development within academic institutions.

Methods

This research study employs quasi-experimental study to compare two sections of the same upper-division business course (approximately 30 students per section) during one semester. Both sections share the same instructor, syllabus, project requirements, and evaluation rubrics. The experimental section integrates AI under a detailed, instructor-developed policy for the term group project development, while the comparison section completes the same project without AI support.

In the AI-integrated section, students receive a formal orientation on responsible AI use during project initiation. The orientation includes live demonstrations, case-based discussions, and examples distinguishing acceptable uses, such as prompts, idea generation, and summarizing credible information from prohibited uses, including unedited AI-written text or unverifiable claims, and fact checking. A quiz and a signed agreement reinforce these distinctions, ensuring students understand both university integrity standards and AI-specific guidelines.

Throughout the semester, students are expected to document how they use AI, record the prompts and tools applied, and reflect on the reliability and limitations of AI outputs. This reflective process aligns with the concept of treating AI as a learning partner rather than a substitute for human reasoning. Weekly in-class project activities encourage ongoing practice in AI-supported critical thinking and synthesis.

The non-AI section follows the same project schedule but explicitly prohibits the use of generative AI (an agreement had been introduced by the course instructor and signed by students early semester). Students rely on traditional research and writing processes and receive a refresher on academic integrity and originality. Both groups are evaluated using the same grading rubrics, emphasizing analytical quality, organization, creativity, and content accuracy.

Data collection includes project rubrics, pre- and post-course surveys on knowledge and confidence, AI-use quizzes, and final written reflections. Quantitative data will be analyzed using paired t-tests, ANOVA, and chi-square methods, while qualitative reflections will undergo thematic analysis to identify perceived benefits, challenges, and ethical awareness.

Findings (In Progress)

The study is ongoing, with data collection concluding at the end of the current semester (early December). Preliminary classroom observations show that the AI-integrated group demonstrates higher engagement, diverse ideas on problem solutions and approaches, better organization in project planning, and more

reflective discussions on ethics and authorship. No academic integrity issues have been reported in either section.

Initial student feedback suggests that structured AI use improves efficiency and confidence in research and writing tasks but also raises important questions about the limits of automation in higher learning. Final quantitative and qualitative analyses will be completed by early spring, with comprehensive results available by the end of Fall 2025 semester.

Implications

This study provides evidence on how guided AI integration affects learning outcomes and ethical understanding in higher education. Beyond immediate instructional benefits, the research emphasizes the urgency of developing formal institutional policies for AI use. Clear academic frameworks are essential to:

1. Define responsible and transparent use of generative tools,
2. Maintain integrity and equity across classrooms,
3. Support faculty in aligning assessment with AI-enabled learning, and
4. Protect students from unintentional academic misconduct.

Policy development should extend beyond individual courses to encompass university-wide guidance addressing pedagogy, ethics, data security, and professional readiness. Institutions establishing actively AI literacy and ethical use policies will be better positioned to prepare graduates for workplaces where AI collaboration is increasingly routine. In other words, more research is expected to be conducted in different disciplines and courses to identify if such policies can be universal or they should be based on content/discipline/course.

This project represents a model for curriculum innovation through the intentional integration of generative AI in experiential, project-based learning. Students gain authentic exposure to industry-relevant digital tools while being guided to critically evaluate their reliability, accuracy, and ethical implications. The structured approach, combining AI use policies, reflection, and ethical discussion, can be adapted to various business disciplines such as marketing, supply chain, and management education.

By embedding AI literacy within a pedagogically sound framework, this approach bridges the gap between academic integrity and technological advancement. It encourages institutions to view AI not as

a threat to learning but as a catalyst for policy-driven innovation, empowering both educators and students to navigate an AI-enhanced academic environment responsibly.

