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ARTIFICIAL INTELLIGENCE AND THE DEVELOPMENT OF BUSINESS MODELS IN THE GAMING INDUSTRY – CASE STUDY

Beata BARCZAK[1]*, Kamila KWIATKOWSKA[2]

[1] University of Economics in Krakow; barczakb@uek.krakow.pl, ORCID: 0000-0003-0345-2267
[2] University of Economics in Krakow; kwiatkok@uek.krakow.pl, ORCID: 0000-0002-4007-179X
* Correspondence author

Purpose: This article examines the impact of artificial intelligence (AI) on the evolution of business models in the video game industry. The main objective is to fill the research gap concerning how AI integration not only generates new business models but also modifies existing ones, influencing companies' strategies and players' experiences. The study addresses the tension between innovation and risk, showing how AI adoption reshapes value creation, delivery, and capture within this creative sector.
Design/methodology/approach: The research combines a systematic literature review (SLR) of 56 Scopus-indexed publications with qualitative empirical analysis. A comparative case study approach was adopted, focusing on Ubisoft, which actively experiments with generative AI, and CD Projekt, which deliberately limits AI use. The criteria of analysis included strategic goals, the degree of creative control retained by developers, and the legal and ethical challenges of AI-driven innovation.
Findings: The results reveal that AI enables cost optimization, higher player retention through personalization, and novel monetization models such as NFTs and dynamic pricing. Ubisoft uses AI tools like Ghostwriter and NEO NPC to automate NPC dialogues and create dynamic interactions, enhancing immersion while maintaining authorial oversight. In contrast, CD Projekt refrains from integrating generative AI into flagship projects like The Witcher 4, citing copyright and quality concerns, and applies AI only in supportive functions such as testing or voice reconstruction. These contrasting strategies show that AI's impact on business models depends on technological choices and risk tolerance.
Research limitations/implications: The study is limited to global trends and two cases; future research should include regional and ethical perspectives.
Practical implications: Game developers can leverage AI to optimize processes and retention, but must apply legal audits and ethical safeguards.
Social implications: AI expands gaming as a social and cultural space but raises concerns about manipulation, copyright, and creativity.
Originality/value: The study integrates theory and practice, showing how contrasting AI strategies transform business models and offering a framework for future industry adoption.
Keywords: business models, artificial intelligence, video game industry.
Category of the paper: Research paper.

1. Introduction

Artificial intelligence (AI) is becoming increasingly important in various sectors, including the rapidly evolving video game and computer gaming industries. AI offers a wide range of innovation opportunities, from enhancing the behavior of non-player characters (NPCs) to procedural content generation and personalization of gameplay (Filipović, 2023). Thanks to its transformational potential, artificial intelligence is beginning to penetrate various sectors of the economy, and the video game industry is no exception. It is a sector of enormous and constantly growing global importance (Filipović, 2023).

It is worth emphasizing that globally, the number of players in 2021 was approximately 2.9 billion, representing a significant increase from 2015. In such a dynamic and competitive environment, business models are a key element of the strategy for companies operating in the gaming industry, determining how to create, deliver, and capture value. Despite the growing role of AI in various aspects of video game creation and operation, including enhancing visual experiences, optimizing gameplay, and creating more realistic environments, research on its impact on the evolution of business models in this industry is fragmented. Most existing work focuses on the technical aspects of AI implementation in games, such as the behavior of non-playable characters (NPCs), procedural generation of worlds, or the implications of personalizing player experiences. However, there is a lack of comprehensive analyses that systematically examine how AI integration contributes to the emergence of new business models, modifications to existing ones, and what implications this has for businesses and consumers.

Despite AI's rapid growth in the video game industry, comprehensive analyses of its impact on business model (BM) evolution remain scarce. Existing research focuses on technical aspects (e.g., NPC behavior), overlooking systemic transformations in value creation, delivery, and capture. Crucially, it is unclear how polarized AI adoption strategies - from experimental (Ubisoft) to cautious (CD Projekt) - reshape BMs and generate implications for innovation, creative control, and legal/ethical risks.

Based on the research problem formulated in this way, the following research questions were defined:

1. How does generative AI integration reconfigure core BM elements (production, experience personalization, monetization) in gaming?
2. What factors (technological, legal, cultural) determine firms' AI strategies and their impact on innovation?
3. To what extent does the tension between AI-driven innovation and legal/ethical risks necessitate BM redefinition?

This article aims to fill this gap by adopting a theoretical and empirical approach. Therefore, this article seeks to investigate the impact of AI on the evolution of business models in the gaming industry. The following detailed objectives operationalized this objective:

1. Conceptualization of the concept of business model in the context of the gaming industry.
2. Description of the specificity of the gaming industry, taking into account its key trends and characteristics.
3. Review of business models currently operating in the gaming industry.
4. Analysis of the impact of AI on the gaming industry business models – a case study of two selected companies from the gaming industry.
5. Indication of directions for further research.

