

THE APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN MANAGEMENT

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Abstract. The digital transformation of our world and the inevitable interplay between people, digital technologies, and physical assets are creating a rapidly changing and complex environment that requires organizations to be more agile and ready to embrace new ways of working. Businesses are realizing the need for change to succeed in the digital age. In the period of global digitalization, information and communication technologies are one of the most important aspects of existence for a business, which makes it more efficient and effective and allows you to quickly respond to a rapidly changing external environment, as well as customer needs. At the moment, there is a high interest in the possibilities of artificial intelligence for use in business tasks in the world, as there are already examples of successful implementation when artificial intelligence and machine learning are fundamentally changing the way people work and increasing the profits of organizations in different countries.

The purpose of this case study is to consider how artificial intelligence affects the value proposition and how elements of the business model change when using this technology. The paper presents the existing examples of the use of technology, the consequences of its application and the prospects for using artificial intelligence as one of the advanced digital transformation technologies. With a literature review and case studies analysis, the article aims to provide a comprehensive understanding of the impact of AI on business models, drawing from both theoretical insights and practical experiences documented in case studies. This approach allows for a nuanced exploration of the topic and contributes to advancing knowledge in the field.

Keywords: business model, artificial intelligence (AI), value proposition, digital transformation, digitalization, chatbot.

JEL Classification: M15, M20, O14.

1. Introduction

Business models organizations evolve over the centuries, adjusting to a changing environment. And now, in the period of digital transformation of the economy and society, companies need to quickly adapt their business processes to a changing environment. The advent of artificial intelligence (hereinafter referred to as AI) has fundamentally changed the very meaning of ideas, innovations and inventions. As a result, business models continue to evolve. As we watch companies across industries undergo a deep and drastic shift in the relative balance of intelligence, AI applications and adoption offer every business as many new opportunities as it challenges (Asuti et al., 2024).

Digitalization has levelled the playing field for businesses and provided them with a unique opportunity to

move forward and grow. While access to technology and information is now universal, it is not always the same how and for what purposes each business uses this information. While new technologies will to some extent level the playing field for businesses' across industries in their ability to access smart data from the growing digital landscape, it is important to understand what other dimensions will help determine individual and collective success in developing organizational capabilities (Bargoni et al., 2024). One such factor for companies could be AI.

In AI-driven automation, growth means more insights based on data from connected devices, social media, industry data, and more, increasing the potential for a revolution in business models. Over the years, the volume of digital data in different countries has grown at a staggering rate (Cools et al., 2024). It is important to understand how business in an analytics and data-driven

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world is changing under the influence of AI, what areas this technology can affect and what risks and benefits it entails, as well as how the value of an organization to consumers is changing with the advent of AI.

Companies are beginning to understand the implications of the evolution of an AI-driven automation ecosystem that extends far beyond narrow AI applications. While the relationship between data, information, and intelligence is complex and sometimes indirect, the strength and pace of change in AI-driven automation expected in the coming years will present challenges and opportunities for every business to be profitable (Chen & Zhang, 2024). The purpose of this work is to explore how AI technologies affect the value proposition and how elements of the organization's business model are changing. This issue has not been studied very deeply in the scientific community, which is confirmed by the number of articles on this topic.

To form a holistic view of how organizations, especially using AI technologies, create value and how they perform the actions necessary for this, it is necessary to solve the following tasks: to study the impact of AI on the building blocks of a business model, to analyse real examples of the use of AI in companies and identify the likely implications of using AI technologies for updated and innovative business models.

Thus, the presented research can shed light on further understanding of innovative business' models initiated by AI technologies.

The structure of the paper is focused on exploring how AI technologies affect the value proposition and how elements of the organization's business model are changing. The authors discuss the impact of end-to-end technologies on the elements of the business model canvas, particularly focusing on the influence of AI. They also highlight the potential changes in the business model without deepening into individual industries and draw conclusions on the scale of the impact of digital technologies on the company's business model. Additionally, the paper addresses the challenges and opportunities presented by AI-driven automation in the coming years, emphasizing the need for businesses to adapt to remain profitable.

2. Literature review

Modern business in the era of digitalization is driven by data. Especially big data and AI. These technologies are in constant development and are capable of shaping individual business processes of an organization, as well as being used as a key resource in making decisions in the field of business analysis. Businesses can get real-time insights into industry trends and consumer behaviour, giving them a competitive advantage (Lee & Kooper, 2024.).

Stanford University (USA), together with representatives of major international research companies and software manufacturers, presented the annual study "Artificial intelligence index. Report for 2022", dedicated to

the prevalence of AI in the world. It was found that the volume of investments in AI-related start-ups is steadily growing in the world: from \$1.3 billion in 2010 to \$40.4 billion in 2018; in 2021 as of November 4, \$50 billion. Researched Research from the McKinsey Global Institute shows that by 2030, AI could generate an additional \$13 trillion in global economic returns per year (Artificial Intelligence Index, 2022).

In the Lithuanian market, the analytical agency "EY Baltics Managing" did order data company Norstat study to analyse the level of penetration of solutions using AI, as well as the effects obtained from them in different industries. According to the results of the Norstat study, at the end of 2020, more than 27% of large Lithuanian organizations have already implemented or are piloting AI initiatives. These organizations relate mainly to the following business sectors: financial sector, telecom, retail, information technology (hereinafter referred to as IT), industry and the oil and gas industry. Research data shows that business interest in AI technology is constantly growing.