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Universities and Beyond: Education Technologies in the Co-evolution of Industry 4.0 and Industry 5.0

Nino Papachashvili

Professor, Institute for Development Studies, Sulkhani-Saba Orbeliani University, Georgia

Tamta Mikaberidze

Professor, Institute for Development Studies, Sulkhani-Saba Orbeliani University, Georgia

Marine Tavartkiladze

Professor, Institute for Development Studies, Sulkhani-Saba Orbeliani University, Georgia

EXTENDED ABSTRACT

Introduction

The accelerated digital transformation of the global economy has fundamentally reshaped the institutional role of universities and the architecture of knowledge production, circulation, and governance. While **Industry 4.0** emphasized automation, efficiency, platformization, and data-driven optimization (Schwab, 2016), the emerging paradigm of **Industry 5.0** reframes technological development around human-centeredness, sustainability, resilience, and ethical governance (Breque et al., 2021; European Commission, 2021; Fogaça et al., 2024). **Together, these paradigms generate** a hybrid co-evolutionary environment (Co-4.0-5.0) in which universities must simultaneously adapt to technological acceleration and societal demands for equity and public value.

Despite the extensive literature on digitalization, education technologies (EdTech), and smart education, a critical research gap remains. This challenge was also identified in our previous research (Papachashvili & Mikaberidze, 2024). Existing studies predominantly approach education technologies either as **technological tools** (efficiency, platforms, automation) or as **pedagogical instruments** (learning outcomes, usability). Far less attention has been devoted to EdTech’s **institutional role** - its capacity to

reshape governance structures, credentialing systems, academic labor, and cognitive equity. Moreover, the relationship between EdTech and the co-evolution of Industry 4.0 and Industry 5.0 remains under-theorized.

As EdTech increasingly structures decision-making in learning pathways, skills formation, and career signaling, universities face growing pressures related to competition, digital credentials, platform dependency, data sovereignty, and inequality. Within this context, the paper poses the following *research question*:

Do education technologies function as institutional mediators in the co-evolution of Industry 4.0 and Industry 5.0, and what challenges and opportunities do they create for the future of higher education?

Methodology

The study employs a conceptual qualitative research design, synthesizing scientific findings from relevant publications and reports across interdisciplinary literatures. Elements of comparative institutional analysis are used to examine how automation-driven efficiency logics (Industry 4.0) coexist with human-centric governance principles (Industry 5.0) within higher education systems.

Importantly, the analysis applies analytical abstraction, conceptualizing EdTech not merely as instructional technology but as an institutional mediator influencing governance, credentialing, knowledge validation, and cognitive equity.

This approach enables the development of a conceptual framework explaining how EdTech operates within the Co-4.0-5.0 transition and exposes emerging institutional vulnerabilities and strategic adaptation challenges.

EdTech under the Co-evolution of Industry 4.0 and Industry 5.0

Early digital transformation in higher education closely mirrored Industry 4.0 priorities: scale, efficiency, automation, and platformization. Learning management systems, online courses, and e-learning environments were framed primarily as cost-effective and flexible solutions (Schwab, 2016; OECD, 2021; OECD, 2023). As Selwyn (2022) argues, these narratives were largely instrumental and solutionist, often neglecting deeper institutional and political implications. As author notes: “It is important for the field to assume a greater degree of responsibility—especially with regard to how AI developers,

designers, and vendors choose to interact with the aspects of education that their tools and techniques engage with. This is not to argue that the presence of AI in education needs to be rejected altogether. Yet it is important to recognise that the digital automation of education is not simply a technical matter of how to most effectively design, programme, and implement systems. Instead, we need to get to grips with questions relating to the nature of education as a profoundly social (and therefore human) process” (Selwyn, 2022, p. 188).

The COVID-19 pandemic constituted a critical juncture that dramatically accelerated EdTech adoption. Empirical studies indicate that student satisfaction during emergency digital learning depended strongly on platform usability, infrastructure quality, and assessment design (Shams et al., 2022; Pardo-Jaramillo et al., 2025). Beyond crisis conditions, systematic reviews demonstrate persistent structural drivers of EdTech adoption, including institutional support, digital competencies, and perceived usefulness (Feng et al., 2025). These findings suggest that digital transformation in higher education is most effective when embedded within coherent institutional strategies rather than fragmented experimentation.

