The Impact of the Fusion of Human and Artificial Intelligence on Changes in the Generation and Protection of Innovations

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Abstract: Artificial intelligence (AI), as a unique multi-innovation, is the result of the action of human intelligence in an anthropocentric innovation model. The intensive development of innovative and autonomous capabilities of AI is a challenge for the transformation of the anthropocentric innovation model. The main aim of the research is to highlight the opportunities and challenges in the field of generating and protecting innovations, which will arise as a result of the fusion of human intelligence and AI. By using a proactive approach, the authors offer insights into the fusion of human intelligence and AI, as a brand-new innovation resource that will affect: the emergence of a new hybrid innovation model, changes in the structure of innovations, the emergence of multi-innovations, the redefinition of the concept of innovation portfolio, the conception and implementation of new intellectual property (IP) policies that will permit the establishment of a balance between human autonomy and the absence of discrimination against AI, as well as adequate legal protection for innovations generated by the fusion of human intelligence and AI. The research results show that the fusion of human intelligence and AI simultaneously represents: a stimulus for redefining and improving the innovative capabilities of human intelligence and the continuous development of innovative and autonomous capabilities of AI, as well as a catalyst for positive changes in the innovative model, which still remains focused on humans. In the near future, the fusion of human intelligence and AI will become a framework for research with scientific, economic, legal and political significance, and a radical systemic impact on society as a whole.

Keywords: Human intelligence, Artificial intelligence, Innovation, Intellectual property

1. Introduction

Innovative activities in contemporary conditions occur in an environment characterised by constant changes and uncertainty: intensive development of AI and quantum technologies, upcoming challenges of the 4th industrial revolution, dynamism of changes in the global innovation ecosystem. Innovative companies are required to react more and more quickly to instantaneous changes.

The success of adaptation of innovative companies is conditioned by the transformative potential of AI, and the adaptive capabilities of participants in innovation activities to adapt to the transformative potential of AI. Most representatives of the academic and business community, as well as innovation policy creators, agree that AI is the biggest transformative force that will radically change the existing innovation system. "By and large, significant innovations from now on will happen in the "unknown world" - that is, via insights gained thanks to AI's ability to streamline and accelerate knowledge accumulation while humans focus on unlocking previously indecipherable mysteries" (Sinha, 2023).

The starting point for determining the transformative potential of AI is found in the answer to the question whether human intelligence, as the only form of intelligence involved in innovation activities so far, is ready to respond to the challenges of upcoming changes. In other words, AI should be considered a transformative potential for transitioning and upgrading the knowledge, abilities and skills of human intelligence.

The impact of AI on the transformation of the innovative potential of human intelligence will cause chain changes in innovative activities. These changes will be conditioned by the quality of the fusion of the two types of intelligence. In this respect, the fusion of human intelligence and AI will become a synonym for a new strategic form of intelligence in innovative activities, and innovative activities can be considered a brand-new system of action of the fusion of human intelligence and AI in the process of generating and protecting innovations.

Despite its transformative potential, a comprehensive review of the impact of the fusion of human intelligence and AI on innovative activities is still missing in the current literature. This paper aims to bridge this gap by providing a detailed analysis of the fusion of human intelligence and AI, as a milestone in overcoming future challenges in the innovation model, which should permit an unprecedented transformation of the model in which innovations are generated and protected, with implications for future research.

2. AI as a Result of Innovation Activities

In order to define AI as an innovation, it is necessary to perceive AI as the result of innovation activities realised by human intelligence.

