

AI in Digital Business Models Development and Monetization*

Maryna LASSOTA and Malgorzata KOCHANOWICZ

WSB Merito University in Poznan, Warsaw, Poland

Correspondence should be addressed to: Maryna LASSOTA, maryna.lassota@warszawa.merito.pl

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Abstract

The aim of the article is to present the role that artificial intelligence tools play in contemporary digital business models of the Industry 4.0 economy, with particular emphasis on monetization.

The research problem is the question: what role do artificial intelligence tools play in contemporary digital business models of the Industry 4.0 economy, with particular emphasis on monetization.

Research niche: existing scientific literature does not sufficiently analyse the impact of AI-based Information and Communication Technologies tools on digital business models of Economy 4.0.

Research methods: As the chosen topic of the article is relatively new and dynamic - the literature overview contains elements of narrative and systematic review. Narrative review has been focused on more liberal selection of sources, and qualitative synthesis of the state of research. It requires critical analysis and comparison of concepts but does not always have a formally defined publication selection procedure.

Applied systematic review based on clearly defined search and criteria, defined data extraction and synthesis procedure aimed to provide the most objective and repeatable synthesis of all relevant studies, often with a publication flow table and a description of the search strategy. Applied scoping review – was used to map a broad field of research, identifying key themes and gaps, without a detailed assessment of research quality.

Main conclusions lead to the statement that literature needs more content that would focus on influence of AI based technologies on companies' business models.

Keywords: artificial Intelligence, innovations, 4th industrial revolution, Economy 4.0

Introduction

The inspiration for taking up the topic of this study is the increasing scope of the AI tools application in the digital environment. The ongoing 4th industrial revolution, and the resulting from it strongly pronounced phenomenon of digitization has been recently especially fostered by artificial intelligence tools, applied in many areas of our environment, especially in the business ecosystem.

The observed phenomenon therefore leads to considerations on how AI tools influence the development and final shape of existing business models, how deeply is it going to transform them. Due to the use of AI tools, these models undoubtedly significantly expand or completely change their configuration, in relation to the state in which they functioned in previous industrial revolutions (meaning the 1st and 2nd industrial revolution in the so-called “analog economy- 1.0 and 2.0”, which functioned without the use of information technologies and digitization.

Literature Review

The basic point of reference for the content of this publication will be a systematic review of the literature on existing management models, among others R. Rothwell's innovation creation models, A. Osterwalder's business model diagram, with particular emphasis on the monetization of business models, and P. Timmers' business model with particular emphasis on the digital environment (Timmers, 1998, p. 3-8). Based on these well-established theories linking the evolution of innovation models, the evolution of business models and the digital environment, considerations were made on the role of AI tools and their impact on the shape of the above-mentioned constructs. These considerations took the form of in-depth analyzes and own studies.

One area that requires attention is knowledge about the impact of AI tools on the development and monetization of business models in the digital environment.

Research Methodology

The article uses a systematic literature review with elements of narrative, critical synthesis, conducted according to the SALSA framework: search, appraisal, synthesis, and analysis. Literature constitutes "research material," and the process of selecting and analyzing sources is treated as a fully-fledged research method in management sciences.

Key Steps

Search: defining research questions, keywords, databases (e.g., Scopus, WoS, BazEkon, etc.), timeframe, and subject area; The result is an initial set of publications.

Appraisal: Defined inclusion/exclusion criteria (document type, language, management area, research quality), possibly outlined in the spirit of PRISMA (publication flow chart).

Synthesis: Grouping papers into categories (e.g., review type: narrative, systematic, scoping; analysis methods used: bibliometric, qualitative, quantitative) and developing tables/classification frameworks.

Analysis: Critical interpretation – comparing approaches, identifying gaps, trends, and methodological recommendations for management research.

Research Results

AI role in the evolution of innovation models and the transformation of business models in the digital environment

A comprehensive approach to this topic will require examining the role of AI in innovation creation models. In the 3rd and 4th industrial revolutions, digital innovations materialize in the form of systems, programs and applications. These are networks of interconnected systems and their components within their value chain. They are shaped as new digital business models in the form of production digital systems (IIoT), and digital platforms, for example transaction, e-commerce, streaming, social, booking, service (IoT) and customer service platforms. The essence of the 3rd and 4th industrial revolution in the era of widespread digitalization is the nature of the process of creating digital innovations.