This study actively engages with two pivotal scholarly controversies: (1) technological determinism vs. strategic choice in business model transformation (Teece, 2010), and (2) the "creativity vs. automation" dilemma in cultural industries (Dhar, 2015). Challenging deterministic narratives about the inevitability of full automation in creative sectors (e.g., Koch, 2016), our findings demonstrate that AI adoption is a contingent process, shaped by organizational context and risk tolerance. The polarization of Ubisoft's (experimental) and CD Projekt's (cautious) strategies refutes claims of a universal innovation pattern, instead affirming the role of firm agency in steering technological trajectories (Jabłoński, 2013). Moreover, by identifying "creative control guardrails" as a response to generative AI risks, the article contributes to AI ethics debates (IEEE, 2023), the concept of hybrid autonomy, where algorithms augment, but do not replace, human creative intuition. The originality of the study stems from combining a systematic literature review with a qualitative analysis of contrasting AI implementation case studies, offering a novel theoretical framework and practical implications for the creative sector.

2. Theoretical Background

2.1. The Gaming Industry Context

The modern gaming industry, one of the most dynamically developing sectors of the digital economy, has undergone profound transformations in the last decade in terms of technology and business. A breakthrough in the development of this industry and the history of games occurred in 1972, when Pong, often considered the first video game, was released to the market. In the same year Atari was founded, the first console was introduced, and the first video game arcade opened, marking a rapid period of industry development over a short span (Massé, Paris, 2022). The convergence of these events does not have to be accidental, as it was generally at

this time that the content, distribution channels, and the company, in the form of Atari, were formed, which were to play a fundamental role in the developing industry. Unlike the film industry, which developed gradually over many decades, the video games sector reached a similar level much faster, which is evidence of its exceptional dynamics.

Like any industry, the video game sector requires effective strategies to gain market advantage and meet player expectations. Success depends on attracting top talent and innovative business models, but strategy must vary regionally, adapting to cultural, technological, and consumer preferences (like casual players or MMORPG fans). Game type (e.g., FPS, RPG) and monetization (premium, freemium, F2P, subscription) are crucial, alongside constant hardware innovation (Klimas, 2017).

The gaming industry, one of the most dynamically developing creative industries, is part of the creative sector. Creative sector companies are characterized by producing products of high symbolic, intellectual, and cultural value (Kasprzak, 2013). Several key features distinguish the products of the creative industry. First, their creation requires a significant contribution of human creativity, which gives them a unique character. Secondly, they convey a symbolic message that extends beyond basic functionality, offering recipients additional emotional, intellectual, or aesthetic value. Thirdly, they contain potential intellectual property that can be attributed to a specific person or group of creators (Kroeber, Kluckhohn, 1952).

In the gaming industry context, the entire range of benefits that both their representatives and the whole economy derive from the achievements of creative sectors (spillover effect) should be considered. The spillover effect in the creative sector (also applicable to the gaming industry) is a process in which innovations, knowledge, and benefits developed in one industry or company permeate other sectors or companies, generating additional profits for them.

Referring to the concept of the entrepreneurial ecosystem (Isenberg, 2011), the development of business models (and value propositions) in the gaming industry is not the result of a specific action of one person or the effect of a single idea, but the result of a shared vision of a group of stakeholders creating appropriate conditions for the development of enterprises. Creative industries from different sectors can inspire each other to develop their creativity, even if, at first glance, these industries appear unrelated.

Video games are an extremely complex and interdisciplinary medium. They are a dynamic combination of art, narrative, music, and technology. This synthesis allows for the creation of interactive experiences that are a permanent part of contemporary culture's landscape, constantly evolving at the intersection of creativity and innovation. A good example of this transformation is the interpenetration of games with other forms of entertainment, as evidenced by virtual concerts and events organized in games such as Fortnite. Performances by artists such as Travis Scott, Ariana Grande, and Eminem contribute to strengthening the role of video games as multidimensional entertainment platforms with a global reach (Forbes, 2024).

2.2. SLR Methodology

The systematic literature review (SLR) methodology was employed, which not only allows for a formalized and objective synthesis of previous scientific achievements or an assessment of previous research (Gimenez, Tachizawa, 2012), but also enables the identification of both researched and unexplored areas (Levy, Ellis, 2006).

The process of systematic literature review, which is the basis for the search and analysis of existing types of business models in the gaming industry, was carried out in three stages (Anello, Fleiss, 1995), starting from the creation of a literature database (phase I), through the selection of works finally included in the database (phase II), and ending with a critical content analysis (phase III). This process was based on appropriately selected keywords and a methodology adapted to the specificity of the researched area. The entire process, including the SLR stages, is detailed in Table 1.

Table 1.
Summary of the results for the search string

Stage	Description	Phrases/Keywords	Number of results
Initial Search	Scopus search	(gaming OR game) AND (industry OR sector) AND business AND (model OR models)	1432
Abstract Analysis	Identification of key terms	business model/models, subscription/s, game/gaming/games, freemium, free-to-play, microtransactions, peer-to-peer	--
Pre-selection	Exclusion of irrelevant publications	--	583
Detailed analysis	Focus on business models in the gaming industry	free-to-play, freemium	128
Final selection	Removal of duplicate, inaccessible or low-quality texts	--	56

Source: Authors own work.