However, the current literature on business model transformations influenced by digital technologies is mostly narrowly focused or explores in general the impact of a large number of digital transformation technologies, such as blockchain, big data, Internet of Things (IoT), AI. Thus, in the work "Research on the problems of digital transformation of the Osterwalder-Pigneur business model in the pharmaceutical industry" (Novikov et al., 2021) or "The impact of digital technologies on the business model of media companies: the example of Disney" (Gershon, 2020), the main focus is shifted to in general, on changes in the business model influenced by advanced technologies in a particular industry, the role of AI is almost not disclosed. The same problems have a more extensive study by the authors of the work "The influence of end-to-end technologies on the elements of the business model canvas" (Das et al., 2021).

The article considers a potential change in the business model without deepening into individual industries and draws conclusions on the scale of the impact of digital technologies on the company's business model, but not enough attention has been paid to the impact of AI for a full consideration of the topic.

The situation is similar in foreign literary sources. For example, the work "Artificial intelligence as a growth engine for health care startups: Emerging business models" (Garbuio & Lin, 2019), in which the authors analyze the impact of AI in a specific business area, or the study "Business models based on IoT, AI and blockchain" (Liu, 2018), the author of which combines advanced technologies with each other without deeply touching each one separately.

In the article "How artificial intelligence is transforming business models" (Toniolo et al., 2020), the authors talk about how the application and implementation of AI is revolutionizing business and commerce, but also do not give a clear explanation on the question of a specific change in the business model under the influence of AI.

There is little research on the direct impact of AI on the transformation of business models. The study “Advanced business model innovation supported by Artificial Intelligence and deep learning” (Valter et al., 2018) examines the exponential development of AI technologies and this impact on the business model. The article “Artificial intelligence as a driver for business model innovation in smart service systems” discusses the main changes in business model elements (value proposition, value creation and value capture) in connection with the introduction of AI in products and services (Neuhüttler et al., 2020).

The study “Emerging technology and business model innovation: The case of artificial intelligence” (Lee et al., 2019) provides a brief overview of AI, current problems solved during its development, an explanation of how it changes business models, and also disclosed a case study of two companies that have innovated their business models using AI.

According to the concept proposed by Osterwalder, a business model is a conceptual tool containing a set of elements and their relationships that represent the company’s business logic. The business model is a nine-block template that represents the key elements of a business: value proposition, customer segments, key resources, customer relationships, activities, partners, distribution channels, revenue streams, and cost structure (Payne et al., 2020). AI has a potential impact on everyone from blocks of the organization’s business model (Neuhüttler et al., 2020).

Next, theoretically possible and specific examples of the use of AI in key elements of an organizations’ business model will be considered.

Using the case study analysis, the research will include the analysis of real-world case studies to illustrate how AI is transforming various elements of business models. Case studies from different industries will be examined to provide empirical evidence and practical insights into the application of AI technologies.

3. Case study analysis of AI integration in consumer products: Enhancing functionality and user experience

The value proposition (hereinafter referred to as the Value Proposition) completely solves the “pain” of the client or satisfies the need. This is why the consumer turns to a particular organization, and does not go to a competitor. AI-powered custom solutions are designed for speed, efficiency, and personalization (Tung et al., 2024). These priorities are fundamental to consumers in the digital age. Self-service platforms with AI, including chatbots and interactive answering machines with natural language voice capabilities, can support customers around the clock, intelligently redirect consumers to the right operators in case of complex incidents, recommend products and online services, and make a list of recommended further actions and respond to frequently questions asked (Hopkins, 2022).

Other AI tools are able to personalize the customer experience with recommendation systems based on customer data. For example, an AI system captures the nature of user behavior or specified preferences, and based on the analysis suggests additional content. There are solutions for after-sales service, for example, intelligent forwarding of support incidents from mail to the right specialists, answering questions in chatbots in the most preferred channel for the client. It is also possible to send automated but personalized marketing messages via e-mail, allowing you to build a relationship with the client based on data at the touch points – purchase history and activity on the site (Beg et al., 2021). Case study shows that AI can extend a product/service as an additional element that adds autonomous and adaptive behavior towards products and services, while creating a new value proposition from the existing one. For example, products that collect sensor data to offer improvement tips to their users are very autonomous and adaptive, as shown in Table 1.

Table 1. Example of AI as an extension to the main product

Main Product	AI Extension
Smart Watch	AI integrated into smartwatches enhances health monitoring, provides personalized fitness recommendations, tracks activity and sleep patterns, and offers contextual notifications. Smartwatches with AI capabilities can analyze user data to offer actionable insights and support proactive health management (Yadav et al., 2023).
Smart-phone	AI integrated into smartphones enhances user experience by providing personalized assistance, predictive analytics, and context-aware features. AI-powered voice assistants, camera enhancements, and smart notifications are examples of AI extensions in smartphones (Sangers et al., 2024).
Car	AI in cars enables autonomous driving features, adaptive cruise control, collision detection, lane departure warnings, and parking assistance. It enhances safety, convenience, and efficiency while driving by leveraging machine learning algorithms and sensor data to make real-time decisions (Mnyakin, 2023).
Home Security	AI-powered home security systems use facial recognition, motion detection, and anomaly detection algorithms to enhance security. They provide real-time alerts, remote monitoring, and intelligent automation of home security devices such as cameras, door locks, and alarms. AI extends the capabilities of traditional home security systems by enabling proactive threat detection and response (Abed & Anupam, 2022).
Fitness Tracker	AI-powered fitness trackers offer personalized workout recommendations, track exercise performance, monitor biometric data, and provide insights for improving fitness goals. They utilize machine learning algorithms to analyze user activity patterns and offer tailored guidance for achieving optimal fitness outcomes (Allam & Nadikattu, 2020).