Artificial intelligence plays a crucial role in shaping business models, particularly in areas such as customer engagement, innovation, sustainability, Industry 4.0, and digitalisation (Jobstreibizer et al., 2025). It also influences the development of start-up business models, significantly affecting the definition of value propositions, the optimisation of distribution channels, and the structuring of revenue streams. This highlights the central significance of AI in monetisation and innovation processes within these business models (Bartczak, 2023). In addition, artificial intelligence considerably enhances operational efficiency, supports decision-making processes, and stimulates innovation and the achievement of sustainable development goals in the context of Industry 4.0 business models. Monetisation mechanisms include, among others, subscription and freemium models, in which the application of AI enables offer personalisation, optimisation of customer experience, and generation of higher revenues (Torres et al., 2025). Despite the considerable potential of AI in applications such as predictive maintenance and production planning, its large-scale adoption in industry remains limited (Windmann et al., 2024).

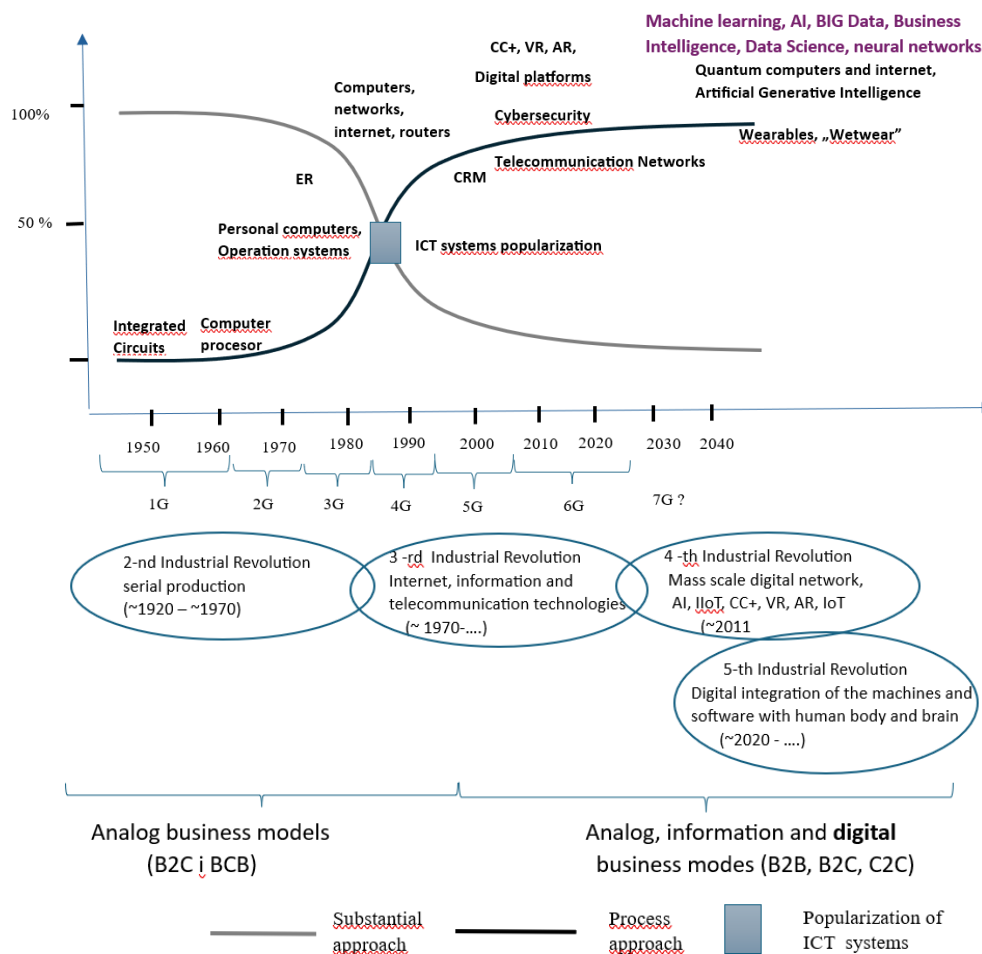
During the first two analog industrial revolutions, the 1st and the 2nd, this process was static and factual. During the 3rd and 4th industrial revolutions, the process of creating innovations became much more dynamic, or functional

(Baumol, 1990, Kirzner, 1997), that is, dynamically integrated with processes both within the organization and in its environment.