Given that innovation "manifests in diverse forms, each serving unique purposes and delivering distinct benefits" (Jain, 2023), it is necessary to see AI as a multi-innovation, in which the characteristics of several types of innovation are intertwined:

- business model innovation, since it "can comprise the development of entirely new business models, the diversification into additional business model, the acquisition of new business models, or the transformation from one business model to another" (Geissdoerfer, Vladimirova and Evans, 2018)
- data-driven innovation, since the application of "DDI in operations, research and development, […], firms can achieve a sustained competitive advantage" (Sultana, Akter and Kyriazis, 2022)
- digital innovation, since it can be observed "as a constant search for and identification of new or evolved problem-solution pairs" (Nambisan et al, 2017)
- product innovation, because like majority product innovations it "can have a long-life cycle because of the multiple stages involved in the process of innovation development and implementation" (Krasadakis, 2020)
- innovation that inspired new breakthroughs, since it is "so monumental that they inspired other designs, markets and industries to develop around them" (Stanford Online, 2024)
- radical innovation, since it has "an important role in economic growth not just because of their direct contributions to productivity but also because further innovations can build on them" (Acemoglu, Akcigit and Celik, 2022)
- discontinuous innovation which "links the substitutable and complementary knowledge and skills of actors to create a network of operant resources" (Michel, Brown and Gallan, 2008).

3. Innovations in the Domain of AI

The intensive development of AI imposes the need to find solutions to use the innovative potential of AI in the process of generating future innovations. "Economists at MIT, Harvard, and Boston University argued that AI's greatest economic impact could come from its potential as a new "method of invention" that ultimately reshapes "the nature of the innovation process" (Rotman, 2019).

3.1 Basic Characteristics of Generative AI

According to the Report of McKinsey&Company (Chui et al, 2023), generative AI (GenAI) could be described as: skill-biased technological change, virtual expertise, and the potential that will open wholly new frontiers in creativity and innovation.

Considering the expected impact of GenAI on the innovation system, GenAI can be considered an intelligent system that:

- is capable of cooperating with people. "AI-human collaboration is the key to addressing challenges and seizing opportunities created by GenAI" (Nah et al, 2023).
- encourages changes in creativity and innovative potential of people. "Regardless of legal outcomes, GenAI is likely to transform creative work and employment" (Epstein et al, 2023).
- can improve innovative activities. "Different AI models require different skills and capabilities from their users. Only when the skills match the task requirements will using GenAI lead to higher innovation performance" (Piller, Srour and Marion, 2024).

3.2 Basic Characteristics of Agentic AI

The next evolutionary level in AI development is agentic AI. According to Shrivastav (2025), "Agentic AI and GenAI are the two sides of one coin reflecting distinct paradigms in Artificial Intelligence dynamics, each with unique capabilities and applications". Hosseini and Seilani (2025) state that agentic AI is capable of:

- independently making decisions, interacting with their environment, and optimizing processes without direct human intervention
- continuous learning while interacting with dynamic environments
- significantly improves productivity, reduces costs, and drives innovation.

Based on its learning ability and autonomy, agentic AI is a reliable partner in innovation activities. Agentic AI is expected to participate in the generation of innovation; humans are expected to implement stages in innovation activities for which agentic AI has yet to possess (autonomous) skills.

3.3 The Future of AI Innovation

The development of quantum technologies will have numerous effects on the development of science, technology and future generations of innovations.

The continuous improvement of the AI system, stimulated by the development of quantum technologies, will simultaneously influence the emergence of a new generation of innovations in the field of business innovations and quantum technologies. "AI is accelerating quantum computing today. We're starting to see researchers tap into the mature infrastructure of AI and accelerated computing to leverage things like Large Language Models (LLMs) to develop new quantum algorithms and improve the performance of quantum computers" (Costa, 2024).

The impact of innovations in the domain of AI on innovations in quantum technologies will generate a positive cycle of major, evolutionary innovations. One of those evolutionary innovations will be the rapid development of innovative capabilities of AI. "And not in a distant future, AI will be integral to every stage of the innovation pipeline, form idea generation to its execution" (Becker, 2024).

Subliming the innovative potential of GenAI and agentic AI, as well as the effects of the intensive development of quantum technologies, AI can be viewed as:

- a tool that can be used by innovative teams in the process of generating innovations
- collaborator in innovative teams
- an autonomous innovator, with or without the participation of people in the process of generating innovations.