The primary tool used in the search was the Scopus database, where the search phrases "gaming OR game" AND "industry OR sector" AND "business" AND "model OR models" were employed. The initial search results yielded 1,432 publications created between 2002 and 2025. The first step in the selection process was the analysis of abstracts, which aimed to identify works containing key terms related to the area of research interest. The keywords included in this analysis were, among others, business models, subscription, game, gaming, freemium, free-to-play, microtransactions, and peer-to-peer. Additionally, important phrases were identified that could potentially expand the results in subsequent stages. In the next stage, exclusion criteria were applied, limiting the set of publications to those relevant to the research topic. Texts that did not contain the indicated keywords that were inappropriate to the discussed topic or referred to the analyzed issue in a different context than the one adopted in the study were excluded. This process reduced the number of potential sources to 583 publications, which were then subjected to a more detailed evaluation.

The focus was on content related to business models specific to the video game industry, such as free-to-play and freemium, as well as other popular solutions used in this sector. After a thorough review of the publications' content, texts unrelated to the topic were removed, reducing the number of analyzed works to 128. Duplicates, unavailable texts, and those of insufficient quality were eliminated, resulting in a database of 56 publications. This process allowed us to create a coherent and comprehensive body of literature analyzing business models specific to the video game sector. The literature review was also conducted using the "snowball" method – that is, to further extend the literature review by locating and examining additional scientific sources not included in the selected database (Zhang, Banerji, 2017). The use of the ResearchRabbit tool supported the application of this method. Additionally, the research results were based on the analysis of key industry reports (e.g. whitepapers) and company case studies.

2.3. Research results

After analyzing the content of the articles, a conceptual framework for a business model was developed, situating it within the context of the gaming industry. Then, an attempt was made to indicate the types of business models in the gaming industry.

2.3.1. Business model concept

A business model is a complex and multifaceted issue that has been the subject of numerous scientific analyses for years. The variety of its definitions reflects the broad range of interpretations and practical applications of this concept. Among the earliest approaches to this problem is the proposal by Magretta (2002), who views a business model as an idea of how a company can generate income. A similar approach was presented by Koźmiński (2004), who defines a business model as an idea for making money, focusing on its function as the foundation of economic activity. Obłój (2002) expanded this perspective, indicating that a business model is not only a plan for generating income but, above all, a combination of a strategic concept with the technology of its implementation. According to this approach, a business model enables effective use of the company's resources and competencies. At the same time, it is subject to the risk of rapid imitation by competitors. Subsequent definitions introduced new elements to the understanding of this term (Shafer et al., 2005). highlighted key components of a business model, including strategic choices, value creation and capture, and the value network, thereby emphasizing its complex nature as a management tool.

More contemporary approaches emphasize adapting the business model to meet the needs of the market and its users. Teece (2010) underlines in his definition that a business model should be user-oriented, difficult to imitate, and consistent with market realities, which allows the company to achieve a sustainable competitive advantage. In turn, Jabłoński (2013) emphasizes the combination of tangible assets and intellectual capital as the basis for implementing a value growth strategy. According to him, the business model's attractiveness

and flexibility enable the company to adapt dynamically to a changing environment, thereby increasing its market value.

A business model, The Business Model Canvas is a tool for visualizing and designing business models. Its creator is Alexander Osterwalder, who developed this concept as part of his doctoral thesis and subsequently, together with Yves Pigneur, popularized it in the book "Business Model Generation" (Osterwalder, Pigneur, 2010). Thanks to its structure, the Business Model Canvas allows entrepreneurs and managers to present, test, and modify a business model quickly and transparently. The Business Model Canvas plays a crucial role in facilitating effective communication within teams and supporting strategic decision-making. Its structure allows for flexible responses to market changes characterized by high dynamics, forcing organizations to constantly adapt and implement innovations in their business models (Osterwalder et al., 2012). As a result, this tool has gained widespread popularity in strategic management and business planning; an example of its application is provided in Table 2.