Innovations bring changes in the field of technique, technology and science, organization, economics, socio-cultural situations, both on the scale of the enterprise, country, Europe or on a global scale. They may be tangible or intangible (Dolińska, 2010, p. 18).

For the purposes of this publication, the definition of innovation is adopted by A.A. Ferraresi, C.O. Quandt, S.A. Santos, J.R. Frega, which reads as follows: Innovation is the process of transforming knowledge into value through the use of new or improved products, processes or systems.

Figure 1. The most important innovations in the industrial revolution 3.0 and 4.0 and the evolution of the definition of innovation. Moving away from understanding innovation as only an invention, in favor of modern system technological solutions.



Source: Own study

Analyzing Figure 1, one can clearly see how knowledge was transformed into value for the company and the customers, offering them new solutions in the form of innovative products and next generations services. The innovation process, or the process of creating innovation in an enterprise, can be implemented in various models of innovation creation. The innovation process is therefore not identical with the model of creating innovations. The innovation process only contains a catalog of stages that an invention or innovation goes through before it finally reaches the consumer. The innovation process, unlike the innovation creation model, does not include participants involved in creating innovations. The model, however, describes the types of tasks that are carried out between the participants, process entities and the types of activities that are carried out by them (Lassota, 2020).

The most famous taxonomy of innovation creation models was proposed in the 1990s by the British sociologist R. Rothwell, who classified previously known models into five successive generations. The main axis of division ran at the level of defining models as supply- or demand-driven. This is a fundamental way of distinguishing innovation creation models based on their place of origin – inside, i.e. the 1G model (supply-driven) or outside the enterprise, i.e. the 2G model (demand-driven). The remaining models from the third to the sixth generation – are an extended and coupled version of linear combinations of the first and second generation models.

For this reason, the first two models are so important for the entire systematics of innovation creation models in subsequent generations (Sopińska, Mierzejewska, 2017). The phenomenon of systematically increasing the group of participants taking part in the process of creating and implementing innovations draws attention. In the 4G model, it can be seen that its essence already consists in the integration of the processes of creating and implementing innovations within enterprises through, for example, MRP (Material Resource Planning) or ERP (Enterprise Resource Planning) systems, optimizing the management of company resources. Looking at the 5G model, it can be seen that consumers are also involved in the process of creating innovations for the first time, often through, for example, the company's website, its discussion forums or e-commerce platforms.

The most famous taxonomy of models for creating innovations was proposed in the 1990s. British sociologist R. Rothwell, classifying the previously known models into five successive generations. The main axis of division runs at the level of defining models as supply or demand. This is a fundamental way of distinguishing models of innovation creation according to the place of their creation - internally, i.e. the 1G model (supply) or outside the enterprise, i.e. the 2G model (demand). The remaining models from the third to the sixth generation are an extended and coupled version of the linear combination of the first and second generation models. For this reason, the first two models are so important for the entire system of models for creating innovations in subsequent generations (Sopińska, Mierzejewska, 2017). What draws attention is the phenomenon of systematically increasing the number of participants involved in the process of creating and implementing innovations within every more advanced type of innovation model. The 4G model shows that its essence lies in the integration of the processes of creating and implementing innovations within enterprise it-self, for example, MRP (Material Resource Planning) or ERP (Enterprise Resource Planning) systems optimize the management of company resources, integrating particular links of company value chain. Looking at the 5G model, it can be noticed that for the first time also consumers are involved in the process of creating innovations, often e.g. through the company's website, their discussion forums or e-commerce platforms.

Table 1. Innovation models of enterprise(1G-6G) - participants perspective

Business model	Generation (1G-6G)	Innovation model	Initiator and object of innovation proces	External participants of innovation process	
Analogue	1G	Supply model	Entrepreneurship	none	Closed Innovations
Analogue	2G	Demad model	Entrepreneurship	none	
Analogue	3G	Supply-demand model	Entrepreneurship	none	
Analogue-Information	4G	Integrated Model	Entrepreneurship	Suppliers, subcontractors, clients, distributors	Open innovation
Analogue-Information and Digital	5G	Network model	Entrepreneurship	Suppliers, subcontractors, clients, distributors (4G) + : Universities, Science and Research Centres, technological clusters, special purpose joint venture vehicles, research consortiums, common venture capitals.	
Analogue-Information and Digital	6G	Social innovations model	Entrepreneurship	Suppliers, subcontractors, clients, distributors (4G) + : Universities, Science and Research Centres, technological clusters, special purpose joint venture vehicles, research consortiums, common venture capitals (5G). + local society groups, internet society groups of final customers and final users.	