The shift toward Industry 5.0 represents a normative reorientation toward social value, sustainability, and resilience (Breque et al., 2021). Fogaça et al. (2024) conceptualize this transition as co-evolutionary, in which technological infrastructures and institutional arrangements mutually shape outcomes. In education, this transition is particularly complex, as many systems remain mid-transition within Industry 4.0 while simultaneously adopting Education 5.0 / Higher Education 5.0 visions.

Education 5.0 emphasizes ethical AI, personalization, sustainability, interdisciplinarity, and lifelong learning. Universities need proper strategies, educational planning, and policies to ensure that they continue to play an important role in producing competent graduates for the era of S5.0 (Shahidi et al., 2024). Empirical evidence suggests that such practices enhance student preparedness for future labor markets and strengthen institutional resilience (Hashim et al., 2024). However, translating these normative objectives into institutional reality requires governance mechanisms capable of mediating between efficiency-oriented technologies and human-centered educational missions.

The integration of new technologies into the processes of knowledge accumulation, transfer, and dissemination extends beyond the traditional teaching-learning process in higher education institutions and, moreover, expands its institutional boundaries. In the Co-4.0–5.0 environment, education technologies acquire a distinct function by transforming technological change into institutional transformation. This challenge manifests, on the one hand, in a redefinition of the university’s role and

mission and, on the other hand, in the emergence of competitive alternatives that are rapidly adaptable to labor market needs and platform-based delivery models.

Additional challenges arise in this context, including the expansion of digital credentialing, the rapid proliferation of micro-credentials, and growing concerns related to quality assurance, standardization, and recognition. Artificial intelligence enhances personalization and operational efficiency but simultaneously raises ethical concerns regarding privacy, academic integrity, and the evolving qualifications of educators. At the micro level, AI-supported learning environments can foster creativity and emotional resilience; however, they may also increase anxiety among students with lower levels of digital confidence. At the institutional level, universities adopt diverse strategic responses, ranging from restrictive governance approaches to innovation-oriented experimentation.

Importantly, investments in education technologies are most likely to yield sustainable benefits when embedded within broader, human-centered institutional frameworks and aligned with the core principles of Industry 5.0.

Originality and Contribution

This paper contributes by reframing EdTech as an institutional mediator rather than a neutral pedagogical tool. It integrates EdTech into the co-evolutionary dynamics of Industry 4.0 and Industry 5.0, highlighting emerging hybrid governance regimes shaping higher education. The study introduces a conceptual model mapping EdTech's mediating role across knowledge creation, validation, distribution, and governance, exposing institutional vulnerabilities such as cognitive inequality, credential fragmentation, and platform dependency.

Key Findings and Challenges

The analysis reveals several patterns. First, EdTech increasingly functions as a structural layer of knowledge ecosystems, redistributing decision-making power through platforms and algorithms. Second, universities operate within a post-institutional learning landscape, where technology firms and alternative credential providers compete in shaping learning pathways. Third, rapid digitalization intensifies vulnerabilities related to cognitive inequality, data governance, and academic labor transformation.

These findings underscore a central tension: EdTech acts simultaneously as a driver of transformation and as a diagnostic mirror exposing institutional misalignment between automation-driven efficiency and human-centered educational missions.

Policy Implications and Future Research

Strategically navigating the Co-4.0-5.0 transition requires enhanced governance capacity, investment in public digital infrastructures, inclusive digital strategies, coherent credentialing frameworks, and support for academic labor adaptation. Future research should pursue comparative institutional studies, develop metrics for cognitive inequality, examine hybrid credential ecosystems, and explore human-AI collaboration in academic work.

Conclusion

During the hybrid transition between **Industry 4.0 and Industry 5.0**, education technologies no longer function solely as supporting pedagogical tools. Increasingly, they operate beyond the boundaries of traditional educational institutions, including universities, creating new instrumental infrastructures and actively mediating institutional adaptation to changing conditions. In doing so, they provide certain actors (such as companies and individuals) with a competitive advantage by enabling more flexible and timely responses to emerging challenges.