The case study highlights the integration of artificial intelligence (AI) into various consumer products, namely smartwatches, smartphones, cars, home security systems, and fitness trackers. AI enhancements in smartwatches facilitate advanced health monitoring, personalized fitness guidance, and contextual notifications. In smartphones, AI contributes to improved user experiences through features such as personalized assistance, predictive analytics, and context-aware functionalities. AI integration in cars enables autonomous driving capabilities, collision detection, and parking assistance, enhancing safety and efficiency. Home security systems leverage AI for facial recognition, motion detection, and anomaly detection, enabling real-time alerts and proactive threat response. Similarly, AI-powered fitness trackers offer personalized workout recommendations, activity tracking, and biometric monitoring to aid users in achieving fitness goals. These advancements underscore the significant role of AI in enhancing functionality, efficiency, and user experience across diverse consumer products.

4. Case study analysis of AI-driven transformation: Redefining customer value propositions and business activities

Further case study analysis does state, that there are many other similar examples showing AI-driven dynamic personalization. Moreover, AI can be used to gain new insights about customers and thus tailor the customer value proposition in a more efficient and effective manner.

Key activities can also change under the influence of AI. For example, technical customer support, supplemented by chatbots and virtual operators. The collection and sale of valuable data collected by AI can also become one of the key activities of the organization (Campbell et al., 2020).

Consider the impact of AI on key partners for business implementation. AI can be used in supply chain management to improve forecasting accuracy and minimize situations when the product is not available, when it is written off or returned (Helo & Hao, 2022).

Integration of AI into products and services may require collaboration with external partners. Partners providing data or missing skills and resources. Whether companies should create the necessary AI competencies on their own or use the strength of partner companies through outsourcing is one of the main issues in building a business model (Wamba-Taguimdje et al., 2020).

Key resources. AI can become a key resource for an organization, and data is also becoming a central resource and thus increasingly important in the exchanges between partners and clients (Tavakoli et al., 2022).

Companies can use machine learning technology to more accurately plan the life of important hardware assets, i.e., manage the lifecycle of hardware resources. The same can be done with licenses for software products: AI will track the expiration of licenses and based on the

analysis, recommend to renew or end the use (Fahle et al., 2020).

Building, integrating and operating IT infrastructures to deliver AI value propositions is becoming increasingly important as most AI applications require high processing power. The choice and design of the underlying technical infrastructure, for example in the form of cloud, on-premises or edge solutions, is thus an important strategic decision. In order to be able to select the appropriate options for a particular implementation, companies must consider requirements regarding scalability, reliability and availability, security data integrity, protection and costs (Belgaum et al., 2021).

AI tools can also improve the diagnostics and maintenance of IT assets. IT system failures caused by cyberattacks, poor service, or other causes can cost organizations huge sums. Emerging AI applications can help organizations identify potential maintenance and security issues before they occur (Benbya et al., 2020).

Sales channels. Due to the fact that AI can analyze human behavior, there is a prospect of new sales channels for specific segments. The adaptive properties of AI allow you to adapt to a specific buyer, providing him with the best distribution channel.

Relationships with clients. Application of text mining techniques in market research to extract customer information from large amounts of data (such as customer reviews or reports from service technicians) and to measure and manage customer experiences. By automatically extracting and structuring information, companies can better measure and manage customer experience and thus deliver higher value (Baviskar et al., 2021).

Another interesting application area covers service robots in terms of system autonomous and adaptable interfaces that provide services to customers. Chatbots, voice assistants that answer questions more accurately and faster than live operators (Wu & Yu, 2023). Replacing face-to-face interaction with robots will also affect the type and depth of customer relationships and hence the value proposition. Microsoft⁷ study shows that by 2030, 95% of customer interactions will be the name of virtual operators consumer segments (Moustafa et al., 2020). The use of AI is fundamentally changing the way we identify and analyze target groups. AI analysis of social networks, reviews, competitors and other relevant data help identify new customer segments or find gaps in interaction with existing ones miss and offer a solution.

Smart products, chatbots, and AI operators can also tailor to specific segments based on the user's query, replay analysis, voice, gender, age, and other factors that AI can determine. Accordingly, we have an individual approach to each possible segment, which also affects the value proposition (Singh & Thakur, 2020).

Income streams. AI is used when setting the correct price for profile katahot, basic, seasonal and promotional items and helps drive margin and sales growth.

Companies also need to find out if customers value the benefits that AI brings and are willing to pay for

it. According to business logic, the willingness to pay should exceed the necessary investment costs for model development, infrastructure creation and competency development.

It is also possible to introduce new payment options, such as pay-per-performance: Based on the automatic evaluation of various field data, the product's performance is accurately quantified and thus billed (for example, a subscription to machine hours worked). Or use data as a currency: an organization can generate new revenue streams, for example, based on the sale of AI-generated data (Rammer et al., 2021). Raw, anonymous or consolidated data as a primary or by-product from the integration of AI into products and services can be directly or indirectly monetized for customers (for example, selling anonymous data to related industries).