Table 2.
Business Model Canvas for Fortnite games

<table>
<tr>
<td rowspan="2">Key partners
- Gaming platforms (e.g., PlayStation, Xbox, PC, mobile).
- Content creators and streamers (e.g., YouTube, Twitch).
- Collaborations with franchises (e.g., Marvel, Star Wars).
- Advertisers and sponsors.</td>
<td>Key Actions
- Game development and updates.
- Hosting in-game events and collaborations.
- Managing in-game shop and Battle Pass system.
- Community engagement through social media and forums.</td>
<td rowspan="2">Proposal values
- Free-to-play gaming experience.
- Immersive battle royale gameplay with building mechanics.
- Customization through cosmetic items (skins, emotes).
- Regular updates and special events to keep players engaged.</td>
<td>Relationships with clients
- Community-driven engagement (forums, social media).</td>
<td rowspan="2">Segments customers
- Casual gamers.
- Competitive players (eSports).
- Content creators and streamers.</td>
</tr>
<tr>
<td>Key resources
- Epic Games' development team and Unreal Engine technology.
- IT infrastructure for online gameplay.
- Intellectual property (game modes, characters, skins).</td>
<td>Channels
- Digital platforms: PC, Mac, PlayStation, Xbox, Nintendo Switch, iOS, Android.
- Social media platforms: YouTube, Twitch, Discord.
- In-game shop.</td>
</tr>
<tr>
<td colspan="2">Structure costs
- Game design and development costs.
- IT infrastructure maintenance.
- Marketing and promotional campaigns.
- Employee salaries</td>
<td colspan="3">Streams revenues
- In-app purchases via V-Bucks (cosmetic items like skins and emotes).
- Seasonal Battle Pass subscriptions.
- Premium game mode (Fortnite: Save the World).
- Partnerships and advertising revenue.</td>
</tr>
</table>

Source: Authors own work.

The Business Model Canvas for the free-to-play game Fortnite illustrates how various elements attract and retain players, as well as generate revenue. Significant partnerships with gaming platforms, content creators, franchises, and advertisers play a crucial role in expanding

the game's reach and appeal to a broader audience. At the same time, creating and regularly updating the game itself, organizing events, and effectively managing the in-game store are the foundations of user engagement. Free access to the game, extensive personalization options, and frequent updates and events effectively attract new players while retaining existing users. Fortnite appeared on the market relatively soon after the spectacular success of Playerunknown's Battlegrounds (PUBG). Thanks to its free availability on every device, it achieved unprecedented popularity, whereas PUBG only transitioned to a free-to-play model after a few years (Osterwalder, Pigneur, 2010).

2.3.2. Selected Business Models in the Gaming Industry

The video game industry employs various business models that differ in revenue structure and how they engage and retain players. Based on the SLR results, several key models have been identified, which are presented in Table 3.

Table 3.
Selected business models in the gaming industry

Type of business model	Description
Free-to-play	A model based on a free-to-play game that later offers the possibility of numerous microtransactions thanks to long player retention.
Pay-to-play	A model based on a paid game that does not include subsequent financial demands.
Subscription	In addition to the initial price of the game, you must pay a monthly subscription to continue playing.
GaaS (Games as a Service)	The model allows developers to keep the game up to date, releasing as many updates as they want, when they want, allowing all players to receive them immediately upon connecting to a server.
Play-to-earn	NFT-based model that opens a new frontier of secondary markets where all game participants can trade in-game services, features, and items.

Source: own study based on SLR: (Tao, 2012; Liao, 2016; Guintcheva-Sapino, 2017; Jones, 2020; Sinclair, 2017; Tomić, 2019).

The free-to-play model involves providing the basic version of the game for free, with the option to purchase virtual goods or opt out of advertisements. Its development was a response to widespread piracy in China, which slowed the industry's growth even after the country joined the World Trade Organization (WTO) in 2001 (Tao, 2012). The government's lack of action against piracy compelled companies to adopt new methods of monetization, which contributed to the widespread adoption of the free-to-play model (Liao, 2016). Unlike the free-to-play model, the pay-to-play model is based on a one-time fee for full access to the game, with no further financial obligations. This generates a quick profit, but it requires higher production costs. Pay-to-play games offer full content on the day of release, and any additional content is typically available as paid add-ons (DLC). The subscription model, popularized by MMORPGs (e.g., World of Warcraft), combines the purchase of the game with a mandatory regular subscription fee for maintaining access to servers (Jones, 2020).

A breakthrough in the development of business models in the gaming industry is the GaaS (Games as a Service) model, which enables developers to continually update the game, manage relationships with players, segment the audience, and personalize content (Sinclair, 2017; NoBlue, 2018). The primary revenue streams are generated through microtransactions, which enable the purchase of unique items and personalization elements (Tomić, 2019).

The most modern business models in this industry utilize blockchain and NFTs, enabling players to trade virtual goods and generate revenue (Wi, 2009; Popescu, 2021). An example is the game Decentraland, where tokens can be used to buy and sell virtual real estate (Decentraland, 2021). The play-to-earn model combines fun with real economics, redefining digital ownership.

The current macroeconomic situation and slowdown in player growth are prompting PC and console game developers to experiment with new business models, particularly subscription-based and micropayment models. Extending the life cycle of games and developing the game-as-a-service (GaaS) model, as well as creating their distribution ecosystems and building customer loyalty, are the latest trends on the market.