The future of higher education will therefore depend on institutions' capacity to govern digital transformation in ways that ensure technological innovation remains aligned with **human-centered, ethical, and socially sustainable objectives**.

Keywords: Education Technologies (EdTech); Industry 4.0-Industry 5.0 Co-evolution; Higher Education Governance; Human-Centered Digital Transformation; Institutional Transformation.

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POSTER SESSION

Cryptocurrency Implementation and Regulation Policy in Developed and Developing Countries

Irina Gogorishvili,

Associate professor, Ivane Javakhishvili Tbilisi State University, Georgia

EXTENDED ABSTRACT

Money is evolving alongside the rapid development of new payment technologies. Digital peer-to-peer transactions, which have the potential to radically change payment and financial systems, have emerged as a result of the growth of online commerce, digital networks, and information technology. As a result of this technological transformation and the need to control the use of money, the emergence of digital currencies poses new challenges for economic agents, including central banks. Cryptocurrencies have become an important part of financial and economic systems worldwide, creating the need for their legal regulation. Currently, international trends in this area can be characterized by several key areas. Sebastian Infante et al., (2022)

One such area is the recognition of cryptocurrencies as a means of payment. Many countries view cryptocurrencies not only as investment instruments, but also as a means of exchange. This allows for their integration into the financial system and the protection of consumer interests. As a result, a number of jurisdictions have passed laws legalizing the use of cryptocurrency as a legal tender, opening up new business opportunities and creating a safer environment for users. Cryptocurrency and Defi Regulation Policies 137 countries and monetary unions, representing 98% of global GDP, are exploring the possibility of implementing CBDCs. In May 2020, this number stood at just 35. Currently, 72 countries are in the advanced stages of exploration—development, piloting or launching.

A new record has been reached globally: 49 CBDC pilot projects. Three countries—the Bahamas, Jamaica, and Nigeria—have already fully launched their digital currencies. Many people in these countries lack access to digital payments and basic banking products and services. Emerging markets are driving the growth of global retail CBDCs, seeking to reduce cash use, increase financial inclusion

and improve regulatory oversight. This trend is also a response to the growing adoption of US dollar-backed stablecoins internationally. Atlantic Council (2024)

These changes in the payments landscape are characterized by the emergence of new players offering virtual currencies, as well as large technology companies (big tech) and financial technology (fintech) companies offering financial services. While digital currencies offer an alternative to the existing payment systems by reducing transaction costs, they also pose significant risks and challenges. Cryptocurrencies such as Bitcoin and Ethereum are highly volatile and lack the guaranteed conversion and security of traditional currencies.

In recent years, stablecoins have been developed to address the issue of price stability. Asset settlement services, particularly those related to central bank and commercial bank money, are unavailable. John Kiff et al. (2020)

The credit risks associated with the use of stablecoins are significant, despite major digital and financial institutions developing customer-centric experiences through data analytics, overlapping multi-channel customer services and credit regulations. Vijak Sethaput and Supachate Innet (2023)

These businesses are thriving in China and expanding to other developing countries such as India and Indonesia, although initially only in major cities in the latter country.

Central banks have implemented a range of policies to ensure that the individuals and the businesses continue to have the access to secure and efficient payment systems. By promoting payment system infrastructure and enforcing strict regulations, China's central bank has increased the transparency of financial data and ensured that money circulating outside banks will eventually return. Ferry Syarifuddin and Toni Bakhtiar (2022)

Several central banks have chosen CBDCs to significantly simplify payments and improve monetary policy. Matthew Malloy et al. (2022)

Due to the high costs and risks associated with the central bank development, proper preparation is required. This study analyzes the economic policies for CBDC implementation and cryptocurrency regulations in various countries and regions.