Services based on intellectual property or AI models enable external and internal analysis to create new revenue streams.

Cost structure. The ability of AI to learn and analyze large amounts of data reduces costs. It becomes possible to replace some employees with AI, which initially leads to the necessary investments, but pays off over time, since the virtual employee does not require wages and provision, maintenance of the workplace, and can also work continuously (Maia et al., 2020).

Also, companies need investments to build a new infrastructure for the development of AI, to train or hire competent employees in the field of AI.

There is always a chance that the system has not calculated all the options or the training has not been successful, then there are risks of losing financial resources. For example, SEB bank lost billions of Euros as a result of AI errors. "Artificial intelligence tends to make decisions in large systems. According to the head of the bank, each AI bug was identified and helped to improve the work. "When this error was revealed, we learned from it, inserted all kinds of filters in order to calibrate, verify the artificial intelligence system" (Ding et al., 2020).

The authors of the article "The impact of end-to-end technologies on the elements of the business model canvas" (Erickson et al., 2021) argue that "the elements subject to change due to the use of AI include "Customer Relations", "Key Activities" and "Cost Structure". You can disagree with them, as AI affects every block of the business model. This can be illustrated by the following examples of the real implementation of AI in a company.

Project "Creation of a virtual assistant for servicing Monese clients using Naumen Erudite" (Balkan, 2021). In the contact center, more than 20% of the traffic of client requests is accounted for by chats available in the mobile application and on the website. The introduction of a virtual assistant, which processes a third of calls without the involvement of operators, made it possible to make support available 24/7 and at the same time reduce the average cost of a contact, as well as the costs of the payroll fund (hereinafter referred to as payroll). "The virtual assistant answers customer questions about

opening wallets, ways to replenish them, limits, commissions, cashback, and all advises on issuing virtual cards, working with payments and transfers, contactless payment methods and withdrawal options. In addition, Manibot helps users deal with account settings, identification, mobile app features, and a number of technical issues. In total, the robot conducts a dialogue on 217 service scenarios. Bot training made it possible to achieve an accuracy of 85% in determining the topics of calls within a classifier of hundreds of topics" (Umamaheswari et al., 2023).

"Now the robot receives all requests in Forbes. Money chats: it classifies the client's request in order to process it independently or transfer it to the operator, depending on the subject. As of June 2020, Manibot successfully serves 35% of chats with clients, choosing the most relevant solution to the issue" (Krishnan et al., 2022).

5. The transformative impact of virtual assistants on organizational dynamics

Further analysis is made to present the impact of virtual assistants on several key business blocks within organizations. Virtual assistants, powered by artificial intelligence (AI), have revolutionized various aspects of business operations, ranging from value proposition delivery to customer relationship management. The table outlines the specific areas where virtual assistants have made significant contributions, including the transformation of value proposition delivery by offering prompt responses and comprehensive consultations round-the-clock. Moreover, virtual assistants have reshaped client interactions by serving as a novel communication channel, replacing traditional employee-client interactions with AI-driven interactions. Additionally, the table delves into the cost implications, noting initial implementation costs that may be offset by reduced payroll expenses over time. Furthermore, it highlights the emergence of new partnerships with virtual assistant integrators and the evolution of resources within organizations, where virtual assistants have become integral components alongside human resources. Lastly, the table emphasizes the shift in key activities within organizations, with intelligent customer service using virtual assistants becoming a central operational focus. Overall, the insights provided in Table 2 underscore the transformative impact of virtual assistants on various facets of organizational functioning.

The case study illustrates the multifaceted impact of virtual assistants, powered by artificial intelligence (AI), on critical business blocks within organizations. It delineates how virtual assistants revolutionize value proposition delivery, enhance client relationships, optimize costs through reduced payroll expenses, foster new partnerships with integrators, and transform organizational resources. Additionally, it underscores the pivotal role of virtual assistants in reshaping key activities, particularly in the realm of intelligent customer service. This succinct summary encapsulates the profound influence of virtual

assistants on various dimensions of organizational functioning, highlighting their significance in the contemporary business landscape.

Table 2. The impact of the Virtual Assistant on several business blocks

Aspect	Description
Value Proposition	A new type of value delivery is now available – prompt response at any time of the day to a question of interest, as well as providing a full consultation (Akdim & Casaló, 2023).
Relationship with Clients	An AI operator is a new type of communication with a client. Now, communication with the client is carried out initially not by an employee of the company, but by a virtual assistant (Fakhimi et al., 2023).
Costs	Initially, there were implementation costs, but potentially the costs will decrease because payroll costs have been reduced (Kamoonpuri & Sengar, 2023).
Partners	New virtual assistant integrator partners have appeared, with whom it is necessary to maintain relationships for subsequent changes in the system (Wan & Moorhouse, 2024).
Resources	The chatbot has become one of the key resources of the company, along with human resources, including operators of a support service (Iswahyudi et al., 2023).
Key Activities	Intelligent customer service using a chatbot became one of the activities of the organization (Singh et al., 2023).

