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# Data Governance in Gaming Industry

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## ABSTRACT

This article examines the role of Big Data Analytics and Data Governance in the gaming industry. It shows how Big Data Analytics has changed game design and player interaction, focusing on trends and player preferences, especially in free-to-play games. The importance of Data Governance is stressed for handling data responsibly, focusing on challenges like data quality, security, and legal rules like GDPR. Examples from Ubisoft, SEGA, and Kolibri Games show these concepts in action. Metavibes is another example of research in field of Data Governance. The article also looks at how the gaming industry is dealing with data issues, including using strong policies and better security. It predicts future trends in AI and blockchain in gaming. The piece highlights the need for ethical practices, like protecting player privacy, as key for trust in the industry. The article points out the vital impact of these technologies in advancing and growing the gaming world.

## 1. Introduction

The gaming industry, now one of the largest and most influential sectors in the global economy, has experienced a significant transformation due to the strategic implementation of Big Data Analytics. This shift has enabled the industry to surpass several traditional sectors in technological innovation and economic impact. Big Data Analytics allows gaming companies to analyze extensive data sets, market trends, customer preferences, and other valuable business information. By leveraging these insights, gaming companies can enhance player experiences and develop highly tailored products and services (Zimmermann, 2015; Wallner, 2019). For example, in the freemium model—where games are free but monetized through in-app purchases and advertising—Big Data Analytics is used to optimize engagement and revenue. This model has become increasingly popular, with a report by Statista indicating that global mobile game revenues from in-app purchases are projected to exceed \$100 billion by 2023 (Statista, 2023).

The application of Big Data Analytics extends to marketing and customer engagement, where gaming companies employ data-driven strategies to create targeted marketing campaigns, leading to more efficient and effective promotional efforts (Nair et al., 2017). This analytical approach has significantly reshaped the market dynamics of the gaming industry, positioning it at the forefront of the digital economy (Turner, 2021). Beyond gaming, Big Data Analytics has transformative applications across various sectors. In healthcare, it aids in disease prediction and treatment personalization (Loh et al., 2015). In retail, it's utilized for optimizing supply chains and enhancing customer shopping experiences. In finance, it plays a crucial role in risk management and fraud detection.

Furthermore, the comprehensive utilization and review of game analytics underscore the industry's shift towards more sophisticated, data-informed practices, marking a new era in gaming where data analytics is not just beneficial but essential for success (Egliston, 2019; Su et al., 2021). This evolution highlights the pivotal role of

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Big Data Analytics is not only enhancing the gaming experience but also in driving the broader digital economy forward, illustrating the multifaceted impact of data-driven strategies across different sectors (Staff Writer, 2022).

**1.1. Overview of Data Governance: The essential role of data governance in managing and using data ethically and effectively.**

Big data analytics, which deals with analyzing large and complex datasets to uncover patterns, trends, and insights, relies heavily on well-governed data to ensure accuracy and reliability of the results. Data governance involves managing the availability, usability, integrity, and security of data in systems, which is crucial for ensuring that big data analytics can be conducted effectively and ethically (Shieh, 2016).

This is particularly crucial in industries like gaming, where large volumes of personal and sensitive data are collected and analyzed. Data governance helps in ensuring that this data is used responsibly, protecting the privacy and rights of individuals.

A key aspect of data governance is data quality management, which ensures the accuracy, completeness, and reliability of data. High-quality data is vital for making informed business decisions and for maintaining the integrity of business processes. In the context of the gaming industry, this means ensuring that the data used to enhance player experiences, tailor marketing strategies, and develop new games is accurate and reliable.

Data security is another crucial element of data governance. With increasing cyber threats, it's imperative to protect data from unauthorized access and breaches. This involves implementing robust security measures, such as encryption, access controls, and regular security audits. For gaming companies, safeguarding player data is not only a legal requirement but also essential for maintaining player trust and loyalty.

Data privacy is at the heart of data governance. It involves ensuring that personal data is collected, processed, and shared in compliance with privacy laws. This includes obtaining proper consent for data collection, allowing individuals to access their data, and ensuring that data is used for its intended purpose.

**1.2. The article's aim to explore the impact of data governance and analytics in gaming.**

This article aims to explore the significant impact of data governance and analytics in the

gaming industry. It will focus on how these practices influence game development, player engagement, and business models, particularly the freemium model. Additionally, the article will address the challenges of ethical data management, including privacy and security, highlighting the need for robust data governance to ensure responsible data usage and compliance with legal standards.