Source: Own study based on: M. Roszkowska-Menkes, *Open Innovations: In Search of Balance*, SGH Publishing House, Warsaw, 2015, pp. 59-111, A. Sopińska, W. Mierzejewska *Open Product Innovations Implemented by Enterprises Operating in Poland. Resource-Based Approach*, SGH Publishing House, Warsaw, 2017, pp. 27-34.

It should be noted that the fifth generation (5G) of innovation models through opening up to communication with customers and suppliers and granting them access to some digital resources of the company has allowed for the wide development and use of CRM (Customer Relationship Management) systems, the implementation of e-commerce and other types of digital platforms, intensively supported by AI for several years now.

In order to describe the essence of business models in the context of using innovation, such as artificial intelligence, it is necessary to combine the concept of innovation, defined for the purposes of this article as the transformation of knowledge into value both for the company and the customer, with the process of creating innovations in business models.

The use of innovations, especially of digital character in business models allows for the increasingly integrated value chain of an enterprise both with the interior and with the environment of the company using, among others, information and communication systems (ICT), telecommunications networks, Data Science approach, information technologies such as Big Data, Business Intelligence, the Industrial Internet of Things (IIoT), the Internet of Things (IoT), Internet of Everything (IoE), cloud computing technologies (CC +), AI tools like artificial intelligence, neural networks, machine learning, or deep learning technologies. These technologies support the work of ICT systems along value chain of the enterprise, in the area of supply, purchasing, warehouse and production systems, also sales and marketing via service and communication platforms with customers, creating new value for them, as well as new value for the company itself.

Integrating subsequent modules in the value chain through the use of AI tools translates directly into greater efficiency of the enterprise's business model, which can therefore offer new, better, more unique and better tailored to customer needs value, than the competition and thus capture more value for its own benefit.

Increased efficiency of business models results also from flexibility in adapting to changes in the environment, especially in the expectations of customers, but also suppliers, subcontractors, and other entities cooperating within the value chain, e.g. opinion-forming certification organizations or industry organizations and associations. The dynamically changing environment leaves no other choice for entities that, in order to maintain or strengthen their current competitive positions, must follow changes, especially those brought by innovative digital technologies. For this reason, the business models used during the first two analogue industrial revolutions were significantly different from those brought and popularized by the 3rd

and 4th industrial revolutions.

Thanks to modern technologies, 3rd and 4th industrial revolutions have offered much greater integration of the value chain of enterprises, and consequently - better opportunities for dynamic and effective response to changes in the market and adequate creation of value for the customer and for the enterprise itself, and consequently - monetization of the business. However, to reach this point of discussion, it is necessary to first review the definitions of business models and their typology.

Table 2. Business models definitions review

Year	Definition	Author
1998	A business model is an architecture of the flow of products, goods and information, containing a description of various business activities and their roles, a description of the potential benefits for various economic entities and a description of the sources of their revenues.	P. Timmers
2001	A business model is a structure, substance and transaction management system designed to create value by exploiting business opportunities.	R. Amit i Ch.Zott
2002	A business model is a story that explains how a company does business. According to the author, a business model should define: 1. Who is the company's customer 2. What does the customer value 3. How the company generates profit 4. How it delivers value to customers at the adequate cost"	J. Magretta
2002	A business model as a combination of the company's strategic concept and the technology of its practical implementation, understood as the construction of a value chain that allows for the effective exploitation and renewal of resources and skills.	K. Obłój
2003	A business model is the way in which a company creates and uses resources to be able to offer customers a higher value than the competition and ensure the company's profitability.	C.L Tucci i A.N. Afuah
2005	Model biznesu – to koncepcyjne odzwierciedlenie sposobu prowadzenia biznesu, będące swoistym uproszczonym opisem przedsiębiorstwa lub jego specyficznych elementów.	A. Osterwalder
2008	A business model is a conceptual tool containing a set of elements and relationships between them, which presents the logic of the company's operation in a specific field (business). The business model includes a description of the value offered by the company to a group or groups of customers, together with the definition of the basic resources of the processes of action and external relations of this company used to create, offer and deliver this value, ensuring the company's competitiveness in a given field and enabling the increase of its value.	T.Gołębiowski, T.M. Dudzik, M. Lewandowska, M. Witek Hajduk
2009	A business model is a general concept that formulates the framework for the logic of running a business and its features such as innovation and competitiveness.	B. Nogalski
2010	A business model expresses the logic, data, and other evidence supporting the customer value proposition, as well as the real structure of revenues and costs for the company. It is a set of benefits that the company will deliver to customers, how it will	D.J. Teece