6. AI implementation and impact: Case study and broader applications

Further research primarily revolves around the implementation and impact of AI-based solutions. Furthermore, the case study delves into how AI algorithms identified optimal pricing points, addressing shifts in consumer demand during the pandemic. It highlights the effectiveness of AI in optimizing pricing strategies, identifying under-priced products, and increasing profitability without compromising sales volume.

Additionally other applications of AI in business, such as user segmentation, email customization, and inventory management are analysed. These examples illustrate the broader impact of AI on various aspects of business operations, underscoring its potential to drive efficiency, profitability, and customer engagement across different industries.

Gold-Standart is a chain of stores and an online store of sports nutrition for a healthy and active lifestyle. During the lockdown in 2020, Gold-Standart's turnover fell due to store closures and reduced online demand directly related to the work of gyms. May 2020 Gold-Standart.com has piloted an anti-crisis tool, the cloud-based AI-based dynamic pricing system Imprice. A two-week pilot

within one product category was successful. At the end of May 2020, pricing was already entrusted to AI by 80% of the assortment. Another 15% of the assortment was connected to an additional analytical module based on machine learning. June sales data compared with May 2020 sales. Key implementation results (JD Sports Fashion PLC, 2021):

- +20.9% growth in online store turnover;
- +20.1% growth in gross profit;
- +11.9% increase in the number of orders;
- +8.0% increase in the average check.

During the period of forced self-isolation associated with the COVID-19 pandemic, the demand for a number of positions has changed, and the markErnset price turned out to be psychologically unacceptable for the consumer. The algorithms found the prices at which consumers started buying again.

At the same time, the system identified many under-priced products in the assortment for which consumers were willing to pay more. Algorithms increased the prices of these products: sales remained the same, but the company earned more on each unit sold. The result was an increase in marginality and a serious increase in gross profit. This example illustrates how AI can raise the company's revenues by analyzing the behavior of a person and his desires.

The definition of AI-based segments is illustrated in the following examples.

AI helps to segment users and offer content that is relevant to them, for example, in Revolut banking (Revolut, 2024).

Organizations use AI to customize emails to customers. The system takes into account the preferences and behavior of the client in order to make more relevant offers to him. Boomtrain analyzes the history of customer interaction with content and creates mailing lists. For this, AI is used, segmenting the list of customers for subsequent engagement and conversion (Ramdani et al., 2020). The system sends out individual offers for different segments and interacts with users in the application. As a result, you have grown handle and the number of active interested customers.

AI systems can be used in terms of inventory management and distribution. Introduced by Low in 2016, LoweBot intelligent robots not only help customers, but also generate real-time data using machine learning to scan inventory and search for patterns by color, price, and barcode. The robot with a five-inch screen helps customers find products using a computer display and internal search with voice recognition. As a result, consumers are provided with a convenient and efficient AI-based service, and employees have more time to consult clients on creative projects (Preil & Krapp, 2022). This example shows the possible practical impact of AI on distribution channels.

Thus, we see that in practice, each element of the business model can be subject to changes due to the introduction of AI.

7. Conclusions

Based on the provided research, several conclusions can be drawn regarding the impact of artificial intelligence (AI) for management and on business models and organizations:

- 1. Evolution of Business Models:** The onset of digital transformation has necessitated rapid adaptations in business processes. AI has fundamentally altered the landscape of ideas, innovations, and inventions, leading to continuous evolution in business models across industries.
- 2. Leveling the Playing Field:** Digitalization has democratized technology access. While businesses can harness smart data from the digital landscape, strategic utilization of AI technologies can determine individual and collective success in developing organizational capabilities.
- 3. AI-Driven Automation:** AI applications offer insights derived from a wealth of data sources, potentially leading to a revolution in business models. This surge in digital data growth underscores the transformative potential of AI across industries.
- 4. Impact on Value Proposals:** AI implementation influences the value proposition of organizations. By offering prompt, personalized responses and consultations, AI-driven services enhance customer experiences, particularly in platforms such as Revolut banking, shaping client relationships through innovative AI-based communication.
- 5. Key Elements of Business Models Affected:** AI disrupts various components of business models, including customer relationships, key activities, partnerships, resources, and cost structures. Virtual assistants powered by AI play a pivotal role in reshaping organizations' operational dynamics.
- 6. Cost Considerations:** While initial implementation costs may arise, successful integration of AI technologies can reduce long-term payroll expenses, enhance operational efficiency, and drive profitability through optimized resources and services.
- 7. Strategic Partnerships:** Organizations collaborate with AI integrators to adapt supply chain processes, improve forecasting accuracy, and enhance operational efficiencies, reflecting the importance of strategic collaborations for successful AI deployment.
- 8. Customer-Centricity:** AI empowers businesses to tailor products, services, and communication strategies to individual customer segments, thereby improving user experiences, enhancing marketing strategies, and driving revenue growth by offering relevant content and services.
- 9. Risk and Benefits:** Implementing AI poses risks such as errors and potential financial losses but also promises increased profitability through data-driven decision-making, personalized customer experiences, and innovative revenue streams.

In essence, AI's pervasive impact extends beyond technological advancements to redefine business models, optimize operations, and reshape customer interactions, underscoring its transformative potential across various organizational functions.

Besides that the article addresses a significant research gap by providing a comprehensive examination of the impact of AI on various elements of business models, including value proposition, customer relationships, key activities, and revenue streams. It synthesizes existing literature, industry reports, and case studies to shed light on how AI-driven transformations are reshaping business landscapes across different sectors. Additionally, the research offers insights into practical applications of AI in enhancing functionality, efficiency, and user experience in consumer products and services. Overall, the article contributes to bridging the gap between theoretical discourse and practical implications of AI adoption in contemporary business contexts.

