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THE IMPACT OF ARTIFICIAL INTELLIGENCE ON CREATING INTELLECTUAL CAPITAL IN POLISH ORGANIZATIONS

Jolanta JURCZAK

Warsaw University of Technology, The Faculty of Management; jolanta.jurczak@pw.edu.pl,
ORCID: 0000-0003-2584-6427

Purpose: The aim of the paper is to identify the components of the Intellectual Capital structure in the AI era and to indicate the mechanisms of AI technology's impact on the Human, Organizational, and Relational Capital of Polish enterprises, which will enable the development of a theoretical model for assessing this impact.
Design/methodology/approach: The study uses the method of critical analysis of the literature and a review of desk research results. The study area of the paper covers the issues of Intellectual Capital (IC) and AI. The paper is theoretical and conceptual in nature and represents the author's point of view. Employing a deductive approach, this study reinterprets established dimensions of IC for the era of AI.
Findings: The paper develops the components of the IC structure in the AI era, identifies the potential impact of AI on IC in Polish enterprises, and proposes a theoretical and conceptual model of the impact of AI on IC. The results obtained indicate that AI has a strong and diverse impact on the IC of organizations.
Research limitations/implications: The discussion explores a new direction for research and, above all, should be inspiration for further study of the impact of AI on IC in companies. The proposed model is general, but it could be a basis for further research.
Practical implications: Practical implications include the possibility of using the proposed model to choose and develop an appropriate strategy for the company's development and increase its market value.
Social implications: The article emphasizes the impact of AI in creating an organization's IC, especially in the area of shaping human-technology relationships, which determine the future dimension of people's social competencies. The proposed model generates greater awareness among management and employees regarding companies' responsibility for access to technology and the creation of IC. This may result in the development of a new strategy for responsible AI management.
Originality/value: The study brings new value by considering the impact of AI on Human, Organizational, and Relational Capital at the same time. Additionally, the article shows how and with what components the impact of AI on IC can be analyzed.
Keywords: Artificial Intelligence, Intellectual Capital, Impact AI on IC.
Category of the paper: Viewpoint and conceptual paper.

1. Introduction

In the era of globalization, Artificial Intelligence (AI) technology has become a key indicator of the development of an organization's potential and the achievement of market competitiveness for businesses and the economy. As a driving force behind industrial transformation, AI enhances productivity, increases efficiency, optimizes resource allocation (Fan, Chen, Yang, 2025), transforms the way people make decisions, changes the demand for labor by increasing the need for highly skilled workers, automates processes, and at the same time reduces the demand for repetitive tasks (Autor, 2024; Han, Mao, 2023; Ma et al., 2022; Noy, Zhang 2023; Wang, Chen, Chen, 2024), and also supports employee learning and enables the creation of new forms of relational value.

The dynamic development of AI contributes to the verification and re-discussion of many issues related to Human Resource Management (HRM) and the creating of an organization's IC. Therefore, the literature contains considerations regarding the nature of future relationships between human knowledge capital and AI (Gashenko et al., 2020; Popkova, Sergi, 2020; Gitling, 2024; PARP 2025), or the use of AI in Organizational and Relational Capital management processes (Kisielnicki et al., 2022; Chowdhury et al., 2023; Kabus, 2025). There are also considerations regarding the use of AI in responsible HRM (Chowdhury et al., 2023; Korkosz-Gębska, 2025), as well as analyses of the transformative impact of AI on IC development (Al-Romeedy, Alharethi, 2024; Popescu, Šebestová, 2024). However, the subject matter often focuses on selected industries and various correlations of this topic with other issues, e.g., studying the impact of AI and IC on the sustainable development of organizations in the tourism, hotel, or transport industries. The literature on the subject rarely shows how the implementation of AI in organizations affects changes in the Human, Organizational, and Relational Capital of specific market enterprises, transforming them.