4. The Impact of Innovations in the Domain of AI on the Transformation of Human Intelligence

Until the expansion of innovation in the domain of AI, human capital (HC) was "the key lever to achieving a competitive edge in the innovation race" (Krys, Born and Geering, 2025).

With the expansion of innovation in the domain of AI, AI is becoming a brand-new intellectual resource. Innovations in the domain of AI are creating a new business reality where AI becomes the impetus for HC transformation. "AI can expand human abilities and creativity not only by replacing aspects of human labour but also by assisting humans as a technologically advanced tool" (Council for Social Principles of Human-Centric AI, 2019). As a "technologically advanced tool", AI can be used for the intelligent expansion of HC that will lead to an increase in the total volume of knowledge and competence of HC.

In addition, AI will affect the change in the innovative potential of HC in the process of generating innovations. "Finally, AI can help increase productivity by helping humans use increased capabilities faster (i.e. towards "augmented intelligence")" (Correia and Reyes, 2020).

Considering the intensity of AI's impact on changes in human intelligence, it is indisputable that human intelligence will become a form of intelligence subject to constant change (dynamics). "This development is significant because the skills required in this new landscape will be a combination of specialized human skills and augmented skills customized to the individual, like what we are already seeing with GenAI" (Sampanthar and Vitanova, 2023). On the one hand, GenAI offers the possibility to improve the performance of knowledge-based activities. On the other hand, GenAI affects the increase of innovative capabilities of human resources. Complementarities between technology (GenAI) and the intellectual and innovative capabilities of human resources become increasingly important and specific over time, often focused on new, inventive forms of knowledge. AI can therefore be expected to "augment human performance rather than fully supplanting it" (Rayner, 2023).

For the purpose of being able to use innovative forms of knowledge, individuals are required to develop new (complementary) knowledge, skills and intelligent abilities. "According to the World Economic Forum's Future of Jobs Report 2020, creativity, critical thinking, and complex problem-solving are the top three skills required for the future workforce, which is being increasingly influenced by the growth of artificial intelligence (AI) and digital technology" (Kapysheva, 2023).

Under the influence of changes in the potential of human intelligence, AI will become more autonomous and inventive over time, which is observed in agentic AI, in order to be a stimulating collaborator in innovative activities. "There is potential to leverage AI to complement humans, which requires a better understanding of the opportunities and limits of combining the two" (Ee, 2023).

By modifying the focus of human action from knowledge-based mental activities to new skills and intuition-based mental activities, the boundaries between human intelligence and AI cannot be precisely determined.

It is precisely this blurring of boundaries between human intelligence and AI that leads to the need for the fusion of human intelligence and AI into a unique "intelligent" resource. The fusion of human intelligence and AI is expected to allow the establishment of a stable balance between:

- creativity of human intelligence and AI
- inventiveness of human intelligence and AI
- human creativity and technological progress in order not to alter the diversity of innovations in favour of technological innovation.

5. The Impact of the Fusion of Human Intelligence and AI on the Transformation of the Anthropocentric Innovation Model

5.1 The Fusion of Human Intelligence and AI as a Unique Multi-Innovation

Before defining the fusion of human intelligence and AI as innovation, we need to determine whether the transformation of human intelligence has elements of innovation. Kogabayev and Maziliauskas (2017) state that innovation is the core action for the development and productivity of any economic activity, while Afuah and Utterback (1997) believe that innovation is synonymous with "new knowledge incorporated in products, processes, and services". Moreover, "innovation may involve a wide range of different types of change depending on the organization's resources, capabilities, strategies, and requirements" (Baregheh, Rowley and Sambrook, 2009).

Since the transformation of human intelligence represents:

- the result of the AI process of implementation in innovation activities
- absolute novelty in the change of HC as an innovative resource of high degree of usefulness in AI-based innovation activities
- a synonym for new knowledge that will be incorporated into innovative processes, products and services
- operating lever for intensive development and increase of productivity in innovation activities,

it is justified to define the transformation of human intelligence as innovation.