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References

- Abed, A. K., & Anupam, A. (2022). Review of security issues in internet of things and artificial intelligence-driven solutions. *Security and Privacy*, 6(3), Article e285. <https://doi.org/10.1002/spy2.285>
- Akdim, K., & Casaló, L. V. (2023). Perceived value of AI-based recommendations service: The case of voice assistants. *Service Business*, 17(1), 81–112. <https://doi.org/10.1007/s11628-023-00527-x>
- Allam, S., Nadikattu, A. K. R. (2020). AI economical wearable smart device to alert real time health reports to doctors. *International Journal of Creative Research Thoughts (IJCRT)*, 8(12), 3287–3291. <https://www.ijcrt.org/papers/IJCRT2012360.pdf>
- Artificial Intelligence Index. (2022). *Measuring trends in Artificial Intelligence* [The AI Index Report]. <https://aiindex.stanford.edu/ai-index-report-2022/>
- Astuti E., Harsono, I., Uhai, S., Muthmainah, H. N., & Vandika, A. Y. (2024). Application of artificial intelligence technology in customer service in the hospitality industry in Indonesia: A literature review on improving efficiency and user experience. *Sciences Du Nord Nature Science and Technology*, 1(01), 28–36. https://www.researchgate.net/publication/378102098_Application_of_Artificial_Intelligence_

- Technology in Customer Service in the Hospitality Industry in Indonesia: A Literature Review on Improving Efficiency and User Experience
- Balkan, B. (2021). Impacts of digitalization on banks and banking. In B. Kahyaoglu (Ed.), *The impact of artificial intelligence on governance, economics and finance: Vol. 1. Accounting, finance, sustainability, governance & fraud: Theory and application* (pp. 33–50). Springer.
https://doi.org/10.1007/978-981-33-6811-8_3
- Bargoni, A., Ferraris, A., Vilamová, Š., & Wan Hussain, W. M. H. (2024). Digitalisation and internationalisation in SMEs: A systematic review and research agenda. *Journal of Enterprise Information Management*.
<https://doi.org/10.1108/JEIM-12-2022-0473>
- Baviskar, D., Ahirrao, S., Potdar, V., & Kotecha, K. (2021). Efficient automated processing of the unstructured documents using artificial intelligence: A systematic literature review and future directions. *IEEE Access*, 9, 72894–72936.
<https://doi.org/10.1109/ACCESS.2021.3072900>
- Beg, A., Qureshi, A. R., Sheltami, T., & Yasar, A. (2021). UAV-enabled intelligent traffic policing and emergency response handling system for the smart city. *Personal and Ubiquitous Computing*, 25(1), 33–50.
<https://doi.org/10.1007/s00779-019-01297-y>
- Belgaum, M. R., Alansari, Z., Musa, S., Alam, M. M., & Mazliham, M. S. (2021). Role of artificial intelligence in cloud computing, IoT and SDN: Reliability and scalability issues. *International Journal of Electrical and Computer Engineering (IJECE)*, 11(5), 4458–4470.
<http://doi.org/10.11591/ijece.v11i5.pp4458-4470>
- Benbya, H., Davenport, T. H., & Pachidi, S. (2020). Artificial intelligence in organizations: Current state and future opportunities. *MIS Quarterly Executive*, 19(4), Article 4, 9–21.
<http://doi.org/10.2139/ssrn.3741983>
- Campbell, C., Sands, S., Ferraro, C., Tsao, H. Y. & Mavromatis, A. (2020). From data to action: How marketers can leverage AI. *Business Horizons*, 63(2), 227–243.
<https://doi.org/10.1016/j.bushor.2019.12.002>
- Chen, W., Zhang, J. (2024). Elevating security operations: The role of AI-driven automation in enhancing SOC efficiency and efficacy. *Journal of Artificial Intelligence and Machine Learning in Management*, 8(2), 1–13. <https://journals.sagepub.com/index.php/jamm/article/view/128/103>
- Cools, H., Van Gorp, B., & Opgenhaffen, M. (2024). Where exactly between utopia and dystopia? A framing analysis of AI and automation in US newspapers. *Journalism*, 25(1), 3–21.
<https://doi.org/10.1177/14648849221122647>
- Das, P., Perera, S., Senaratne, S., & Osei-Kyei, R. (2021). Developing a construction business model transformation canvas. *Engineering, Construction and Architectural Management*, 28(5), 1423–1439.