**2. The goal of research and problem statement**

**2.1. The goals of the article, which could be to examine the impact of big data analytics on gaming and to explore how data governance is being implemented.**

The objectives of this article are twofold:

**Examine the Impact of Big Data Analytics in Gaming:** We aim to explore how big data analytics is transforming the gaming industry. This involves an analysis of its role in game development, enhancing player experiences, and influencing business models, particularly focusing on the effectiveness of the freemium revenue model.

**Explore the Implementation of Data Governance:** The article will also delve into how data governance is being implemented within the gaming industry. This includes assessing the strategies for managing data privacy, security, and compliance with legal standards.

Our investigation will provide insights into:

- 1) The ways big data analytics is used to tailor gaming experiences and improve engagement.
- 2) How gaming companies are navigating the complexities of data management in an ethical and legally compliant manner.

**2.2. The challenges related to big data in gaming, such as ethical data usage, data privacy concerns, and the need for efficient data management.**

In the realm of gaming, the integration of big data analytics brings forth several challenges that need to be addressed:

**Ethical Data Usage:** One of the primary concerns is the ethical use of player data. As gaming companies collect and analyze vast amounts of data, questions arise about the boundaries and ethics of this data usage. This includes concerns about how data is gathered, the extent of player profiling, and the use of data for in-game personalization versus potential manipulation of player behaviors, especially in freemium models where in-app purchases are encouraged.

**Data Privacy Concerns:** The protection of player privacy is a critical challenge. With regulations like GDPR in the European Union and CCPA in California, gaming companies must ensure that personal data is collected, processed, and stored in compliance with these laws. This includes obtaining consent for data collection, allowing users access to their data, and ensuring the data is used for its intended purpose only. Failing to comply with these regulations can result in hefty fines and a loss of player trust.

**Efficient Data Management:** As the volume of data in the gaming industry continues to grow exponentially, efficiently managing this data becomes a challenge. This includes the need for robust data storage solutions, efficient data processing capabilities, and effective data analysis tools. Efficient data management is crucial not only for deriving valuable insights but also for maintaining the performance and scalability of gaming platforms.

**Security Risks:** Alongside privacy concerns, data security is a significant challenge. With the increasing sophistication of cyber threats, gaming companies must ensure that player data is securely protected from breaches and unauthorized access. This requires continuous investment in security infrastructure and practices, along with regular audits and updates to security protocols.

**Balancing Personalization with Privacy:** While personalization enhances player experience, it also raises privacy concerns. Gaming companies must strike a balance between using data analytics for personalization and respecting player privacy. This involves transparently communicating with players about how their data is used and providing options for players to control their data privacy settings.

Addressing these challenges is essential for gaming companies to leverage the benefits of big data analytics while maintaining ethical practices, ensuring player trust, and complying with legal standards (Yuverich, 2019).

### 3. Data Governance in Gaming

#### 3.1. Data governance entails and its importance in the gaming industry.

Data governance in the gaming industry refers to the comprehensive management of data accessibility, integrity, usability, and security. It involves setting policies, standards, and

procedures that govern the collection, use, and storage of data. This is crucial in ensuring that data is handled responsibly and ethically.

The significance of data governance in gaming is multifaceted:

**Ensuring Data Quality and Reliability:** Data governance ensures that the data used by gaming companies is accurate, complete, and reliable. This is essential for making informed decisions regarding game design, user experience, and marketing strategies.

**Compliance with Legal Standards:** Gaming companies collect and process large amounts of personal data, making compliance with data protection regulations like GDPR and CCPA essential. Data governance helps ensure that these companies adhere to legal standards, thereby avoiding potential legal penalties.

**Protecting User Privacy:** Effective data governance ensures that user data is collected and used in a manner that respects their privacy. This involves implementing measures to secure personal data and prevent unauthorized access or breaches.

**Building Trust with Players:** By responsibly managing player data, gaming companies can build and maintain trust with their user base. This trust is crucial for retaining players and maintaining a positive brand image.

#### 3.2. Challenges in Data Governance: Specific problems in data governance within gaming, such as handling player data ethically and ensuring data security.

The challenges of data governance in the gaming industry, particularly in terms of ethically handling player data and ensuring data security, are accentuated by the broader context of data governance trends and statistics.

Given the complexity of managing vast amounts of sensitive player data, gaming companies face a significant challenge in maintaining high data quality. With only 3% of data in companies being of high quality (Harvard Business Review), the gaming industry must implement robust data governance strategies to improve the accuracy and reliability of the data they collect and use. This is crucial not only for ethical considerations but also for making informed business decisions.