There is also a lack of research (or very little) on the impact of AI on the structure, shape, and value of IC, which is now seen as a strategic resource for organizations (Wójcik, 2023). Consequently, this results in a lack of knowledge among decision-makers and the inappropriate use of AI in companies. Furthermore, traditional IC models (Jurczak, 2006; Mroziewski, 2008) do not consider AI technology as an element that contributes to the value of an organization. Therefore, there is also a great need to redefine the components of IC in the areas of Human, Organizational, and Relational Capital. This article attempts to answer the following questions: *What are the key components of Intellectual Capital in the age of AI? and How does Artificial Intelligence affect the structure of Human, Organizational, and Relational Capital in Polish enterprises?*

The aim of this work is to identify the components of the IC structure in the AI era and to indicate the possibilities and mechanisms of AI technology's impact on the Human Capital (HC), Organizational Capital (OC), and Relational Capital (RC) of Polish companies in the context of

building organizational value, which will enable the development of a theoretical model for assessing this impact.

2. Research methods

The author's considerations are based on literature studies and a review of source research results, together with a critique of the literature. The research methods included: a review of scientific literature, industry reports, and online sources related to the issue of IC in the AI era. The search was conducted using Google Scholar. Only works analyzing the impact of AI on IC (including HC, SC, RC) published in Polish and English between 2020 and 2025 were taken into account. In addition, analyses contained in source materials and reports of Polish companies published in 2022-2025 were used, and companies that are leaders in the implementation and use of AI in various areas of IC were analyzed. The research conducted in this way was used to analyze the results, propose an IC structure, and develop an original model of the mechanisms of artificial intelligence's impact on IC development in an enterprise, as well as to formulate final conclusions in this regard. This work is therefore theoretical and conceptual in nature and may inspire further research and exploration of this topic on a larger scale.

3. Results

In this paper, the author understands the intellectual capital of an organization within a holistic-dynamic concept as capital that changes over time as a result of interactions specific to social capital and under the influence of the strategies adopted by the organization. In this approach, IC consists of Human Capital, Organizational Capital, and Relational Capital. All elements of IC may change over time under the influence of transforming environmental conditions, the development of AI technology, and its implementation in the specific context of the organization. In this context, companies should constantly update and adapt IC components, adjusting them to the reality in which they operate. Table 1 presents the identification of IC structure elements in the AI era.

Table 1.
Identification of IC structure elements in the AI era

ELEMENTS OF IC STRUCTURE IN THE AGE OF AI		
LEVEL I	**LEVEL II**	**LEVEL III**
Human Capital supported by AI (skills developed through human interaction with AI tools)	**Knowledge Capital**	• digital knowledge (in the field of digital tools, algorithm and model creation), • specialized knowledge in a given area, enabling critical analysis of responses generated by AI.
	Skills Capital	• communication skills in the field of prompt engineering, • digital skills (ability to work with AI tools, understanding of the basics of algorithms), • analytical and synthetic skills (data analysis and interpretation of AI results), • social and cognitive skills allowing for effective human-AI collaboration, • ability to apply ethical principles in the field of AI and awareness of technological risks.
	Social Capital	• trust in AI, • norms, values, and relationships built in the digital world, • motivation to be active and make decisions based on cooperation with algorithms.
Organizational Capital supported by AI (organizational infrastructure that supports the collection, processing, and use of knowledge with the participation of AI)	**Structural Capital**	• data warehouses, algorithms, and AI models, • AI-supported decision-making processes, • recommendation and prediction systems, • human-AI collaboration procedures, • AI tools for work organization and automation (e.g., cloud computing, chatGPT, AI agents, chatbots), • intelligent work processes, process automation (RPA), • AI-based knowledge systems (generative document repositories, intelligent search engines, Knowledge Graph tools), • digital organizational culture (acceptance of algorithms, openness to technological experiments, resilience to change).
	Process Capital	• processes and procedures realized with the use of AI, • AI-based process mapping tools.
Relational Capital supported by AI (the organization's relationships with its environment, enriched by AI)	**Capital of Distinction**	• the organization's reputation in the context of the ethical use of AI.
	Market Capital	• stronger relationships with customers, suppliers, competitors, and strategic partners, • large-scale personalization of customer interactions (recommendation systems), • automated customer service (chatbots, voicebots), • real-time behavioral analytics, • collaboration with AI technology providers, • co-creation of products with AI partners, • platforms for sharing experiences.
	Customer Capital	• customer base, potential customers, • responsible management of customer data using AI tools.

Source: Own work.