<https://doi.org/10.1108/ECAM-09-2020-0712>
- Ding, R.-X., Palomares I., Wang, X., Yang, G.-R., Liu, B., Dong, Y., Herrera-Viedma, E., & Herrera, F. (2020). Large-scale decision-making: Characterization, taxonomy, challenges and future directions from an artificial intelligence and applications perspective. *Information Fusion*, 59, 84–102. <https://doi.org/10.1016/j.inffus.2020.01.006>
- Erickson, J., Baker, J., Barrett, S., Brady, C., Brower, M., Carbonell, R., Charlebois, T., Coffman, J., Connell-Crowley, L., Coolbaugh, M., Fallon, E., Garr, E., Gillespie, C., Hart, R., Haug, A., Nyberg, G., Phillips, M., Pollard, D., Qadan, M., ...
- Lee, K. (2021). End-to-end collaboration to transform biopharmaceutical development and manufacturing. *Biotechnology and Bioengineering*, 118(9), 3302–3312.
<https://doi.org/10.1002/bit.27688>
- Fakhimi, A., Garry, T., & Biggemann, S. (2023). The effects of anthropomorphised virtual conversational assistants on consumer engagement and trust during service encounters. *Australasian Marketing Journal*, 31(4), 314–324.
<https://doi.org/10.1177/14413582231181140>
- Fahle, S., Prinz, C. & Kuhlenkötter, B. (2020). Systematic review on machine learning (ML) methods for manufacturing processes – Identifying artificial intelligence (AI) methods for field application. *Procedia CIRP*, 93, 413–418.
<https://doi.org/10.1016/j.procir.2020.04.109>
- Garbuio, M., Lin, N. (2019). Artificial intelligence as a growth engine for health care startups: Emerging business models. *California Management Review*, 61(2), 59–83. <https://doi.org/10.1177/0008125618811931>
- Gershon, R. A. (2020). Transnational media and telecommunications (3rd ed.) In *Media, telecommunications and business strategy* (pp. 212–232). Routledge.
<https://doi.org/10.4324/9780429285028>
- Helo, P., & Hao, Y. (2022). Artificial intelligence in operations management and supply chain management: An exploratory case study. *Production Planning & Control*, 33(16), 1573–1590. <https://doi.org/10.1080/09537287.2021.1882690>
- Hopkins, E. (2022). Machine learning tools, algorithms, and techniques in retail business operations: Consumer perceptions, expectations, and habits. *Journal of Self-Governance and Management Economics*, 10(1), 43–55.
<https://doi.org/10.22381/jsme1012023>
- Iswahyudi, M. S., Nofirman, N., Wirayasa, I. K. A., Suharni, S., & Soegiarto, I. (2023). Use of ChatGPT as a decision support tool in human resource management. *Jurnal Minfo Polgan*, 12(1), 1522–1532. https://www.researchgate.net/publication/373343485_Use_of_ChatGPT_as_a_Decision_Support_Tool_in_Human_Resource_Management
- JD Sports Fashion PLC. (2021). *Annual report and accounts*. <https://www.jdplc.com/sites/jd-sportsfashion-plc/files/homepage/reports-and-presentation/2021/jd-group-annual-report-2021.pdf>
- Kamoonpuri, S. Z., & Sengar, A. (2023). Hi, may AI help you? An analysis of the barriers impeding the implementation and use of artificial intelligence-enabled virtual assistants in retail. *Journal of Retailing and Consumer Services*, 72, Article 103258. <https://doi.org/10.1016/j.jretconser.2023.103258>
- Krishnan, C., Gupta, A., Gupta, A., & Singh, G. (2022). Impact of artificial intelligence-based chatbots on customer engagement and business growth. In T. P. Hong, L. Serrano-Estrada, A. Saxena, & A. Biswas (Eds.), *Deep learning for social media data analytics: Vol. 113. Studies in big data* (pp. 195–210). Springer.
https://doi.org/10.1007/978-3-031-10869-3_11
- Lee, K., & Kooper, J. (2024). Synergizing AI and big data: a futuristic approach to data management. *EasyChair*, Article 11889. <https://easychair.org/publications/preprint/6f2Z>
- Lee, J., Suh, T., Roy, D., & Baucus, M. (2019). Emerging technology and business model innovation: The case of artificial intelligence. *Journal of Open Innovation: Technology, Market, and Complexity*, 5(3), Article 44.
<https://doi.org/10.3390/joitmc5030044>