The fusion of human intelligence and AI, as a unique innovation, arises as a result of the fusion of complementary elements of AI and the transformation of human intelligence, as unique multi-innovations. Based on this, the fusion of human intelligence and AI is within the scope of the domain of multi-innovation, as it contains elements of different types of innovation:

- radical innovation, since it will be able to be defined in the (near) future "as innovation that society categorizes and institutionalizes in a new category rather than within an existing category, and valuates the innovation positively for its novelty" (Frenken and Punt, 2023)
- revolutionary innovation, because it resembles other revolutionary innovations which "fall onto a continuum ranging from 'radical incrementalism' – that delivers significant change to the mainstream market […] – to totally 'disruptive innovations' that deliver transformational change to the mainstream market and its value attributes" (Thomond and Lettice, 2002)
- incremental innovation, since it is "largely driven by internal processes and knowledge held by employees" (Engen and Holen, 2014)
- business model innovation, since it represents "the discovery of a fundamentally different business model in an existing business" (Markides, 2006), in this case, the discovery of a fundamentally different innovation model
- process innovation, since it refers to "changes in a methodology or process to achieve efficiency" (Kahn, 2018)
- innovation that aspires to fully become a sustainable and profitable innovation in the (near) future.

5.2 The Impact of the Fusion of Human Intelligence and AI on the Transformation of Innovation and the Innovation Portfolio

Although it represents innovation, the fusion of human intelligence and AI also represents an impetus for the transformation of innovations.

In the fusion of human intelligence and AI, there is potential to increase the innovative capabilities of both types of intelligence. In order for this potential to be used, it is necessary for innovative activity to be stimulating for human intelligence, and at the same time to provide mechanisms that will allow the maximum use of the potential of AI, because "artificial intelligence also has the potential to change the innovation process itself, with consequences that may be equally profound, and which may, over time, come to dominate the direct effect" (Cockburn, Henderson and Stern, 2018).

Properly harnessed potential of increased innovative capabilities of human intelligence and AI will cause numerous changes.

The first group of changes will refer to incremental improvements in existing innovations. By shifting the focus from knowledge as a resource for generating innovation to the fusion of human intelligence and AI, the concept of innovation will be redefined. Innovations that will be created as a result of the fusion of innovative capabilities of humans and AI will have a significantly transformed anatomy with regard to existing innovations.

The second group of changes will involve changes in the type of innovations. Continuity and complementarity in the development of human intelligence and AI will permit the emergence of a new spectrum of innovations, which will condition a wave of evolutionary and disruptive innovations. Strengthening the connections between human intelligence and AI will become the cornerstone of major innovation.

The third group of changes, driven by the evolution of the innovative fusion of human intelligence and AI, will cause the emergence of an increasing number of multi-innovations, which will replace the existing concept of the innovation portfolio. The concept of multi-innovation will be based on a holistic approach, as well as an approach to the diversity of innovations. Multi-innovation should represent a combination of different types of innovation, existing and new, which will consist of an indefinite number of innovations that may or may not be complementary. The balance between existing and new types of innovation will affect the success of innovative companies, as a longer period of time will pass before the market verifies new types of innovation.

In order to ensure the financial balance of innovative companies, it is necessary to determine how the fusion of human intelligence and AI will affect the protection of generated innovations, which will be discussed in the next chapter.

5.3 The Impact of the Fusion of Human Intelligence and AI on the Transformation of the Legal Protection System for Generated Innovations

"The intersection of AI and IP law presents a complex landscape where traditional legal frameworks are often inadequate to address the unique issues posed by AI technologies. […] Therefore, understanding the evolving regulatory landscape is crucial for ensuring that IP laws remain relevant and effective in the AI era" (Salle and Rini, 2025). "This brings forth pertinent questions concerning Intellectual Property Rights, (IPR) for, it challenges not only traditional notions of concepts such as patents and copyrights, but also leads to the emergence of questions related to the regulation of such creations amidst others" (Tripathi and Ghatak, 2018).