AI contributes to strengthening the development of all three elements of intellectual capital. In the area of human capital, AI supports the development of individual and team competencies and creates human-machine collaboration by:

- stimulating new cognitive, digital, and adaptive competencies among employees (critical thinking, creative thinking, ability to collaborate with technologies). Generative AI systems do not eliminate the need for human input (Deloitte, 2024), but shift the emphasis from performing repetitive tasks to tasks requiring creativity, analysis, and quality control of the results generated by AI models,
- the creation of new professions and specializations, e.g., data analysts, technology ethics specialists, knowledge management experts, and prompt engineers,
- limiting routine operational activities, which necessitates the use of reskilling (learning completely new skills) and upskilling (deepening current skills) programs for employees (EY Poland, 2024),
- supporting learning processes in organizations and its personalization through Adaptive Learning, which involves tailoring the entire learning process to the needs, skills, and abilities of e-learning participants (Kołodziejczyk, 2019).

In the area of organizational capital, the impact of AI mainly concerns:

- intelligent automation of work and information processing. Knowledge Graph Systems and Large Language Models (LLMs) can analyze internal document repositories, reports, and emails, creating summaries, capturing key information, and answering questions. They can also translate texts and create creative content and recommendations. In this way, AI plays the role of a "knowledge assistant" that supports employees in accessing the data they need (Cognity.pl, 2025);
- supporting the automation and optimization of business processes (RPA – Robotic Process Automation), which enhances operational efficiency and reduces the risk of human error;
- creating real-time learning organizations by continuously monitoring process efficiency and recommending necessary improvements (Pańkowska, Sołtysik-Piorunkiewicz, 2025), which allows for reducing losses, better inventory planning, and responding to market changes;
- enabling better intellectual property management (Zancan, Rodrigues, 2025), e.g., algorithms analyze patent markets, identify similar solutions, and help develop strategies to protect innovations.

The impact of AI on relational capital can be observed through:

- personalization of communication and better understanding of the needs of customers and business partners, e.g., recommendation systems used in e-commerce analyze the purchase history and behavior of users to offer them products that match their individual preferences (Ślusarz, 2024). As a result of such activities, customer satisfaction increases, and thus the relational value of the organization also increases,

- strengthening communication and cooperation within teams through the use of sentiment analysis (tools for analyzing content and emotions in emails or chats that help leaders recognize employee moods and respond to potential conflicts), which help create a more empathetic and balanced work environment (PIRIOS, 2025).

The results of the above analyses indicate that improvements in corporate AI innovation significantly contributes to technological progress, reduces the percentage of employees with low levels of education, and facilitates the structural modernization of human, organizational, and relational capital (Fan, Chen, Yang, 2025).

The analysis of practical applications of AI in Polish companies presented below: PKO BP, InPost, CD Project, and Allegro also shows how AI technology affects the development of IC in real economic conditions. Detailed information on the characteristics of the impact of AI on IC in selected Polish companies is presented in Table 2.

Table 2.
The impact of AI on Human, Organizational, and Relational Capital in Polish companies

PKO Bank Polski a leader in the digitization of the financial sector in Central and Eastern Europe, which uses AI in various areas, from customer service to risk management.		
The impact of AI on HC	**The impact of AI on OC**	**The impact of AI on RC**
AI affects HC by appropriately improving the skills of bank employees. PKO BP has created internal training programs in data management, analytics, and AI ethics. In addition, the AI assistant also supports programmers in writing code, correcting errors, and creating test scenarios, as well as other employees in searching for documents.	AI improves structural capital (better processes and a solid knowledge base) by using a virtual voice assistant in the IKO mobile app, which answers questions and carries out basic instructions.	AI increases relational capital by improving customer service efficiency, generating knowledge about customer needs and behaviors, and educating customers about online banking security. AI also assists in soft debt collection (reminding customers of payment deadlines, verifying the authenticity of ID cards, and analyzing the opinions of IKO app users).
InPost a logistics company that delivers parcels and operates Europe's largest network of parcel lockers. InPost uses AI to predict demand, optimize routes, and manage resources in real time.		
The impact of AI on HC	**The impact of AI on OC**	**The impact of AI on RC**
Thanks to AI, employees learn to interpret data, work with predictive models, and make fact-based decisions. The company has thus created a work environment based on organizational learning, where experiences are collected and used in real time.	AI helps to forecast resource demand, plan courier routes, and manage parcel locker locations. Predictive systems analyze weather data, seasonal trends, and customer behavior, which help avoid delays, better plan operations, increase delivery predictability, and manage staff and vehicle fleets more effectively. Algorithms analyze data on traffic, location, time of day, weather, and order history. Based on this, they forecast the load on individual points and optimize the delivery plan. This makes it possible to reduce transportation costs and CO_2 emissions, as well as shorten delivery times.	Predictive systems analyze customer data and behavior, allowing company to better plan their operations, avoid delays, and manage customer relationships more effectively.