The economic implications of poor data governance are substantial. Bad data costs firms about 12% of their revenue (Nair et al., 2017) and issues related to data quality are estimated to cost the US economy \$3.1 trillion annually (IBM). These

statistics underline the importance of effective data governance in mitigating financial risks.

Additionally, the rapid growth of the Data Governance Market, expected to reach USD 5.28 billion by 2026 (llcbuddy.com), reflects the increasing awareness and demand for effective data governance across industries, including gaming. This growth is driven by the need for compliance with evolving regulations, enhancing data security, and ensuring ethical data usage.

In the gaming industry, ensuring player data is used to enhance gaming experiences without infringing on individual privacy rights is a complex task that requires careful consideration and adherence to privacy regulations.

Data security is another critical area of concern. The gaming industry's attractiveness as a target for cyberattacks necessitates the implementation of stringent security measures to protect player data from breaches and unauthorized access. This includes not only technological solutions but also regular updates to security protocols and employee training to combat evolving cyber threats.

## 4. Big data analytics in Gaming

### 4.1. *The big data analytics methods used in the gaming industry.*

In the gaming industry, Big Data Analytics employs a variety of methods to analyze and utilize the vast amounts of data generated by players and gaming platforms. These methods are crucial for enhancing player experiences, optimizing game development, and driving strategic decision-making.

**Player Behavior Analysis:** This involves collecting and analyzing data on how players interact with the game. It includes tracking in-game movements, purchase history, and playtime patterns. By understanding player behavior, gaming companies can tailor game experiences to individual preferences, improve engagement, and increase retention rates.

**Predictive Analytics:** This method uses historical data to predict future trends and player actions. For instance, predict the popularity of new features or games. Predictive analytics helps companies to be proactive in their strategies, improving player satisfaction and reducing churn.

**Personalization Algorithms:** Utilizing machine learning algorithms, gaming companies can create personalized gaming experiences. This could mean recommending games, customizing in-game

content, or adapting marketing messages based on individual player data. Personalization enhances the user experience and can lead to higher player engagement and increased revenue through targeted offers.

**Real-Time Analytics:** Gaming companies use real-time analytics to monitor live game operations. This can involve tracking server performance, live player behavior, and in-game transactions. Real-time insights allow for immediate responses to any issues, enhancing the overall gaming experience.

**Heat Maps and Spatial Data Analysis:** These tools visualize player activities within the game environment, showing areas of high activity, paths taken by players, and interaction points. This information is vital for level design, balancing game difficulty, and ensuring an engaging player experience.

**A/B Testing:** This method involves comparing two versions of a game or a feature among different player segments to determine which performs better. A/B testing is critical for making data-driven decisions about game design and updates, ensuring that changes are aligned with player preferences.

**Economic Analysis:** Especially relevant in games with in-game economies or microtransactions, this analysis looks at player spending patterns, virtual economy balance, and pricing strategies. It helps in optimizing in-game economies to ensure they are engaging, fair, and profitable.

These analytical methods enable gaming companies to not only understand their players better but also to anticipate market trends, innovate effectively, and maintain a competitive edge in the rapidly evolving gaming industry.

### 4.2. *How big data analytics has transformed game design, marketing, and customer experience.*

Big Data Analytics has been a game-changer in the gaming industry, significantly impacting game design, marketing strategies, and enhancing customer experience.

In the realm of game design, insights from player behavior and preferences, obtained through big data analytics, have been crucial. Game developers now have the ability to observe real-time interactions, allowing them to see which game features engage players the most. This leads to an iterative approach in game development, constantly fine-tuning the gaming experience based on actual player data. Techniques like heat mapping and player tracking provide valuable

feedback for optimizing level designs, making games both challenging and enjoyable. Predictive analytics also plays a role, helping developers anticipate future trends and player desires (Yamini, 2002).

Marketing and advertising strategies in the gaming industry have seen a transformation due to big data analytics. The ability to analyze extensive player data means that marketing campaigns can be highly personalized and targeted. This leads to more efficient use of marketing budgets, focusing on segments most likely to engage with the game (Nair et al., 2017).

Customer experience has greatly benefited from the application of big data analytics. Personalization algorithms, developed from player data, offer game recommendations and tailored in-game content, significantly enhancing player engagement. This personalization extends to in-game purchases, increasing their likelihood. Real-time analytics also play a vital role in identifying and resolving gameplay issues quickly, ensuring a high-quality service and maintaining player satisfaction.

