

# Analyzing Video Game Success: A Comparative Study of Sales, Reviews, and Developer Trends

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## Abstract

This comprehensive study, spanning 2000 to 2020, investigates video game sales and ratings, utilizing a robust dataset. Anchored on five key questions, it explores video game success and consumer preferences. It examines the correlation between critic and user review scores for action games by major publishers, contrasts Super Mario franchise sales trends across generations, identifies top-selling game developers and their shared traits, compares user review scores between RPG and action/adventure games [1] on major platforms, and assesses regional preferences' impact on game genres' sales and critical reception. Through advanced statistical analyses on the dataset, this study reveals insights into the gaming industry. Notably, it uncovers a correlation between critic and user scores in action games, generational shifts in Super Mario sales, and key traits of successful developers. The comparative analysis exposes distinct preferences between RPG and action/adventure gamers, while regional trends emphasize the localized nature of gaming success. These findings deepen our understanding of video game popularity, developer strategies, and consumer behavior, contributing to the evolving landscape of digital entertainment and inspiring future research in this dynamic field.

## Keywords:

*Video game sales, Ratings, Correlation, Critic and, user review scores, Action games, Sales trends, Generations, RPG, Action/adventure games, regional preferences, Gaming industry, Developer strategies, Consumer behavior.*

## I. Introduction

The video game industry, a dynamic and rapidly evolving sector, has cemented its position as a major player in the global entertainment landscape. Originating as a niche market, it has blossomed into a

multi-billion-dollar industry, rivaling, and often surpassing traditional entertainment forms like film and music in both revenue [2] and cultural impact. This growth is fueled by continuous technological advancements, the proliferation of gaming platforms, and an ever-expanding global audience.

Crucial to understanding this industry's success are several key metrics: critical scores, user scores, and sales data. Critic scores, often aggregated by sites like Metacritic, provide an expert assessment of a game's quality, considering aspects such as gameplay, graphics, and storyline. These scores are influential, shaping initial market perceptions and impacting consumer purchasing decisions. User scores, in contrast, offer a window into the gaming community's reception, reflecting the broader audience's sentiments and engagement with a game. Together, these scores provide a multifaceted view of a game's appeal and quality.

Sales data, meanwhile, offers a direct measure of a game's commercial success. High sales not only signify financial [2] achievement but also indicate a game's ability to attract and engage a wide audience. In an industry where artistic creativity intersects with commercial imperatives, sales figures remain a crucial barometer of a game's impact.

The interplay of these metrics – critical and user scores, sales, and other factors like developer reputation and game genre – paints a comprehensive picture of what drives success in the video game industry. This research delves into these aspects, aiming to untangle the complex web of factors that contribute to a video game's popularity and commercial triumph.

## II. Research Problem

The research problem at the core of this study arises from the need to comprehensively understand the factors that drive success in the video game industry, a sector characterized by rapid innovation and intense competition. While sales figures, critical scores, and user reviews are commonly used metrics to gauge a game's success, the complex interplay between these factors is not fully understood. This gap in understanding poses a [3] significant challenge, especially in an industry where the success of a title can influence market trends and future development decisions. The problem is compounded by the evolving nature of gaming platforms, the diversity of gaming genres, and the shifting preferences of a global audience. Additionally, the impact of regional differences on the reception of games and the influence of developer reputation on consumer expectations are areas that require deeper exploration. Addressing these issues is crucial for developers, publishers, and marketers in the industry to effectively navigate [3] the market, tailor their products to meet consumer demands, and achieve commercial success. This research aims to bridge these gaps, providing insights into the nuanced relationships between various success metrics and offering a more holistic understanding of what propels a video game to achieve critical and commercial acclaim.

### III. Importance of Research Problem

The significance of addressing the research problem in the video game industry is multifaceted and profound, given the industry's rapid growth and substantial impact on global entertainment. Firstly, this research is pivotal for guiding game development. Insights into how critic scores, user reviews, and sales figures interrelate can substantially inform development strategies, leading to content that resonates with both critics and players. Additionally, understanding these dynamics [4] aids in making informed marketing and distribution decisions, especially when considering regional preferences and the influence of developer reputation. Such knowledge is invaluable in predicting market trends, a crucial advantage in an industry known for its quick shifts in consumer tastes and technological advancements. This understanding also aids in effective resource allocation, an increasingly important factor given the rising costs of game development. Furthermore, by identifying the elements that contribute to a game's success,

developers can enhance user experiences, leading to greater player satisfaction and engagement. Beyond the immediate industry, this research has broader economic implications, influencing job creation, technological innovation, and revenue generation in the sector. Moreover, video games [4] are a significant medium for cultural expression and storytelling. Insights gained from this study can empower creators to produce not only commercially successful but also culturally resonant games. Overall, the research holds the potential to provide a comprehensive understanding of success drivers in video games, essential for industry stakeholders to navigate this complex and dynamic field effectively.