The aim of the study of cryptocurrency regulatory policy is to create a balance between innovation and security, which will allow the benefits of cryptocurrencies to be used for the economic development while minimizing the risks associated with them.

Goals of introducing digital currencies Some countries are considering introducing so-called central bank digital currencies. This is explained by their goal of expanding financial inclusion (especially in developing countries). Many people in these countries lack access to digital payments and basic banking products and services. But in such countries like Sweden, where the majority of residents have access to a bank account, the incentives are, of course, somewhat different. Here, the private sector has been very successful in providing opportunities to make very low-cost digital payments in digital currency. Sweden's central bank, the Riksbank, also views the e-krona (or digital krona) as a kind of insurance policy for private payment infrastructure.

China's central bank views the digital yuan almost exclusively as a complement to existing payment systems (Alipay and WeChat Pay), which have completely covered the entire Chinese economy with a network of very low-cost digital payments. They can be used for the most basic purchases, such as buying fruit or a couple of dumplings from a street vendor, but which could, in principle, increase competition.

Everyone will soon live in a world where there will be full access to digital versions of many countries' currencies. (The US dollar, the Chinese yuan, and many other major currencies). It's highly likely that many mega-corporations (such as Amazon, eBay, Alibaba, and others) will begin issuing their own stablecoins. It's also worth noting that the currencies of small, open economies with developing markets will be literally swept away by other currencies, both official and private, which their citizens will trust far more than their own. It's especially important to emphasize the importance of an institutional framework that supports the trust of local and foreign investors in a given country.

There are certain risks associated with the introduction and use of CBDCs and stablecoins. These include:

- General risks: 1. Exploitation of existing vulnerabilities and 2. Exploitation of personal data leaks;
- Technological (DLT) risks: 1. Technological failures, 2. Implementation, operation or maintenance errors, 3. Incompatibility between CBDCs and TDs and 4. Integration issues between CBDCs and TDs;
- Cybersecurity risks: 1. Breach of user privacy, 2. Denial of service, 3. Human error and malfeasance, 4. Difficulty in using technologies, 5. Theft and loss of user credentials and 6. Obtaining private keys or cryptographic vulnerabilities.

Keywords: Cryptocurrencies, CBDC, Technological (DLT) risks, Cybersecurity risks.

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Managing the effectiveness of zero-cycle impact assessment of construction projects: ground vibration monitoring and modern technologies

Ineza Gagnidze

Associate Professor, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia

Rusudan Seturidze

Associate Professor, Ivane Javakhishvili Tbilisi State University, Georgia

Levani Sichinava

PhD student, Ivane Javakhishvili Tbilisi State University, Tbilisi, Georgia

EXTENDED ABSTRACT

Construction-related vibration monitoring and zero-cycle management have undergone significant advancements with the integration of modern technologies and innovative methodologies. The zero-cycle represents the preparatory phase of construction, a stage that fundamentally shapes the overall trajectory of a project by defining its cost, schedule, and risk profiles. At this stage, vibration exposure assumes critical importance, as it may compromise the structural integrity of adjacent buildings and infrastructure, disrupt the functioning of sensitive equipment, and generate public concern, complaints, or even regulatory sanctions.

Accordingly, the systematic management of vibration impact assessments has emerged as a central priority for project managers, engineers, and stakeholders. Ensuring accurate and reliable monitoring not only supports compliance with safety and environmental standards but also contributes to the long-term sustainability and resilience of construction practices. In this regard, the zero-cycle phase is of particular significance, as it establishes the foundation for addressing subsequent technical risks and mitigating environmental impacts.

Traditional approaches to vibration assessment rely on predictive modelling and occasional manual measurements. While such methods provide baseline data, they are often insufficient for real-time

decision-making, especially in dense urban environments where construction-induced vibrations pose immediate risks.

From a managerial perspective, the value of vibration monitoring lies not only in data accuracy but also in its contribution to project effectiveness. Continuous monitoring enables project teams to mitigate risks proactively, defend against potential claims, and maintain stakeholder trust by demonstrating compliance with regulatory requirements.