	organize itself to do so, and in some way capture some of the value delivered	
2010	A business model describes the motives of how organizations create, deliver and preserve value.	A.Osterwalder, Y. Pigneur
2013	A business model as a relatively isolated, multi-component conceptual object that describes how a business is run by describing the logic of creating value for the customer and capturing part of that value by the enterprise.	T. Fałęcikowski
2018	A business model is a specific simplification and representation of business reality constructed on the basis of a precisely developed econometric model that shapes the mutual relations between its key components expressed in a configurational approach.	A.Jabłoński
2024	"framework that demonstrates how an organization creates and delivers value to its stakeholders, facilitating the core activities of the organization.	Arto Ojala, William W. Baber

Source: Own study based on: A. Osterwalder et.al., *Claryfying business models: Origins, present and future of the concept, Communications of the Association for Information Systems* 2005, 16 (1), p.1. P. Timmers, *Business models for electronic markets*, „Electronic Market” 1998, no. 8, p. 4., R. Amit, CH.Zott, *Value creation in e-business* „Strategic Management Journal” 2001, issue 22, p. 493., A. Afuah, C.L Tucci, *Internet Models and Business and Strategies, Text and Cases*, Mc Graw-Hill, New York, 2003, s.11, A. Osterwalder, Y. Pigneur, *Business Models Generations: A Handbook for Visionaries Game Changers, and Challengers*, John Willey and Sons, New York 2020, p.11, J. Magretta *Why business models matter*, „Harvard Business Review” 2002 vol.80.(5) p. 87, K. Oblój, *Tworzywo skutecznych strategii*, PWE, Warszawa 2002, p. 98, D.J. Teece, *Business models, business strategy and innovation* „Long Range Planning”, 2010, no 43 (2-3) p. 179, B. Nogalski, *Modele biznesu jako narzędzia reorientacji strategicznej przedsiębiorstw*, „Master of Business Administration” 2009, no 17(2), p. 12., T. Fałencikowski, *Spójność modelu biznesu. Koncepcja i pomiar* Wydawnictwo CeDeWu, 2013 p. 37, T.Gołębiowski, T.M. Dudzik, M. Lewandowska, M. Witek Hajduk *Modele biznesu polskich przedsiębiorstw*, Oficyna Wydawnicza SGH Warszawa 2008, A.Jabłoński *Modele ekonometryczne w konstruowaniu modeli przedsiębiorstw*, *Przegląd Organizacji* 2018 nr 10 s.19, Arto Ojala, *William W. Baber Business Models*, <https://www.sciencedirect.com/science/article/abs/pii/B9780443137013000347?via%3Dihub>

From the above-mentioned definitions it can be seen that their authors, speaking about a business model, usually refer to the way of conducting business activity focused on building a lasting competitive advantage by enterprises and to issues related to creating value for the enterprise and for the customer. In this sense, these are business models of universal character, among which the most widely known is the business model of A. Osterwalder and Y. Pigneur (Osterwalder, Pigneur, 2010). Its design allows for a brief and coherent presentation of all the most important dimensions of the value chain that define the company's business model, divided into nine blocks, contained in 4 areas: 1. Customer, 2. Commercial offer, 3. Infrastructure and 4. Financial credibility (Zinczuk, Bolibok, Kasprzak-Czelej, 2023).