### IV. Research Questions

Through a series of aimed research questions, this study explores different aspects in an attempt at understanding the complex dynamics of video game success. Every question aims to delve into a different aspect that together helps us understand what motivates the popularity and financial success of a video game.

The research questions are:

1. What is the correlation between critic review scores and user review scores for action games released by major publishers (EA, Activision, Ubisoft, Take-Two) between 2010-2020?
2. How do median sales in the first 12 months following release compare between 3rd/4th generation games in the Super Mario franchise and their 1st/2nd generation predecessors?
3. Which developers produced the most games that sold over 10 million copies globally between 2000-2020, and what common characteristics do the top 5 share?
4. How does the distribution of user review scores compare between role-playing (RPG) and action/adventure games released in the last 5 years for the PlayStation and Xbox platforms?
5. To what extent do regional differences in user preferences affect the sales and critical reception of specific game genres, considering the top gaming platforms in each region?

The "Correlation Between Critic and User Review Scores" segment of this research aims to explore the connection between the assessments of game critics

and the opinions of players, with a specific focus on action games. This investigation is centered around titles released by prominent [5] publishers like EA, Activision, Ubisoft, and Take-Two, during the period from 2010 to 2020. The primary goal is to determine how closely the evaluations made by critics align with or differ from the viewpoints of gamers. Through an in-depth examination of these scores within the realm of action games from major publishers, this study intends to uncover potential factors that may influence both critical and user-based assessments. This understanding is essential as it can offer valuable insights into how games are received, shedding light on whether professional critiques mirror the sentiments of the broader player community. This analysis plays a critical role in deciphering the intricate relationship between these two crucial metrics and their combined impact on a game's reputation and success in the highly competitive video game market.

The section of the study titled "Sales Comparison in Super Mario Franchise" has the objective of examining and contrasting the median sales figures of Super Mario games within their first year of release. Specifically, this analysis will focus on comparing the titles from the 3rd and 4th generations with those from the earlier 1st and 2nd generations. The aim is to shed light on how the commercial success of the Super Mario franchise has [6] evolved over different generations. Various influential factors, including technological advancements, shifts in player preferences, marketing strategies, and broader industry trends, will be investigated to understand how they may have contributed to these changes.

The section within the study, titled "Prominent Game Developers with High Sales," is dedicated to the identification of game developers who have achieved notable commercial success by producing games that surpassed the 10 million global sales thresholds between the years 2000 and 2020. The primary aim of this analysis is to discern which developers have consistently attained this impressive [2] level of sales and to investigate the factors that have played a role in their achievements. With a specific focus on the top 5 developers in this category, the study seeks to uncover shared characteristics, including innovative game design, effective marketing strategies, genre preferences, or advancements in technology. This inquiry holds significant importance, as it provides

valuable insights into the crucial elements responsible for games achieving substantial sales figures. These findings can serve as a valuable resource for developers and publishers, offering guidance on understanding the primary factors contributing to commercial success within the fiercely competitive gaming market.

The primary goal of this study segment is to conduct a comparative analysis of user review score distributions between role-playing games (RPGs) and action/adventure titles. This analysis specifically focuses on game releases from the past five years on PlayStation and Xbox platforms, with the intention of exploring the subtleties in player reception and preferences within these two prominent gaming genres. By examining user review scores, the study aims to gain insight into the [7] distinct expectations and satisfaction levels of players for each genre. This comparison holds significant importance as it provides valuable insights into the elements that resonate most with players in RPGs as opposed to action/adventure games, potentially offering guidance to developers and publishers in shaping future game design and marketing strategies.

This aspect of the research endeavors to assess the degree to which disparities across regions impact game sales and critical reception. The study will take into consideration the dominant gaming platforms in different geographic areas and explore the variations in user preferences within these regions. The importance of this investigation lies in its ability to reveal how cultural and [8] regional factors influence gaming habits and preferences. By presenting a global perspective on how distinct game genres are received in various parts of the world, the research aims to offer valuable insights to the gaming industry. This comprehension is essential for customizing games to cater to diverse audiences, ensuring that they align with the unique tastes and preferences of players across different cultural backgrounds and geographic regions.