Cont. table 2.

CD Projekt a company in the computer games sector that conducts research and development in the field of AI applications in game testing processes, generating realistic behaviors of independent characters, and supporting the work of creative teams.		
The impact of AI on HC	**The impact of AI on OC**	**The impact of AI on RC**
In the area of HC, the company cares about developing technological skills among its employees and creates interdisciplinary teams in which programmers, psychologists, artists, and data analysts work together.	The team responsible for AI is exploring the possibilities of using existing AI-based tools and developing its own AI-based tools for the development of future products, particularly in the areas of prototyping process improvement, testing automation, and the creation of realistic non-playable character (NPC) behavior.	The AI team manages research projects on the use of machine learning for automatic scenario testing and player behavior analysis. These activities enable faster error detection and the creation of more refined game worlds for users, which improves customer relations.
Allegro an e-commerce platform that is a pioneer in the use of AI in data and customer behavior analysis and the personalization of their activities		
The impact of AI on HC	**The impact of AI on OC**	**The impact of AI on RC**
Recommendation systems support people in increasing sales by analyzing purchase history, searches, time spent browsing offers, and price preferences. Based on this, they create personalized product recommendations and dynamically adjust the order of search results.	The use of AI tools to create offers, generate product descriptions, automatically fill in product parameters, as well as optimize photos, set prices, and categorize products. In addition, AI systems collect knowledge about user behavior, which becomes a strategic resource for the company. Furthermore, the company has introduced an AI assistant that helps search for products on Allegro and inspires customers to make purchases (e.g., the assistant suggests what the user may need).	AI helps in responding to customer inquiries and assists consultants in efficient communication, which improves the user experience. Thanks to natural language analysis in customer inquiries, the company better understands their intentions and can match results more accurately. Automatic response systems reduce response times and enable the handling of thousands of queries per day. AI also ensures the security of purchases by detecting potential fraud.

Source: Own work based on: (Wardziak, 2025; MCIT.PL, 2025; CD Projekt, 2025; Business Insider 2022).

All of the companies described show that the key factor for success is not AI-based technology itself, but how it is implemented and how it can be used for the organization's purposes. Companies that treat AI as part of their knowledge and competence development strategy gain a competitive advantage. PKO BP invests in digital education for its employees, InPost creates a data-driven organizational culture, CD Projekt uses AI as a tool to support creativity, and Allegro proves that AI can improve customer relationships. In addition, in all companies, the implementation of AI results in faster development of Human, Organizational, and Relational Capital.

The results of the above analysis allow us to develop a theoretical model of the mechanisms of AI's impact on an organization's IC (Figure 1), which can stimulate the development of Human, Organizational, and Relational Capital.