The existing IP system is dominated by an anthropocentric model that favours and encourages human creativity and inventiveness. The fusion of human intelligence and AI represents the beginning of the transformation of the anthropocentric model. This transformation is expected to allow a shift in focus from favouring and encouraging human creativity and inventiveness to establishing a balance between human creativity and creative activities that will realise a new form of intelligence created by the fusion of human intelligence and AI. The end result of this transformation is the conception of a new, hybrid model for the protection of innovations.

Conceptualising a new model involves overcoming numerous challenges. In the following, only a few of the most important ones are highlighted, since before conceiving a new model, it is necessary to realise extensive legal and economic research, which will require the participation of representatives of the academic, business and government sectors.

First, redefining the term IP, inasmuch as "the definition of IP cannot be limited to the human intellect" (WIPO, 2019).

Second, defining new forms of intellectual creations. "If we truly want to spur innovation globally, we must recognize all forms of intellectual creations - from AI to all humans - and make space for them in our legal frameworks" (Skibsted, 2024).

Third, conceptualisation of new legal policies that should allow:

- a certain degree of protection for innovations generated by any kind of intelligence
- new forms of protection for multi-innovations resulting from the fusion of human intelligence and AI
- respecting the diversity of IP generated by the fusion of human intelligence and AI in relation to existing IP
- establishing a balance between "hard" IP and "soft" IP, inasmuch as the boundaries between them will become more and more indistinct
- retention of existing concepts of author's creativity (individuality, originality, subjective choices of the author, "awareness of creation", personal and spiritual connections of the author to the work) for works created by the fusion of human intelligence and GenAI
- preservation of human autonomy for works created by the fusion of human intelligence and agentic AI
- determining the useful life for IP generated by the fusion of human intelligence and AI
- conceptualising new models of named and unnamed contracts for the transfer of IP rights
- legal autonomy for the economic disposal of IP generated by the fusion of human intelligence and AI in order to have an equal market position as existing IP

- economic incentives for generating (multi)innovations...

6. Conclusion

In this paper, the authorial focus is on determining the basic challenges for conceiving a new, hybrid innovation model in which innovations will arise as a result of the fusion of human intelligence and AI. The fusion of human intelligence and AI, as a unique multi-innovation, will become the generator of numerous changes in the model for generating and protecting future innovations. Considering the impact of the fusion of human intelligence and AI on innovation activities, the following conclusions were reached:

- innovation activities in the future will be adapted processes that will mark the end of the dominance of human intelligence in the process of generating innovations
- the success of innovation activities will depend on the ability and speed of human intelligence and AI to intellectually "upgrade" and adapt to mutual changes in innovation potential
- properly used innovative potential of human intelligence and AI will influence the transformation of innovations and innovation portfolio
- new forms of innovation, unique multi-innovations, will initiate a wave of chain changes in the legal system of innovation protection, from the redefinition of the term IP, to the conception of new innovative policies that are expected to stimulate a new wave of innovations and innovative changes in the future.

In addition to changes in the innovation model, the fusion of human intelligence and AI will initiate research in the academic community, business and government sectors. Researching this challenge will require the design of innovative methodological approaches that will initiate a wave of multidisciplinary research and practical solutions that will use the power of cooperation between the aforementioned participants. The research challenges that will be a priority in the following period are:

- building flexible organisations to implement the fusion of human intelligence and AI
- empowering organisations to develop innovative skills for an adaptive future dominated by a fusion model of human intelligence and AI
- management of organisations dominated by the fusion model of human intelligence and AI
- managing multi-innovation as a result of the innovative action of the fusion of human intelligence and AI
- new legislative framework for IP rights, with an ethical sub-framework for regulating AI rights in the multi-innovation protection model

- instruments and mechanisms for financing multi-innovations
- future industries that will arise based on the application of the fusion of human intelligence and AI in business organisations

▪ building resilient innovation systems for prosperity and sustainable development...

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