#### **V. Data set:**

The dataset used in this study was a comprehensive compilation of information related to video game sales and ratings. It covered a wide period, from the early 1980s to the present. Many factors were included in this dataset, such as information on publisher details, ESRB ratings, developer information, game genres, gaming platforms, global

and regional sales, user and critic review scores, and game genres. This dataset was created with the main goal of offering a thorough and comprehensive perspective on the commercial dynamics of the gaming industry, the critical reception of games, and the changing preferences of users.

There was a wide range of games in this dataset, including popular releases from well-known franchises as well as games from various genres and platforms. This variety [9] was intended to cover both niche gaming markets and well-known gaming titles. Every entry in the dataset matched a distinct game title, and to guarantee the highest level of accuracy and dependability, the data points were carefully collected from reliable industry sources.

The comprehensive and rich data set served as the foundation for the various analyses carried out in this investigation. It was essential in understanding the complex relationships that exist between game popularity, current market trends, and regional preferences in the context of the global gaming industry.

## **VI. Literature Review**

This study's literature review examines key findings from several notable reports that provide insights into the video game industry, particularly focusing on online ratings, consumer reviews, platform impact, and consumer perceptions.

In the report authored by L. F. L. Martinez, titled "The Impact of Online Ratings on Video Game Sales" and published on June 1, 2015, [10] the primary focus revolves around elucidating the relationship between online ratings and the economic prosperity of video games. Martinez's analysis assumes paramount importance by accentuating the substantial role played by digital feedback mechanisms, such as online ratings, in exerting a considerable influence on consumer purchasing decisions. The study offers an extensive and thorough understanding of the degree to which online ratings, which essentially mirror public sentiments and contentment, possess the capacity to sway the market performance of video games. This research bears relevance to our own study, given its alignment with our core objective of delving into the interconnection between critics and user review scores and their consequential impact on game sales. By comprehending the sway of online ratings, as scrutinized by Martinez, we can attain a

deeper comprehension of the determinants that underpin commercial success within the video game industry. In doing so, we illuminate the influential role of digital feedback in shaping consumer behavior.

In the study conducted by F. F. Zhu, titled "The Influence of Online Consumer Reviews on the Demand for Experience Goods: The [8] Case of Video Games," which is accessible through the AIS Electronic Library (AISeL), an insightful examination is undertaken concerning the profound impact of online consumer reviews on the video game industry. Zhu's research specifically hones in on the way these user-generated reviews wield influence over the demand for video games, particularly those categorized as experience goods. The study holds notable significance, as it underscores the pivotal role played by consumer feedback in shaping market demand, with a particular emphasis on the perspectives and experiences shared by players in the online domain.

This research aligns remarkably well with the core focus of our own study, which revolves around the analysis of user review scores and their distribution across diverse game genres. Zhu's findings contribute substantially to our comprehension of how user reviews can effectively guide [8] consumer preferences and decision-making processes, ultimately exerting an impact on the commercial performance and popularity of games across various genres. By shedding light on the critical role of user engagement and feedback in the success of video games, Zhu's study seamlessly integrates with the broader objectives of our research endeavor.

In John Sacranie's thought-provoking work, "Consumer Perceptions & Video Game Sales: A Meeting of the Minds," published in 2010, an in-depth exploration is conducted to unravel the intricate dynamics between [11] consumer perceptions and the sales of video games. Sacranie's study delves profoundly into how consumer attitudes and beliefs wield significant influence over purchasing behaviors within the gaming market. This comprehensive analysis holds substantial relevance for understanding the myriad factors that contribute to sales figures, encompassing not only individual preferences but also broader societal trends.

The pertinence of Sacranie's research to our own study is highly evident, as it closely aligns with our

primary goal of examining regional disparities in gaming preferences. By scrutinizing the intricacies of consumer perceptions meticulously delineated by Sacranie, we can attain a more nuanced and comprehensive understanding of the variations in gaming habits and preferences [12] across different regions. These distinctions, in turn, exert a discernible impact on the commercial performance of video games within specific geographic areas. Sacranie's research, therefore, emerges as an indispensable element in the puzzle of comprehending the complex relationship between consumer attitudes and the commercial success achieved in the video game industry.

The study titled "The Impact of Platform on Global Video Game Sales," authored by J. J. Babb, N. N. Terry, and K. K. Dana and published in the International Business & Economics Research Journal in 2013, conducts a comprehensive analysis of how different gaming platforms affect the sales [11] of video games on a global scale. This research meticulously examines how the choice of gaming platform influences the market success of video games, providing valuable insights into the varying commercial performances observed across platforms such as PlayStation, Xbox, and others.