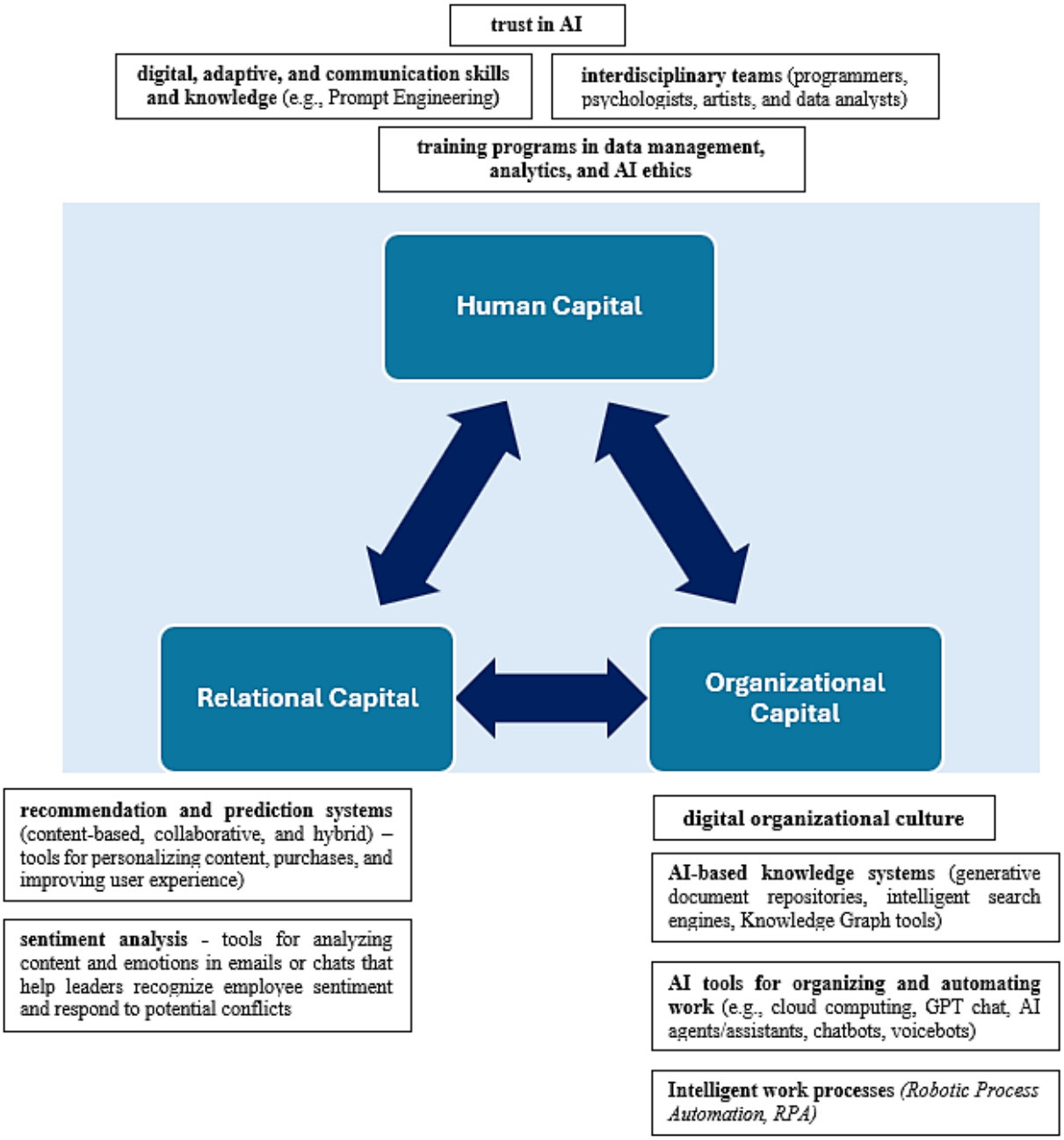

Figure 1. The theoretical model of AI mechanisms influencing IC in creating organizational value. Source: Own work.

4. Conclusions

An analysis of the literature and existing research lead to the conclusion that the speed of implementation and use of innovative AI-based technologies has a significant impact on the formation and development of an organization's IC. Proper implementation and use of AI in a company develop the knowledge and skills of employees, contribute to the development of

infrastructure and organizational processes, and generate stronger and more valuable relationships with the organization's stakeholders, increasing the company's market competitiveness.

However, the effect of AI on IC is not the same for every organization and depends on the specifics and context of the company's operations - its size, technological maturity, or business model, as well as the level of identification and engagement of IC. Therefore, it is worth considering the key mechanisms of AI's impact on IC presented in the theoretical model and analyzing them according to the specifics and context of the organization's operations.

The proposed model generates greater awareness among management and employees of the possibilities and mechanisms of AI technology's impact on an organization's IC, which can contribute to the creation of a thoughtful strategy for the organization's development, focused on the conscious and responsible use of AI in the context of stimulating people's competencies and knowledge, enriching organizational solutions, and building relationships based on mutual trust and cooperation.

The discussion explores a new direction for research and, above all, should inspire further reflection. Future research should take into account empirical data on the impact of AI on the structure, shape, and value of IC (including HC, SC and RC). In the future, it will also be worthwhile to conduct longitudinal studies that monitor how IC evolves over time with the increasing adoption and integration of AI. It is also worth considering the possibilities of measuring the impact of AI on the development of IC in an organization and developing appropriate measurement tools.

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