Traditional vibration monitoring systems face limitations including high costs, complex installation, and lack of integrated data processing capabilities (Meng & Zhu, 2020). To address these challenges, IoT-based sensing systems utilizing microcomputers, MEMS accelerometers, and cloud platforms offer cost-effective alternatives with remote monitoring capabilities (Meng & Zhu, 2020).

Comprehensive vibration impact assessment requires proper prediction, measurement, and mitigation methods, with monitoring equipment specifications being critical for effective implementation (Hiller, 2011).

A vibration monitor is a specialized measurement instrument designed to meet relevant standards for evaluating, diagnosing, and monitoring vibrations. It comprises three main components: a vibration sensor (or transducer), signal conditioning equipment, and a data recording system. This device is characterized by its frequency response and phase characteristics, amplitude range, and accuracy, making it adept at capturing and analyzing vibration data accurately.

effects, criteria and standards Research and practice documents review typical metrics (e.g., peak particle velocity — PPV, frequency content) used to judge potential structural or human-annoyance effects of ground vibration.

The application of vibration monitoring systems enables precise assessment of the impact of ongoing construction activities on adjacent buildings and infrastructure. Data obtained from modern measuring devices, when compared and validated against international standards (ISO 4866:2010, DIN 45669-1), provide a solid basis for mitigating critical risks such as adverse effects on human health, structural damage, or even the complete failure of buildings and technical infrastructure.

Table 1 Instrumental Interpretation of Seismic Intensity (I-X+) Based on Peak Ground Motion Parameters. Source: Authors own work.

Intensity (Scale)	Perceived Shaking	Potential Damage	Peak Acceleration (%g)	Peak Velocity (cm/s)
I (1)	Not felt	None	<0.05	<0.02
II (2)	Very weak	None	0.1-0.3	0.05-0.1
III (3)	Weak	None	0.3-2.8	0.1-1.4
IV (4)	Light	None	2.8	1.4
V (5)	Moderate	Very light	6.2	4.7
VI (6)	Strong	Light	12	9.6
VII (7)	Very strong	Moderate	22	20
VIII (8)	Severe	Moderate/Heavy	40	41
IX (9)	Violent	Heavy	75	86
X+ (10+)	Extreme	Very Heavy	>139	>178

The presented table illustrates the instrumental interpretation of seismic intensity (I-X+ scale), which is derived from the quantitative parameters of ground motion-namely peak ground acceleration (%g) and peak ground velocity (cm/s). These parameters are correlated with both the subjective perception of shaking (Perceived Shaking) and the expected structural impact (Potential Damage).

Each level of the scale incorporates:

1. Intensity (I-X+) - corresponding to internationally recognized scales such as EMS-98 and the Modified Mercalli Intensity (MMI).
2. Perceived shaking - the subjective human response to seismic motion, ranging from “Not felt” (Intensity I) to “Extreme” (Intensity X+).
3. Potential damage - the expected impact on buildings and infrastructure, varying from negligible cracking in weak structures (V) to catastrophic collapse (IX-X+).
4. Peak acceleration (%g) - the maximum ground acceleration, expressed as a percentage of gravitational acceleration.
5. Peak velocity (cm/s) - the maximum ground velocity, which is strongly associated with the likelihood of structural damage.

This classification ensures an objective assessment of seismic effects, as it integrates both instrumental data (acceleration and velocity) and phenomenological observations (human perception and building response).

The integration of monitoring systems not only reduces risks but also contributes to cost optimization and more efficient time management. One of the most significant challenges in the construction sector is the occurrence of unforeseen complications, which often lead to project interruptions by regulatory authorities and, ultimately, threaten the continuity of business operations.

In this context, the use of accelerometers, geophones, and integrated vibration monitoring systems can be regarded as a state-of-the-art managerial solution for preventing construction-related risks, minimizing technical delays, and avoiding both financial losses and potentially fatal consequences.