The significance of this study lies in its thorough exploration of how platform-specific characteristics and consumer preferences contribute to the outcomes of game sales. This research is particularly relevant to our own study as it complements our investigation into the distribution [11] of user review scores across diverse gaming platforms. The findings presented by Babb, Terry, and Dana significantly enhance our understanding of the complex dynamics of the market, specifically in the context of factors related to different platforms that shape sales trends and consumer decision-making in the global gaming industry.

In essence, their work enriches our comprehension of the multifaceted nature of success in the video game industry, especially in highlighting how platform preferences and features can exert a substantial impact on sales patterns and consumer choices.

## VII. Research Strategy and Methodology:

The research strategy and methodology employed in this study aim for a thorough analysis of the factors

that impact the success of video games. This approach is multifaceted, blending quantitative and qualitative analysis methods to effectively address our research questions.

Data collection centers primarily on the "Video\_Games\_Sales\_Mani.csv" dataset, which contains comprehensive data on video game sales, critic and user scores, and relevant metrics. Supplementary data sources include online consumer reviews, sales figures from diverse geographic regions, and platform-specific data.

Quantitative analysis employs statistical methods to scrutinize correlations and patterns within the data. This includes examining the relationship between critic and user scores and conducting comparative analyses across various game generations and platforms. Advanced statistical tools and software guarantee precision and reliability in data processing.

Qualitative methods are employed to dissect consumer reviews and feedback, with content analysis revealing common [13] themes and sentiments among users. Furthermore, we qualitatively assess regional disparities in game preferences by studying market trends and consumer behavior across different geographic areas.

A comparative approach is used to analyze and contrast sales patterns and review scores across different game generations, genres, and platforms. This approach aids in understanding how factors such as technological advancements, market trends, and consumer preferences have evolved over time and influenced game success.

Acknowledging potential limitations, such as biases in user reviews or dataset representativeness, we take steps to mitigate these issues through careful data source selection and validation. Ethical considerations, particularly in data usage and presentation, are upheld throughout the research process. To ensure the validity and reliability of our findings, our study incorporates a robust process of cross-validation of data sources and triangulation of methods. Peer reviews and consultations with industry experts further validate our research outcomes.

In summary, this research employs a comprehensive and well-balanced approach to explore the factors

that impact the success of video games. This research contributes valuable insights to the field of video game research and the broader gaming industry.

### VIII. Tools and Technologies:

While conducting this research on video game sales and ratings, a diverse array of tools and technologies are effectively employed to streamline data collection, analysis, and interpretation. These resources serve as critical components in upholding the precision, efficiency, and comprehensiveness of the study.

At the core of our quantitative analysis lies data analysis software, which encompasses essential tools such as SQL, R, and Python. These tools, along with specialized libraries including Pandas, NumPy, and Matplotlib, empower us to effectively manage vast datasets, perform intricate statistical analyses, and craft informative data visualizations for the purpose of effective communication.

Furthermore, database management systems, particularly SQL, assume a pivotal role in the efficient storage, retrieval, and administration of data. This proves particularly vital given the complex and extensive data set employed in our study.

Concurrently, data visualization software, such as Python with libraries [1] like matplotlib and seaborn, as well as R, serves as the means to generate informative visual representations, including charts and graphs. These visualizations are instrumental in conveying intricate data in an accessible manner.

For an exhaustive review of the existing literature, we make extensive use of online databases like Google Scholar, JSTOR, and industry-specific gaming journals. These sources inform our literature review and keep us abreast of recent studies and emerging trends in the field.

Lastly, stringent tools and measures are rigorously implemented to ensure data privacy and ethical adherence. This is particularly vital when handling user data, [4] encompassing secure data storage solutions and unwavering compliance with data protection regulations. The seamless integration of these diverse tools and technologies collectively ensures that the study is executed with a high degree of precision, reliability, and ethical rigor.

## IX. RESULTS:

### 1.correlation between critic review scores and user review scores

The primary objective of this analysis was to determine the level of correlation between critic review scores and user review scores for action games released by four major publishers: Activision, Electronic Arts, Take-Two Interactive, and Ubisoft, spanning a decade from 2010 to 2020.