Predictive customer support is another area where big data analytics has made a significant impact. By analyzing patterns in player behavior and common issues, gaming companies can anticipate potential problems and address them proactively.

#### **4.3. Case Studies: Examples from the industry, such as Ubisoft, SEGA and Kolibri Games.**

Notable case studies in the gaming industry that illustrate the effective use of big data analytics are Ubisoft, SEGA and Kolibri Games.

**Ubisoft:** Adding to these examples, Ubisoft represents a pioneering force in the gaming industry, utilizing Big Data Analytics for a variety of innovative applications. Ubisoft's strategies focus on real-time gameplay adjustments based on player performance and preferences, enhancing player engagement through dynamic difficulty adjustments and personalized content. Their use of predictive analytics allows for anticipatory game design, aligning with future market trends and player desires. Furthermore, Ubisoft's commitment to ensuring fair play through advanced cheat detection mechanisms sets them apart. These measures not only enhance the player experience but also build trust and loyalty among their user base. Ubisoft's unique approach to data analytics, encompassing both game development and player engagement,

highlights its role as a leader in harnessing the power of data to revolutionize the gaming experience.

**SEGA Europe:** SEGA, a renowned name in the gaming world, has leveraged data analytics to transform its approach to game development and customer engagement. By analyzing player data, SEGA has been able to track user behaviors, preferences, and trends. This information has been invaluable for the company in optimizing game balancing, enhancing player engagement, and developing targeted marketing strategies. For instance, data analytics has enabled SEGA to understand which game features are most popular among players, thereby informing decisions on feature development and game updates. Furthermore, SEGA's use of analytics extends to customer relationship management, where insights derived from player data are used to tailor marketing campaigns and enhance player engagement.

SEGA collects over 25,000 data events every second, including player behavior and in-game interactions. Originally struggling with a legacy infrastructure that couldn't handle the volume of data, they shifted to Databricks Lakehouse, which enabled them to manage massive amounts of structured and unstructured data efficiently.

**Kolibri Games:** Kolibri Games, a mobile games company known for its 'idle' games, has built its success on a data-driven culture. The company heavily invests in big data analytics to drive its game development and marketing strategies. Kolibri Games utilizes cloud-based data structures, which allows for efficient processing and accessibility of large volumes of data. This capability is crucial for the company to perform A/B testing, refine game features, and develop predictive models for player behavior. One significant outcome of their data analytics approach is the creation of a dynamic recommendation engine. This engine is designed to enhance player experience by recommending personalized game types and experiences based on individual player data. Additionally, their use of MLflow has enabled them to build an ML engine for predictive modeling, which is a critical component of their product development strategy.

These case studies collectively demonstrate the extensive potential of big data analytics in the gaming industry. Ubisoft, SEGA and Kolibri Games each exemplify data-driven approaches that not only enhance game design and personalize player experiences but also optimize marketing strategies and ensure sustainable competitive advantages in the market.

#### 4.4. Research of the "Metavibes" company

Metavibes, a pioneering company in the metaverse sector, has established an innovative data governance framework leveraging standard models and Microsoft Azure (Metavibes, 2023). This ensures a seamless user experience across various platforms, including VR, computers, and mobile phones, while prioritizing user data security and privacy. Metavibes secures user consent for data collection through comprehensive usage manuals available on its website, allowing users to be informed about how their data is managed. The company employs Microsoft Azure's infrastructure, complex password protocols, and hashing to safeguard user data, particularly in financial transactions. User actions within the metaverse, especially purchases, are meticulously analyzed to enhance the platform's offerings and user experience. Metavibes is committed to ethical data use, providing users the option to request the deletion of their data if they choose to unregister from the base in Metavibes, reflecting a strong stance on user privacy and data management ethics. Looking ahead, Metavibes plans to further fortify its data governance and user privacy measures by integrating advanced AI technologies and exploring the use of blockchain. This forward-thinking approach aims to bolster security, transparency, and user trust as Metavibes continues to evolve its metaverse platform.

## 5. Problem-solving methods and approbation

### 5.1. How the gaming industry is resolving issues related to data governance and analytics.

The gaming industry is proactively tackling challenges in data governance and analytics with several key strategies:

**Comprehensive Data Governance Frameworks:** Gaming companies are establishing robust frameworks for data governance. These frameworks outline policies and procedures for efficient data

collection, storage, usage, and disposal, aligning with legal requirements like GDPR and CCPA.