Research results – own studies

Looking at the business model defined above, from the perspective of integrating subsequent links in the company's value chain through the use of AI tools in each of the areas allows us to determine the following roles for this technology:

Table 3. Role of AI instruments in A. Osterwalder and Y. Pigneur business model

	Object of the management	Subject of the management	Role of AI instruments
1.	Client	Customer segments: -definition of the target group along with its individual sub-segments, differentiation between the concepts of end customer and end user	AI tools in Data Science approach, supporting market segmentation processes – demographic, geographical, psychographic and behavioral
2.	Client	Customer Value Proposition	AI tools supporting the analysis of the market, the position and offer

		- captures the functional, emotional and value benefits that can be delivered to a company's customers as its products or services, responding to customer needs	of competitors and the needs of consumers
3.	Client	Customer Relationships – this is a specialized dimension of value that a company conveys to its customers, e.g. the way in which the customer is served after sales	AI tools supporting customer relationships through integrated CRM ICT systems and social media
4.	Infrastructure	Distribution, sales and customer communication channels - determine how the company has logistically configured its path to the market and to the customer, consistently with points 2 and 3.	AI tools supporting the management of organizational resources through integrated ERP ICT systems
5.	Infrastructure	Key partners -suppliers, clients, certifying institutions, industry associations	AI tools supporting the management of organizational resources through integrated ERP ICT systems
6.	Infrastructure	Key areas of activity	AI tools supporting the management of organizational resources through integrated ERP ICT systems
7.	Infrastructure	Key resources	AI tools supporting the management of organizational resources through integrated ERP ICT systems
8.	Financial credibility	Cost structure -fixed costs, variable costs, economies of scale, cost centers	AI tools supporting the management of organizational resources through integrated ERP ICT systems (EPM type)
9.	Financial credibility	Defining the ways an enterprise generates income (margin, commission, subscription, rental, advertising, license, franchise)	AI tools supporting organizational resource management through integrated ICT ERP-class systems.

Source: Own study

The above-mentioned business model is flexible enough to be used in defining business models with particular emphasis on the digital environment of the enterprise. This is confirmed by P. Timmers (Timmers, 1998, p. 3-8), who believes that each digital business model should include:

1. Architecture of the flow of goods
2. Description of entities participating in this flow and their roles
3. List of potential benefits of business entities and sources of revenue
4. List of services and information.

As it results from the above considerations, A. Osterwalder's model, in the version functioning in the digital environment, is fully compatible with the components listed by P. Timmers. It can be its extension, specification.

AI tools and the monetization of business models

One of the most interesting for entrepreneurs and investors components of A. Osterwalder's business model is the method of generating revenue streams. Currently, in the digital environment, we can observe the functioning of several typologies of the digital business model from digital systems like IIoT, IoT, Cloud Computing to digital platforms like trading platforms, streaming services, social media, e-commerce or customers services (CRMs). A perspective considering the methods of their monetization indicates that the revenue models most often used in digital environment are charging fee for the subscription of services or acces to valuable content, charging fee for displaying advertisements, charging commission on transactions and services, and finally client service platforms, charging fee for enhanced/extended post sales functions and services.

When comparing the most important typologies of business models (P. Timmers 1998, L.M. Applegate 2001, M. Rappa 2001), it was noticed that several of them are listed as the most common. Their types are listed in Table 4.

Table 4. Types of monetization in digital business models

Type of the model/Type of monetization in digital business model	Subscription fee for access to the platform	Subscription fee for using the Cloud Computing services by B2B	A fee for advertisement display in time units	Sales commission for transaction, content or software upload
E-commerce	Yes	Yes	Yes	Yes
Social Media			Yes	Yes
Industrial Internet of Things systems	Yes	Yes		
Information systems	Yes	Yes		Yes
Thematic platforms	Yes		Yes	
Auction Platforms	Yes			Yes
Streaming platforms	Yes		Yes	
Booking platforms			Yes	Yes
Information mediation	Yes			Yes
Content platforms	Yes			Yes
Software support platforms	Yes	Yes		Yes
Transaction and trading platforms (e-banking, financial markets, commodity markets)	Yes			Yes

Source: Own study

It should be remembered that in the 4th Industrial Revolution - i.e. the era of digitalization, business models still remain, aside from digital systems (ERP, CRM, CC+ Cloud Computing Systems, IIoT systems, IoT and digital platforms), also extensive value chains of organizations managing these systems and platforms, their way of creating value for the final customer, capturing value from the industry, managing the quality of services, their uniqueness and credibility.

Quite often, this value for the customer is created through the use of ICT, IIoT systems and AI solutions in improving and integrating business processes within the company. Sometimes the platform is the "cherry on the cake", creating a good image of the organization and being its quintessence, while the majority of operations that allow for gaining a competitive advantage take place within the entire value chain of the organization.