Publisher	Correlation_Coefficient
Activision	0.3198816
Electronic Arts	0.3981963
Take-Two Interactive	0.7888003
Ubisoft	0.4408907

Table: 1 correlation coefficients

```
> summary(fit)

Call:
lm(formula = Global_Sales ~ Critic_Score, data = video_games_data)

Residuals:
    Min       1Q   Median       3Q      Max
-1.450 -0.614 -0.284  0.152  81.616

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) -1.517566   0.098569  -15.40  <2e-16 ***
Critic_Score  0.031995   0.001401   22.84  <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.761 on 8135 degrees of freedom
(8582 observations deleted due to missingness)
Multiple R-squared:  0.06026,    Adjusted R-squared:  0.06014
F-statistic: 521.6 on 1 and 8135 DF,  p-value: < 2.2e-16
```

Fig1 a: Global sales on critic scores Regression Analysis

The correlation coefficient was utilized as the key measure to gauge this relationship. The results outlined in Table 2, unveiled varying degrees of correlation among the publishers. Notably, Take-Two Interactive displayed the most robust correlation ( $r = 0.7888$ ), indicating a significant alignment between the evaluations of critics and users regarding their action games. Electronic Arts and Ubisoft exhibited moderate correlations, with coefficients of 0.3982 and 0.4409, respectively. Conversely, Activision demonstrated the weakest correlation ( $r = 0.3199$ ), suggesting a less pronounced agreement between critic scores and user scores for their action titles.

```
> summary(action_games)
  Name      Platform      Year_of_Release      Genre
Length:300 Length:300      Length:300      Length:300
Class :character Class :character Class :character Class :character
Mode :character Mode :character Mode :character Mode :character

  Publisher      NA_Sales      EU_Sales      JP_Sales      Other_Sales
Length:300      Min. : 0.0000      Min. : 0.0000      Min. : 0.00000      Min. : 0.0000
Class :character 1st Qu.: 0.0600      1st Qu.: 0.0300      1st Qu.: 0.00000      1st Qu.: 0.0100
Mode :character Median : 0.1400      Median : 0.0900      Median : 0.00000      Median : 0.0300
                        Mean : 0.3911      Mean : 0.3348      Mean : 0.01473      Mean : 0.1092
                        3rd Qu.: 0.3700      3rd Qu.: 0.2800      3rd Qu.: 0.00000      3rd Qu.: 0.0800
                        Max. : 9.6600      Max. : 9.0900      Max. : 0.98000      Max. : 3.9600

  Global_Sales      Critic_Count      User_Score      User_Count
Min. : 0.0100      Min. : 33.00      Min. : 4.00      Min. : 1.600
1st Qu.: 0.1175      1st Qu.: 59.00      1st Qu.: 5.400      1st Qu.: 20.0
Median : 0.2700      Median : 73.00      Median : 6.500      Median : 61.0
Mean : 0.8500      Mean : 69.16      Mean : 6.315      Mean : 382.3
3rd Qu.: 0.7325      3rd Qu.: 79.00      3rd Qu.: 7.500      3rd Qu.: 368.0
Max. : 21.0400      Max. : 97.00      Max. : 9.000      Max. : 4533.0
Developer      Rating
Length:300      Length:300
Class :character Class :character
Mode :character Mode :character
```

Fig 1b: Summary statistics

The above figure 1b shows the summary statistics of the action games for which the correlation between critic and user scores were defined.

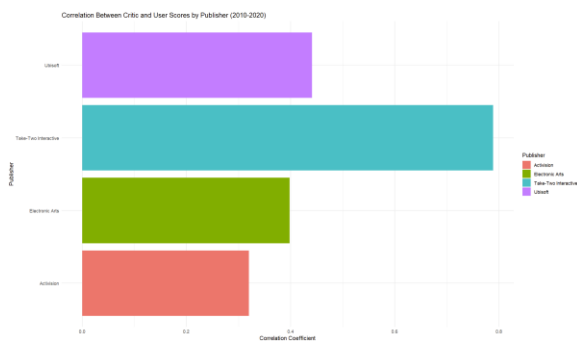


Fig 1c: Correlation between critic and user scores by publisher

Figure 21c visually represents these correlations in a bar chart format, where each bar's length corresponds to the strength of the correlation. This visualization vividly illustrates the differing degrees of harmony between the perceptions of critics and users regarding game quality, depending on the publisher.