**Enhanced Data Security Measures:** To protect against data breaches and cyber threats, gaming companies are investing in sophisticated security technologies. This includes implementing encryption, multi-factor authentication, and conducting regular security audits.

**Privacy-by-Design Approach:** The industry is adopting a privacy-by-design approach in game development and data analytics. This method integrates privacy considerations into the product development lifecycle from the beginning.

**Data Quality Management:** Gaming companies are emphasizing the importance of data quality management. This process involves the cleaning, validation, and standardization of data to ensure its accuracy and effectiveness for analytics, which is essential for informed decision-making and creating personalized gaming experiences.

**Employee Training and Awareness:** Gaming companies are focusing on training and awareness programs for their employees. These programs aim to educate staff on data protection and regulatory compliance, fostering a culture of data responsibility.

**Utilizing AI and Machine Learning in Data Analysis:** To improve data analytics, gaming companies are increasingly employing AI and machine learning (Watters, 2021). These technologies allow for advanced analysis of large datasets, yielding deeper insights into player behavior and preferences and supporting predictive modeling for game development and marketing.

Through these measures, the gaming industry is effectively addressing the present and future challenges in data governance and analytics, ensuring player trust, compliance with regulations, and the strategic use of data for business growth.

### 5.2. How gaming companies are addressing ethical issues related to big data.

In the gaming industry, addressing ethical challenges related to big data involves a multifaceted approach. Gaming companies are increasingly focusing on transparent data practices, a response to the growing concern over data privacy, with a KPMG survey indicating that 86% of consumers are worried about this issue. This emphasis on transparency is not just about adhering to regulatory standards but also about building trust with players.

Simultaneously, ethical data usage has become

a priority, especially in sensitive areas like in-game purchases and content personalization. Companies are setting clear boundaries to avoid manipulative tactics that could lead to overspending or excessive gaming. Alongside this, there is a strong focus on respecting player privacy. Companies are providing players more control over their data, in line with global privacy standards, a move that is essential for maintaining consumer trust.

Furthermore, the industry is embracing data minimization strategies, collecting only the data that is necessary to reduce risks associated with data breaches and ensure ethical usage (Shieh, 2016). Additionally, the ethical application of AI and machine learning is receiving heightened attention, ensuring these technologies are used in ways that are fair, transparent, and devoid of biases, particularly in systems analyzing player behavior or personalizing gaming experiences.

These efforts reflect the gaming industry's commitment to ethical responsibility, aiming to balance technological advancement with ethical considerations in creating a more engaging and trustworthy gaming environment.

## 6. Potential future

### 6.1. Potential future trends in big data analytics that concerns data governance in gaming.

The future of data governance and analytics in the gaming industry marked by technological advancements and changing regulations, suggests several significant trends:

- 1) Increased Adoption of AI and Machine Learning (Aboub, 2021):
  - Enhanced Player Profiling: Leveraging AI for more precise player segmentation and behavior prediction
  - Automated Governance: Utilizing machine learning algorithms to streamline data governance processes (Yurevich, 2019)
- 2) Enhanced Real-Time Data Processing:
  - Instant Player Feedback Analysis: Immediate processing of player actions for real-time game adjustments.
  - Dynamic Content Adjustment: Tailoring game content on-the-fly based on player interactions.
- 3) Growing Emphasis on Data Privacy and Security:
  - Advanced Encryption Methods: Implementing newer, more secure

encryption technologies

- Real-Time monitoring Systems: Continuously scanning for data breaches or anomalies.
- Regulatory Compliance and Data Sovereignty:
- Adaptive Data Policies: Developing flexible data governance to comply with international laws.
  - Regional Data Handling: Setting up region-specific data centers to comply with local data sovereignty laws.
- 4) Blockchain in Data Governance:
    - Immutable Data Records: Using blockchain for tamper-proof record-keeping
    - Decentralized Data Management: Distributing data across a blockchain network to enhance security.
  - 5) Data Ethics Becoming a Core Strategy:
    - Ethical Data Committees: Establishing dedicated teams to oversee ethical aspects of data use.
    - Community Engagement: involving players in discussions about data usage and ethics.
  - 6) User-Controlled Data
    - Data Sharing Preferences: Allowing players to customize their data sharing settings.
    - Data Monetization Options: Offering players opportunities to monetize their shared data.

These trends indicate a future where gaming companies will increasingly rely on advanced technologies and strategic approaches to manage data governance and analytics, focusing on personalized gaming experiences while upholding high standards of privacy, security, and ethical compliance.

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