Amazon is not only a shopping platform, but also AWS cloud services, Amazon Go retail outlets, continuously improving quality of operations in production, delivery logistics and customer service. Apple is not only digital platform such as iCloud, iTunes, Airdrop or Apple Pay. It is primarily a producer of unique computer equipment and sleek design smartphones, and iPads with a powerful physical network of sales and customer service. Samsung is not only an integrative digital platform for users of products from the household appliances/consumer electronics industry but also a leader in the production and sale of these devices. Tesla is not only software integrating the user of an electronic car with the service and manufacturer, but above all, exceptional cars.

It can therefore be concluded that the described business models in the digital environment have hybrid character, skillfully combining the area of sales and communication with the customer through digital platforms with powerful, physical, integrated value chains within the organization, which are still necessary to ensure the efficient functioning of the platforms. In order to maintain the necessary high level of integration in such systems, the implementation of new technologies supported for now by the first generation of AI is increasingly observed. In large enterprises it can be for example the Industrial Internet of Things (IIoT - Industrial Internet of Things) applied in the processes of production and storage automation, that will be supporting the optimization with integrated ICT management systems of the MRP or ERP class.

For the microenterprises and SME sector especially useful will be technologies related to sales support in the digital environment, such as CRM information systems, e-commerce platforms, technologies related to cloud computing management (CC+), as well as the use of AI, VR and AR technologies, OLTP, technologies and

architecture of federated and object-oriented OLAP databases or even social media themselves. In the current era of the digital economy, it is difficult to imagine the functioning of enterprises in a modern business model without activity in the digital environment, and not supported by artificial intelligence tools. For this reason, we can also observe an increasingly wide use of modern technologies applied in the digital environment, such as AI, already built into popular packages such as MS Office 365, or MS Dynamics, and many tools that are dedicated to SMEs, such as text generators, e.g. Chat GPT or Copilot or graphics (Midjourney, Dall-e and many others).

This thread, however, is a topic for a separate series of scientific articles, which will also illustrate the evolution of artificial intelligence itself and its tools, the scope of its use, which will be provided by its next generations such as AGI and quantum artificial intelligence. However, it certainly cannot be denied that the use of artificial intelligence tools promotes quality and increases the level of integration of individual elements of the enterprise's value chain, because in each of them there is an important role for it to play.

Table 5. AI functions (roles) in digital business models from the perspective of systems and platforms

Function (role)	Business model	
	B2C	B2B
Customization of the offer for the customers needs	Yes	Yes
Creating graphic, text, audio/video content	Yes	Yes
Enhancement of integrated ICT systems efficiency of, i.e. ERP and CRM	Yes	Yes
Optimization and control of organizational costs	Yes	Yes
Optimization and control of production processes	Yes	Yes
Optimization and control of the distribution of goods and services	Yes	Yes
Enhancement of the integration of business processes within the value chain	Yes	Yes
Customers support in IoT, IoE, IIoT application	Yes (IoT, IoE)	Yes (IoT, IIoT, IIoE)

Source: Own study

Discussion and conclusions

From the above considerations on business models, it can be seen that technology based on Artificial Intelligence strongly marks its raison d'être in several different e-business models and is an important and permanent element of the 4th industrial revolution, with wide application.

Artificial intelligence also fits into the functional nature of creating innovations. It consists in the use of algorithms that constantly improve their capabilities of recognizing business phenomena and optimize their management processes.

We can therefore expect that AI will permanently embed in business ecosystem as an ever-improving portfolio of tools that constantly evolve, creating new solutions. These tools will be used in an increasingly specialized and effective way in subsequent industries and areas of life. The only limitation seems to be the computing power of the next generation computers for the needs of artificial intelligence algorithms and the currently very high costs of energy necessary to power them.

Already now, some business practitioners and IT specialists believe that not all investments in the development of artificial intelligence are justified and 100% pays off, because the sum of the profits from its use is lower than the total cost of its production, power, and maintenance. Many companies that have invested, at least during the Covid-19 pandemic in the development of AI technologies (Open AI, Microsoft, Google, Meta, Amazon, Elon Musk), are considering whether these investments will at least pay off and whether they will justify the costs of further stages of work on AI. In connection with this, the question arises whether we are facing another investment bubble in the ICT sector, this time not dot.com, but related to AI? What will digital business models look like in 2 years, in 5 and in 10 years? The answers to these questions will require further studies and studies.

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