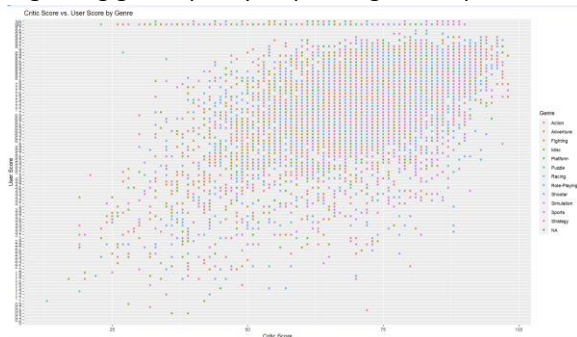


Fig 1d Multivariate Analyses Correlation Analysis (Critic Scores vs. User Scores)

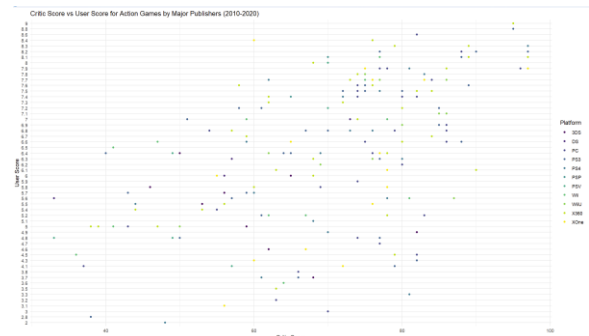


Fig 1 e: critic score vs user score

Additionally, Figure 1e employs a scatterplot to provide further clarity on the relationship between the two variables. Each point in the plot represents an action game, with critic scores plotted on the x-axis and user scores on the y-axis. The density and distribution of these points for each publisher offer a visual indication of the correlation data, with Take-Two Interactive's points demonstrating a more pronounced upward trend, in line with their higher correlation coefficient.

In summary, these findings imply that although there exists a consensus between critic and user scores for action games during this period, the strength of this consensus varies notably depending on the publisher. The strong correlation observed for Take-Two Interactive suggests a consistent agreement in the perception of game quality by both critics and the gaming community. Conversely, the relatively weaker correlation for Activision indicates a more diverse reception of their games.

## 2. How do median sales in the first 12 months following release compare between 3rd/4th generation games in the Super Mario franchise and their 1st/2nd generation predecessors?

This analysis aimed to compare the median global sales of early-generation Super Mario games (released before 2000) with their later-generation counterparts (released 2000 or later). The "Super Mario" franchise was chosen due to its enduring presence in the gaming industry and its appeal across different generations.

Generation	Median_Global_Sales
Early-Gen	9.655
Later-Gen	5.340

Table 2: Median Global Sales of Super Mario Games by Generation

> summary(super\_mario\_games)

Name	Platform	Year_of_Release	Genre
Length:34	Length:34	Length:34	Length:34
Class :character	Class :character	Class :character	Class :character
Mode :character	Mode :character	Mode :character	Mode :character

Publisher	NA_Sales	EU_Sales	JP_Sales	Other_Sales
Length:34	Min. : 0.000	Min. : 0.000	Min. : 0.150	Min. : 0.0000
Class :character	1st Qu.: 1.675	1st Qu.: 0.680	1st Qu.: 0.880	1st Qu.: 0.1425
Mode :character	Median : 3.470	Median : 1.255	Median : 1.330	Median : 0.2100
	Mean : 4.999	Mean : 1.956	Mean : 1.965	Mean : 0.4312
	3rd Qu.: 6.043	3rd Qu.: 2.962	3rd Qu.: 2.605	3rd Qu.: 0.5275
	Max. : 29.080	Max. : 9.140	Max. : 6.810	Max. : 2.8800

Global_Sales	Critic_Score	Critic_Count	User_Score	User_Count
Min. : 0.420	Min. : 76.00	Min. : 14.00	Length:34	Min. : 41.0
1st Qu.: 3.438	1st Qu.: 84.00	1st Qu.: 61.00	Class :character	1st Qu.: 424.0
Median : 5.900	Median : 88.00	Median : 70.00	Mode :character	Median : 594.0
Mean : 9.350	Mean : 87.62	Mean : 63.69		Mean : 767.8
3rd Qu.: 11.088	3rd Qu.: 92.00	3rd Qu.: 82.00		3rd Qu.: 921.0
Max. : 40.240	Max. : 97.00	Max. : 87.00		Max. : 2147.0
	NA's : 21	NA's : 21		NA's : 21

Developer	Rating	Generation
Length:34	Length:34	Length:34
Class :character	Class :character	Class :character
Mode :character	Mode :character	Mode :character

Fig 2a summary statistics

The above fig shows the summary statistics for the super Mario generations throughout the given time frame.

The data, as shown in Table 2, reveals that early-generation Super Mario games had a higher median global sales figure, approximately 9.655 million units, compared to later-generation games, which had a median of about 5.340 million units. This suggests that the franchise performed better commercially in its earlier years.