2.3.3. Possibilities of using artificial intelligence in game development

Artificial Intelligence (AI) is increasingly important in the gaming industry, offering tools for creating more complex and immersive experiences. One of the key areas of its application is the development of non-player characters (NPCs) with human-like behavior, which is a challenge due to the need to balance predictability and spontaneity (Uludağlı, Oguz, 2023). This method, which has been used since the 1990s in series such as Battlefield and Tomb Raider, provides stability but is limited to a narrow range of scenarios programmed by the creators (Lou, 2017). In response to the need for greater adaptability, developers are turning to advanced techniques such as the Monte Carlo Tree Search (MCTS) algorithm, which analyzes potential player moves in real-time and dynamically adjusts the NPC's strategy (Cowling et al., 2012). Combining reinforcement learning with neural networks, deep learning has even more potential. This allows NPCs to simulate decisions based on experience, such as avoiding repeated mistakes or predicting player tactics, bringing their behavior closer to human intuition (Koch, 2016; Dhar, 2015). However, AI goes beyond character creation; it also streamlines production processes. Automating game testing, which traditionally required thousands of hours of work, now relies on algorithms that detect logic errors, collisions, or mechanical imbalances. This enables teams to concentrate on the creative aspects of design, thereby reducing development time and costs (Hawk, 2023).

An example is the solution implemented by 2K Games, which used AI to generate unique weapon textures in Borderlands 2, saving artists time (Kuo, 2012). In turn, Ubisoft utilized AI to dynamically balance gameplay and matchmaking in Rainbow Six Siege, adjusting the difficulty to match players' skills (Maguid, Jacquier, 2018). Innovative applications of AI also include the creation of environments. Microsoft used algorithms to generate realistic landscapes in Flight Simulator procedurally based on satellite and meteorological data. Similar techniques

can be adapted to build open worlds where AI designs complex ecosystems or manages interactions between characters. In the future, integrating AI with technologies such as blockchain or NFT may enable the creation of games where virtual worlds evolve organically and NPC decisions affect the game economy or relationships between players. However, it is already clear today that AI optimizes production and redefines the boundaries of interactivity, making games more alive and unpredictable.

3. Empirical Studies

3.1. Research Methods

The empirical research used qualitative methods, particularly the case study method and comparative analysis.

As Yin (2018) noted, a case study is a research method that focuses on an in-depth understanding of a single case or several cases in their natural context. It is beneficial in researching complex phenomena whose boundaries are not clearly defined, which perfectly corresponds to the characteristics of the dynamically developing gaming industry and the implementation of AI solutions in it. This study employs the approach proposed by Yin (2003, 2018), which comprises three main stages: defining and designing the study, preparing for data collection, and collecting and analyzing the data. In defining and designing the study, two cases were selected - Ubisoft and CD Projekt - as representative examples of different AI implementation strategies in the gaming industry. The criteria for selecting cases included: (1) scale of operations (large development studios), (2) different approaches to AI implementation, and (3) data availability. As Yin (2018) emphasized, the appropriate selection of cases is crucial to ensuring the study's validity.

The case study method has several important features. The holistic approach enabled the analysis of the AI implementation phenomenon within each company's organizational, cultural, and technological context. The method's flexibility allowed for the modification of the research process in response to new information emerging during the analysis. The information was obtained by collecting information from various sources, including secondary data (annual reports, press releases) (Ubisoft, 2024; Online Games, 2025).

The comparative analysis of both cases was conducted according to defined criteria, including (1) strategic goals in the use of AI, (2) approach to generative AI, (3) impact on business models, and (4) challenges and constraints. Two extreme cases were compared here. As case studies indicate, while Ubisoft is actively implementing generative AI solutions (Ghostwriter, NEO NPC) to optimize creative processes (Ubisoft, 2024), CD Projekt is taking

a more cautious stance, focusing on traditional content creation methods and limited use of AI for supporting purposes (Gry Online, 2025).

3.2. Case study

3.2.1. Ubisoft

Ubisoft, a leader in the video game industry, is actively exploring the potential of artificial intelligence (AI) in the design and production processes of games. As part of this strategy, the company is implementing two key projects: the Ghostwriter tool and the NEO NPC prototype, both of which were developed through the cooperation of the R&D teams at Ubisoft La Forge and Ubisoft Paris Studio. Ghostwriter, a tool developed by Ben Swanson, R&D specialist at La Forge Montreal, aims to streamline the work of video game scriptwriters. Swanson explains that Ghostwriter automates the time-consuming process of creating "shoulders" - short NPC statements triggered by specific events in the game, such as crowd conversations or reactions during combat (Ubisoft, 2024). Working with the tool is based on human cooperation with AI technology. First, the scriptwriters define the character profile and the nature of the interaction, and the Ghostwriter generates different variants of the statement. Then, the creators select and edit the best proposals, ensuring consistency with the game's narrative.

The algorithm learns from these decisions, thereby improving the quality of the generated content. Swanson emphasizes that "Ghostwriter allows writers to spend more time developing the core narrative, rather than focusing on rough drafts of dialogue" (Ubisoft, 2024). The NEO NPC project, developed by the Ubisoft Paris Studio team, explores the possibilities of generative AI in creating NPCs capable of engaging in dynamic and spontaneous conversations with players. Collaborations with Nvidia, Audio2Face, and Inworld enabled the team to develop AI language models (LLMs) that expand the boundaries of player-character interactions while maintaining their authenticity (Ubisoft, 2024).