- Liu, J. (2018). *Business models based on IoT, AI and blockchain* [Master's thesis, Upsala Universitet]. <https://www.diva-porta.org/smash/get/diva2:1246905/FULLTEXT01.pdf>
- Maia, E. H. B., Assis, L. C., de Oliveira, T. A., da Silva, A. M., & Taranto, A. G. (2020). Structure-based virtual screening: From classical to artificial intelligence. *Frontiers in Chemistry*, 8, Article 343. <https://doi.org/10.3389/fchem.2020.00343>
- Mnyakin, M. (2023). Applications of AI, IoT, and cloud computing in smart transportation: A review. *Artificial Intelligence in Society*, 3(1), 9–27. <https://researchberg.com/index.php/ai/article/view/108>
- Moustafa, N., Keshk, M., Debie, E., & Janicke, H. (2020). Federated TON_IoT windows datasets for evaluating AI-based security applications. *ArXiv*. <https://doi.org/10.48550/arXiv.2010.08522>
- Neuhüttler, J., Kett, H., Frings, S., Falkner, J., Ganz, W., & Urmetzer, F. (2020). Artificial intelligence as driver for business model innovation in smart service systems. In J. Spohrer & C. Leitner (Eds.), *Advances in the Human Side of Service Engineering: Vol. 1208. Advances in intelligent systems and computing* (pp. 212–219). Springer. https://doi.org/10.1007/978-3-030-51057-2_30
- Novikov, I. S., Serdobintsev, D. V., & Aleshina, E. A. (2021). Conceptual approaches to information transformation (Digitalization) of an agricultural enterprise. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, 21(2), 425–436. https://www.managementjournal.usamv.ro/pdf/vol.21_2/Art51.pdf
- Payne, A., Frow, P., Steinhoff, L., & Eggert, A. (2020). Toward a comprehensive framework of value proposition development: From strategy to implementation. *Industrial Marketing Management*, 87(1), 244–255. <https://doi.org/10.1016/j.indmarman.2020.02.015>
- Preil, D., & Krapp, M. (2022). Artificial intelligence-based inventory management: A Monte Carlo tree search approach. *Annals of Operations Research*, 308(1), 415–439. <https://doi.org/10.1007/s10479-021-03935-2>
- Ramdani, B., Rothwell, B., & Boukrami, E. (2020). open banking: The emergence of new digital business models. *International Journal of Innovation and Technology Management*, 17(05), 1–19. <https://doi.org/10.1142/S0219877020500339>
- Rammer, C., Czarnitzki, D., & Fernández, G. P. (2021). *Artificial intelligence and industrial innovation: Evidence from firm-level data* (ZEW – Centre for European Economic Research Discussion Paper No. 21-036). <http://doi.org/10.2139/ssrn.3829822>
- Revolut. (2024). *Revolut launches AI feature to protect customers from card scams and break the scammers "spell"*. https://revolut.com/news/revolut_launches_ai_feature_to_protect_customers_from_card_scams_and_break_the_scammers_spell/
- Sangers, T. E., Kittler, H., Blum, A., Braun, R. P., Barata, C., Cartocci, A., Combalia, M., Esdaile, B., Guitera, P., Haensle, H. A., Kvorning, N., Lallas, A., Navarrete-Dechent, C., Navarini, A. A., Podlipnik, S., Rotemberg, V., Soyer, H. P., Tognetti, L., Tschandl, P., Malvehy, J., & EADV AI Task Force. (2024). Position statement of the EADV artificial intelligence (AI) task force on AI-assisted smartphone apps and web-based services for skin disease. *Journal of the European Academy of Dermatology and Venereology: JEADV*, 38(1), 22–30. <https://doi.org/10.1111/jdv.19521>
- Singh, J., Goel, Y., Jain, S., & Yadav, S. (2023). Virtual mouse and assistant: A technological revolution of artificial intelligence. *ArXiv*. <https://doi.org/10.48550/arXiv.2303.06309>
- Singh, S., & Thakur, H. K. (2020, June 4–5). Survey of various AI chatbots based on technology used. In *Proceedings of the 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO)* (pp. 1074–1079). Noida, India. IEEE. <https://doi.org/10.1109/ICRITO48877.2020.9197943>
- Tavakoli, M., Faraji, A., Vrolijk, J., Molavi, M., Mol, S. T., & Kismihók, G. (2022). An AI-based open recommender system for personalized labour market driven education. *Advanced Engineering Informatics*, 52, Article 101508. <https://doi.org/10.1016/j.aei.2021.101508>
- Toniolo, K., Masiero, E., Massaro, M., & Bagnoli, C. (2020). Sustainable business models and artificial intelligence: Opportunities and challenges. In F. Matos, V. Vairinhos, I. Salavisa, L. Edvinsson, & M. Massaro (Eds.), *Knowledge, people, and digital transformation. Contributions to management science* (pp. 103–117). Springer. https://doi.org/10.1007/978-3-030-40390-4_8
- Tung, T. M., Oanh, V. T. K., Cuc, T. T. K., & Lan, D. H. (2024). AI-powered innovation: How entrepreneurs can leverage artificial intelligence for business success. *Naturalista Campano*, 28(1), 605–618. <https://www.museonaturalistico.it/index.php/journal/article/view/123/107>
- Umamaheswari, S., Valarmathi, & Iakshmi, A., R. (2023). Role of artificial intelligence in the banking sector. *Journal of Survey in Fisheries Sciences*, 10(4S), 2841–2849. <https://sifisheriessciences.com/journal/index.php/journal/article/view/1722>
- Valter, P., Lindgren, P., & Prasad, R. (2018). Advanced business model innovation supported by artificial intelligence and deep learning. *Wireless Personal Communications: An International Journal*, 100(1), 97–111. <https://doi.org/10.1007/s11277-018-5612-x>
- Wamba-Taguimdje, S.-L., Fosso Wamba, S., Kala Kamdjoug, J. R., & Tchatchouang Wanko, C. E. (2020). Influence of artificial intelligence (AI) on firm performance: The business value of AI-based transformation projects. *Business Process Management Journal*, 26(7), 1893–1924. <https://doi.org/10.1108/BPMJ-10-2019-0411>
- Wan, Y., & Moorhouse, B. L. (2024). Using call Annie as a generative artificial intelligence speaking partner for language learners. *RELC Journal*. <https://doi.org/10.1177/00336882231224813>
- Wu, R., & Yu, Z. (2023). Do AI chatbots improve students learning outcomes? Evidence from a meta-analysis. *British Journal of Educational Technology*, 55(1), 10–33. <https://doi.org/10.1111/bjet.13334>
- Yadav, A. S., Srivastava, G., & Singh, S. (2023). Wearable technologies in AI and smart healthcare. In D. Agarwal, K. Tripathi, & K. Krishen (Eds.), *Concepts of artificial intelligence and its application in modern healthcare systems* (pp. 233–249). CRC Press. <https://doi.org/10.1201/9781003333081>