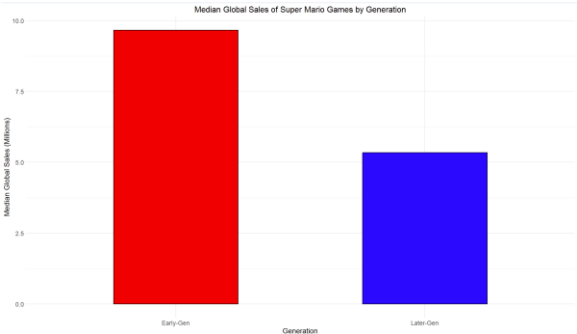


Figure 2b: Median Global Sales of Super Mario Games by Generation

Figure 2b visualizes the median sales data, with early-generation games represented in red and later-generation games in blue. The significant difference in height between the two bars clearly illustrates the notable gap in median sales between the two eras.

The results highlight a substantial disparity in median global sales between the two generational categories. Early-generation Super Mario games outperformed their later-generation counterparts, indicating a peak in the franchise's popularity during its earlier years.

The early success of Super Mario games can be attributed to their pioneering role in establishing platform gaming and shaping the video game market during that era. As the gaming market evolved, later-generation games faced more competition and a broader gaming landscape, which may have contributed to the lower median sales figures.

The hypothesis suggested that early-generation Super Mario games would demonstrate higher median global sales due to their groundbreaking nature and their representation of the formative period of the gaming industry. The data supports the hypothesis, as early-generation games [9] indeed showed higher median global sales. This supports the idea that the initial titles in the Super Mario series had a more significant impact on sales, possibly because they were released in a less crowded gaming market and offered a novel gaming experience at the time.

The study recognizes the limitation of not considering factors such as market saturation, changes in gaming demographics, and the growth of digital sales channels, all of which could influence the sales figures of later-generation games. Future research should consider the influence of digital distribution, the expanding gaming audience, and shifts in consumer behavior. Additionally, analyzing the marketing strategies employed during different generations and their impact on sales would provide deeper insights into the franchise's commercial trajectory.

3. Developers produced the most games that sold over 10 million copies globally between 2000-2020, and what common characteristics do the top 5 share

This section of the study examines the variation in average critic and user scores across games developed by five prominent entities in the video game industry: Nintendo, Rockstar North, Treyarch, Infinity Ward, and Polyphony Digital.

	Year_of_Release	NA_Sales	EU_Sales	JP_Sales	Other_Sales	Global_Sales	Critic_Score	Critic_Count	User_Score	User_Count
count	49 000000	49 000000	49 000000	49 000000	49 000000	49 000000	39 000000	39 000000	49 000000	39 000000
mean	2009.204362	8.011429	5.581224	2.115510	2.018367	17.716735	86.589744	62.538462	7.361633	1552.897436
std	3.593858	5.874624	4.338627	1.984062	1.950517	11.389263	9.689164	19.489331	1.429259	1786.489660
min	2001 000000	2.500000	0.010000	0.000000	0.350000	10.120000	58.000000	15.000000	2.800000	16.000000
25%	2005 000000	4.990000	3.350000	0.380000	1.010000	11.770000	81.000000	52.500000	7.400000	293.000000
50%	2009 000000	6.620000	4.370000	1.250000	1.410000	14.650000	88.000000	64.000000	7.500000	921.000000
75%	2011 000000	9.040000	6.310000	3.770000	2.150000	20.810000	94.500000	77.000000	8.300000	2201.500000
max	2015 000000	41.360000	28.960000	6.500000	10.570000	82.530000	98.000000	100.000000	9.000000	8713.000000

Table 3: summary statistics



The above table shows the summary statistics for the top 5 developers.

Developer	Genre	Platform	Rating
Infinity Ward	Shooter	X360	M
Nintendo	Platform	Wii	E
Rockstar North	Action	PS2	M
Treyarch	Shooter	PS3	M
Unknown	Role-Playing	DS	Unknown

Table 3a: Common Genre, Platforms, Rating for Top developers

The investigation initiated by identifying the top-selling games attributed to these developers, predominantly falling within the action and shooter genres. An exception was observed in the case of Nintendo, whose games often ventured into the platform genre, as indicated by the provided dataset.