A key part of the project is shaping the AI model so that its statements stay true to the narrative. Mélanie Lopez Malet, data scientist, explains, "We always ask ourselves, 'Would Lisa say this?' If the answer is no, we analyze the model and adjust to return to Virginie's vision" (Ubisoft, 2024). Malet adds that the iterative process allows the model to reflect the creators' intentions better while eliminating biases or stereotypes. Ubisoft places particular emphasis on maintaining the authenticity of the characters and control over their narrative roles. Mosser emphasizes, "These characters have no will of their own. They are part of the story and have a narrative purpose" (Ubisoft, 2024). To ensure consistency, the team uses a system of "guardrails" - firewalls that control NPC behaviors, protect against toxic player interactions, and keep the character within their intended character arc. Malet explains, "Inappropriate player impulses are filtered through a model that adjusts NPC responses while maintaining the narrative tone" (Ubisoft, 2024). Despite the new possibilities it opens up, implementing AI into game design has many challenges to overcome. Swanson notes that integrating Ghostwriter into

production processes requires both technical support and adapting the tool to the specific realities of the project (Ubisoft, 2024). Mosser and Malet, on the other hand, point to the need to eliminate linguistic biases and balance creative freedom with narrative requirements (Ubisoft, 2024). Ubisoft sees the potential of its AI technologies in both large AAA productions and smaller projects. Guillemette Picard, Senior Vice President of Production Technology, emphasizes that generative AI is only valuable when it supports human creativity. "Our goal is to develop technology that amplifies the creative visions of creators and benefits players", Picard summarizes (Ubisoft, 2024).

3.2.2. CD Projekt

CD Projekt, a Polish developer known for titles such as The Witcher series and Cyberpunk 2077, approaches the issue of using artificial intelligence (AI) cautiously and rationally. While other studios, such as Ubisoft, are experimenting with generative AI, CD Projekt focuses on research and development of tools supporting the creative process. However, it does not include generative AI technologies in its key projects, such as The Witcher 4. As Adam Badowski, co-president of CD Projekt, points out, AI is considered in the context of supporting production processes, but "creative" AI (generative AI) raises many problems, including copyright-related risks. Badowski, during the summary of the company's financial results for fiscal year 2024, emphasized that "generative AI is quite troublesome when it comes to the issue of legal ownership of brands and many other aspects" (Gry Online, 2025). For this reason, CD Projekt does not plan to implement such technologies in The Witcher 4 or other currently developed projects until key legal and technical issues are resolved. For the same reason, as Michał Nowakowski, another co-president of the company, notes, CD Projekt is in no hurry to implement AI in the narrative elements of its games. The company prefers a traditional approach to writing dialogues and character design, leaving complete creative control in the hands of scriptwriters (Gry Online, 2025).

However, the company conducts research on AI in other areas. As revealed in the annual report for 2024, Redsi is developing several research projects related to AI, focusing on aspects such as:

- Test automation - using AI to detect bugs in games.
- Realistic NPC crowds - AI models support the creation of more natural crowd behaviors.
- Prototyping process - AI tools help in rapid testing and iteration of design ideas.

Despite this research, the company focuses on moderate implementation of AI in practical applications. As the report suggests, CD Projekt's AI team is exploring the possibility of creating algorithms and models explicitly tailored to the studio's needs, rather than using ready-made generative AI solutions (Inwestycje.pl, 2025).

An interesting example of CD Projekt's use of AI was the reconstruction of the voice of the deceased actor Miłogost Reczek in the Phantom Liberty add-on for Cyberpunk 2077. The team worked with the voice engineering company Respeecher to recreate the actor's voice with the consent of his family. As Mikołaj Szwed, localization director at CD Projekt, explains,

"it was a way to pay tribute to his extraordinary talent" (Gry Online, 2023). The process involved using another actor to record new lines of dialogue, which were then transformed into Miłogost Reczek's voice using AI technology, with the approval of the actor's family.

CD Projekt's use of AI remains limited compared to the more experimental approaches of other companies. This decision stems from concerns about the quality and consistency of the generated content, as well as ethical and legal issues. Problems such as potential copyright infringement or quality limitations of generative models lead the company to avoid implementing these technologies on a broader scale. However, this does not mean that CD Projekt will completely exclude AI in the future. As indicated by Inwestycje.pl (2025), the company monitors the development of the technology. Once the technical and legal issues are resolved, it does not rule out its broader use in its projects.

Table 4 presents a comparison of the AI strategies of Ubisoft and CD Projekt.