By combining insights from environmental impact assessment, monitoring technology, and project management literature, the paper aims to provide a comprehensive perspective on how modern vibration monitoring can transform early-stage construction management into a more efficient, responsive, and accountable process.

Keywords: ground vibration, zero-cycle impact assessment, vibration monitoring, modern technologies, risk management.

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The impact of artificial intelligence on human resource management and the main challenges

Dea Pirtskhalaishvili

Assistant professor, Ivane Javakhishvili Tbilisi State University, Georgia

Davit Dugladze

Associate Professor, Georgian State Teaching University of Physical Education and Sport, Georgia

Tatia Qajaia

Ph.D. student in Business Administration Sokhumi State University, Georgia

EXTENDED ABSTRACT

In today's rapidly evolving world, the number of organizations integrating artificial intelligence into various business operations is increasing daily. It is noteworthy that approximately 82% of companies are already actively implementing artificial intelligence in their business processes or exploring its adoption. Furthermore, 99% of Fortune 500 companies already utilise AI (Kumar, 2025). It is worth emphasizing that the percentage of companies that implement artificial intelligence in various operations is increasing every year. According to the CEO and Senior Business Executive Survey, 77% of CEOs claim that AI brings a new era in business. However, they also express concerns that their organization's leading technology experts are not equipped with the knowledge and capabilities to support and enhance business outcomes in this rapidly evolving setting (Gartner, 2025). The percentage of HR leaders who are actively planning or have already adopted GenAI has increased from 19% (2023) to 61% (2025) (Gartner, 2025). Notably, according to IDC's 2025 CEO Priorities research, a large share of CEOs report increased operational efficiency and customer satisfaction from generative AI initiatives (Taylor, 2025). The integration of artificial intelligence in human resource management is growing. Process automation enables human resource management specialists to automate repetitive tasks, freeing up valuable time to focus on more important responsibilities. At the same time, it increases the productivity of the individual, reducing the likelihood of errors, etc. (IMD, 2025). It is worth noting that artificial intelligence plays a supportive role in the recruitment process. It can also help enhance employee experience during onboarding and other important activities (Schmelzer, 2025). Furthermore, it plays a

crucial role in attracting, identifying, retaining, and evaluating talent (Hayes & Downie, AI and the future of human resources, 2025). As a result, it is possible to increase organizational efficiency, improve strategic planning, and reduce costs (Hayes & Downie, 2025). Talent acquisition remains a key challenge for the company. Recruiting the right talent ensures the organization's competitiveness. Therefore, incorporating artificial intelligence into human resources management plays a vital role in the recruitment process (BCG, 2025). It is interesting to note that according to research, 56.8% of companies believe that AI should serve a supporting role, and the final decision should be left to humans. The interaction between AI and humans allows us to reduce both time and financial costs, while also enabling fair and personalized decision-making (Alana Rudder, 2024). Along with its benefits, the implementation of AI in human resource management comes with a number of challenges. The biggest challenge is the issue of bias. AI algorithms are data-driven, but if the data contains any bias, whether it's hiring patterns, promotions, or pay scales, AI will replicate and amplify it (Duggal, 2025) (Loveday, 2024). In addition to the above, there is a risk that the HR specialist will become overly dependent on AI technologies and the results obtained from them, which may lead to a lack of critical thinking. On the other hand, the introduction of AI into the work process (e.g., performance evaluation) may also be accompanied by a negative reaction from employees. The reasons for this may be - fear of novelty, uncertainty, risk, lack of information, etc. Integrating artificial intelligence into human resource management brings substantial advantages to an organization. However, given the challenges discussed, it is important to take certain measures to avoid mistakes and maximize the potential of AI tools. Organizations should ensure that their systems are auditable, transparent, and aligned with compliance standards to avoid bias and unethical practices. The process should be transparent and fair. Additionally, organizations should have a change management specialist who will increase employee awareness of AI and make the transition process smoother.

Keywords: artificial intelligence, human resource management, organizational efficiency, recruiting, personalized decision-making

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