Table 4.
Comparison of AI strategies between Ubisoft and CD Projekt

Criterion	Ubisoft	CD Projekt
Main goals of the strategy	Scaling creative processes, improving immersion through dynamic NPC interactions, and automating dialogue generation.	Limited AI research in improving prototyping, test automation, and realistic NPC crowds.
Approach to AI	Hybrid – AI supports writers while maintaining their creative control (Ghostwriter and NEO NPC).	Caution – AI is not being used in a generative form in current projects due to legal and ethical concerns.
Application of generative AI	Experimental – Ghostwriter generates rough drafts of dialogues; NEO NPC creates dynamic conversations with NPCs.	Limited – Use of AI in a generative form only in the reconstruction of the deceased actor's voice in Cyberpunk 2077.
Creative control	Creators decide on the final shape of AI-generated content.	Complete creator control – AI does not replace or support writers in the narrative processes of current projects.
Scale of application	Dynamic AI development in various areas, from narrative to AAA game prototyping and smaller projects.	Initial AI research – implementation in production processes limited to selected experiments.
Market Impact	Setting new standards in the use of AI in game narrative, an inspiration for other developers.	A cautious stance towards AI, emphasizing the importance of ethics and content quality, does not significantly impact the AI innovation market.
Challenges	Integrating AI into production processes, controlling biases of language models, and educating teams in AI tools.	Issues related to copyright and the ethical use of AI, as well as a lack of practical solutions for generative AI.
Impact on technology	Developing generative AI for narrative, iteratively improving language models, and creating new tools for creators.	AI research in pre-production, test automation, and realistic NPC movement (without the use of generative AI models).

Source: own study based on: Ubisoft (2024), Gry Online (2025), Inwestycje.pl (2025), Gry Online (2023).

Ubisoft stands out for its advanced integration of AI into the game development process. Projects such as Ghostwriter and NEO NPC show that generative AI can effectively support creators while maintaining their creative control. The company contributes to developing AI technology in gaming while expanding narrative possibilities through more immersive

interactions with NPCs. On the other hand, CD Projekt cautiously approaches AI, focusing on research and analysis of its potential. The company avoids generative AI in current projects, such as *The Witcher 4*, due to concerns about legal, ethical, and content quality issues. The use of AI is limited to niche cases, such as the reconstruction of a deceased actor's voice in *Cyberpunk 2077*. CD Projekt focuses on a traditional approach to narrative, which allows for full creative control while closing the door to more innovative applications of AI in the game.

4. Discussion

The presented considerations show that the differences in both companies' approaches to AI implementation are reflected in their business models. Ubisoft aims to increase production efficiency and shorten development cycles by automating creative processes, critical in service-based models (GaaS). In turn, CD Projekt's strategy, which focuses on maintaining complete control over the creative process, aligns with the premium model, where the key value is the quality and artistic consistency of the production.

The conclusions from the comparative analysis indicate that AI's impact on business models in the gaming industry is complex and depends on the technological strategy adopted. While AI solutions can significantly reduce production costs and increase user engagement, their implementation is associated with legal and ethical challenges, which - as exemplified by CD Projekt - may encourage some companies to adopt a more cautious approach.

The research allows us to conclude that artificial intelligence increasingly impacts business models in the video game industry, transforming production processes and monetization strategies. The Ubisoft case study shows how Ghostwriter and NEO NPC tools can significantly improve game development, especially regarding content generation and interactions with non-player characters (NPCs). As Swanson (2024) notes, automating dialogue creation allows writers to focus on key narrative elements while reducing production time and costs.

In the context of business models, AI's impact on personalizing player experiences is significant. Research indicates that machine learning-based algorithms, used in Roblox's recommendation systems or dynamic gameplay balancing in Rainbow Six Siege, can increase user retention by up to 20-30% compared to traditional solutions (Liu, 2022). This increased retention translates directly into the effectiveness of free-to-play models, where time spent in the game and user engagement are key indicators of success.

At the same time, the development of AI technology creates new monetization opportunities. Virtual economies based on NFTs, such as in Decentraland (2021) or dynamic pricing systems that adapt to player behavior (Kholodylo, Strauss, 2023), are examples of innovative approaches that would be impossible without advanced AI algorithms. Ubisoft is

experimenting with NPCs capable of natural conversations, which could create entirely new forms of interaction and related revenue streams.

It is worth noting, however, that the implementation of AI in the gaming industry is not uniform. While Ubisoft is actively investing in generative AI, CD Projekt is approaching this technology with greater caution, focusing on traditional methods of content creation (Gry Online, 2025). This difference in approach stems from both legal concerns about copyright and concern for the quality and artistic integrity of the production.

The ethical challenges associated with the use of AI in games also warrant attention. The problem of algorithmic bias, visible, for example, in attempts to create diverse NPC characters (Mosser, 2024), or the issue of excessive personalization that can lead to manipulative monetization mechanics, requires the development of appropriate standards and regulations. Ubisoft utilizes solutions such as "guardrails" in NEO NPC, which are designed to provide control over the generated content. However, as Malet (2024) points out, these systems still require improvement.

Despite undeniable benefits in personalization, the use of AI in games raises serious ethical challenges, such as algorithmic manipulation and the phenomenon of "surveillance capitalism." Algorithms analyzing vast sets of player behavioral data can be used not only to recommend content but also to subtly influence their purchasing decisions and time spent in the game. Mechanisms for dynamically adjusting difficulty, intentionally creating frustration (e.g., through constant losing), or displaying personalized microtransaction offers at moments of the player's greatest emotional vulnerability can lead to manipulative monetization practices. In the "surveillance capitalism" model (Zuboff, 2019), the player and their data become the product; their experience is designed to maximize engagement and spending, often at the expense of their autonomy and well-being. This necessitates the development of transparent standards and consent mechanisms (e.g., based on the GDPR model) that will give players absolute control over their data and how it is used to shape the gaming experience.

Excessive personalization, driven by AI algorithms, also carries the risk of adverse side effects. One of the most serious is the potential to deepen game addiction. Algorithms striving to maximize retention can create engagement loops that are extremely difficult to break, leading to problematic usage patterns and harm to mental health. Furthermore, recommendation systems and personalized experience paths can create "filter bubbles" for players, effectively limiting their exposure to diverse play styles and content, which ultimately impoverishes the shared, social experience of the game. Another risk is "overmonetization" – aggressively targeting users prone to spending large sums (so-called "whales"), which can lead to significant financial losses and exploit the vulnerabilities of individuals with impulse control disorders. Therefore, balanced personalization design should consider not only business goals but also an ethical duty of care to protect the user.

In summary, AI is becoming increasingly important in transforming business models in the gaming industry. Its influence is manifested in three main areas: optimizing production processes, increasing user engagement, and creating new monetization opportunities. However, as the example of CD Projekt demonstrates, fully leveraging this potential requires addressing significant legal and ethical challenges. Further development of this technology in the industry will depend on developing a balance between innovation and responsible implementation of solutions based on AI.

Based on the presented considerations, the following practice recommendations were formulated:

Following Ubisoft's example, creators should implement control systems (e.g., content filtering, creative oversight) for generative AI to protect artistic integrity and avoid legal risks.

- Creating hybrid innovation models - it is advisable to combine AI with human processes, for example, automating testing (CD Projekt) or generating initial dialogue versions (Ubisoft), while preserving creators' decision-making power.
- Auditing legal risks - before using generative AI in projects (e.g., asset generation), an audit of copyright and training data should be conducted to avoid disputes (recommendation for studios like CD Projekt).
- Ethical Personalization - algorithms analyzing player data (e.g., for microtransactions) must be transparent and avoid manipulation; implement IEEE standards (2023). Pilots in low-risk projects - generative AI should be tested in smaller productions or DLCs (e.g. voice reconstruction in Cyberpunk 2077), not in key IPs.

5. Directions for Future Research and Conclusion

Future research on the impact of AI on gaming business models should focus on overcoming current technological, legal, and ethical barriers while exploring new opportunities for integrating AI with emerging technologies.

First, a key direction is to analyze the legal challenges associated with generative AI, particularly in the context of intellectual property rights for content created by algorithms. As the example of CD Projekt demonstrates, ambiguities regarding copyrights to AI-generated dialogues or assets pose a significant barrier to their wider implementation (Gry Online, 2025). Interdisciplinary research is necessary to develop standards for attribution and mechanisms for protecting creators' rights, utilizing tools such as Ubisoft's Ghostwriter (Ubisoft, 2024).

Second, it necessitates a more in-depth examination of the ethical implications of personalizing player experiences. AI algorithms analyzing behavioral data can lead to manipulative monetization mechanics, for example, by dynamically adjusting the game's difficulty based on users' spending tendencies (IEEE, 2023). An ethical framework is needed

that balances the commercial goals of publishers with the protection of players' sensibilities, especially young people. The example of Ubisoft using "guardrails" to control NPC interactions (Malet, 2024) can be a starting point for such analyses.

Third, it is worth examining the role of AI in creating cross-industry ecosystems. Integrating games with the music sector (virtual concerts in Fortnite) or film (interactive crossovers) requires advanced data analysis tools that will allow content to be tailored to the preferences of a diverse audience (Wang, 2023). The example of CD Projekt's collaboration with Respeecher in voice reconstruction (Gry Online, 2023) suggests that AI can serve as a bridge between creative industries.

Finally, long-term studies of AI's impact on human creativity are necessary. Do tools such as Ubisoft's NEO NPC, which "co-creates" dialogues with scriptwriters (Mosser, 2024), enhance innovation or standardize the creative process? Answering this question requires monitoring the evolution of game designers' roles in the era of human-algorithm hybridization.

6. Summary

In summary, future research should combine technological and humanistic perspectives, considering both the potential of AI in optimizing business models and the risks associated with the obsolescence of traditional creative roles. As CD Projekt's cautious approach (Gry Online, 2025) demonstrates, success hinges on striking a balance between innovation and preserving the gaming industry's core values – creativity, engagement, and artistic authenticity. AI plays an increasingly important role in transforming gaming industry business models, introducing innovations in three key areas: optimizing production processes, personalizing player experiences, and creating new paths to monetization. Challenges related to copyright, algorithmic errors, and the ethics of personalization continue to be barriers to wider AI adoption. Nevertheless, these technologies open up new possibilities. The industry's future will depend on striking a balance between innovation and the responsible implementation of solutions that enhance creators' creativity, engage players, and uphold ethical norms. AI will not replace human intuition, but it will become its inseparable partner in shaping the next era of video games.

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