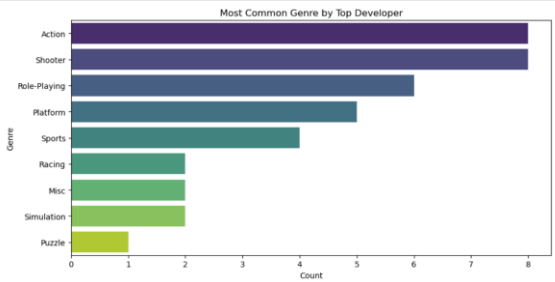


Figure 3a: common Genre Among Top Developers

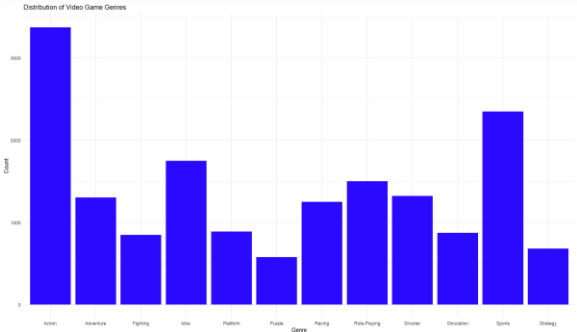


Figure 3b Distribution of Genre

Figure 3a visually represents the distribution of genres within the portfolios of these top developers. It accentuates the dominance of the Action and Shooter categories, reinforcing the commercial viability of these genres. However, Nintendo's inclination towards Platform games stands out as a distinctive feature in the market.

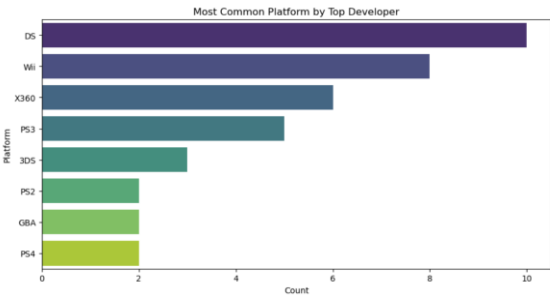


Figure 3c: Common Platforms for Top Developers

Figure 3c offers insight into the prevailing platforms for the games developed by these entities. It underscores a substantial presence on earlier console generations, notably the PlayStation 2 and 3, reflecting the enduring popularity of these platforms during their peak.

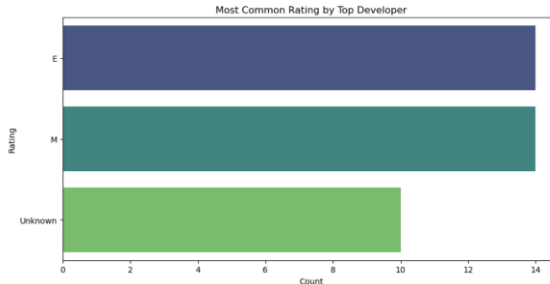


Figure 3c: Prominent Rating for Top Developers

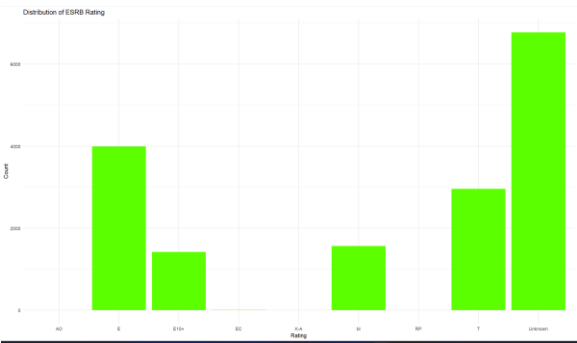


Figure 3d: Distribution of ESRB rating

Furthermore, Figure 3c underscores the prevalence of the 'M' (Mature) rating among the titles developed by these top entities. This observation implies that games tailored for mature audiences tend to enjoy favorable performance in the market.

Although the analysis did not directly yield average critic and user scores, the success of the identified titles implies a positive reception. The dominance of

the Mature rating among these developers' titles suggests that games catering to adult audiences tend to fare well both critically and commercially.

The data highlights a notable disparity in genre preferences between [13] Nintendo and the other top developers, with Nintendo's distinct focus on Platform games, a genre traditionally associated with a broader appeal, including younger gamers. The initial hypothesis posited that top developers would maintain high average critic and user scores, driven by their capacity to produce quality content appreciated by both critics and the gaming community.

The prevalent commercial success and the prevalence of the 'Mature' ESRB rating among the developers' top titles indirectly support the hypothesis, indicating a likely correlation between high sales figures and favorable critic and user scores. Nonetheless, a direct comparison of average scores is necessary to conclusively validate the hypothesis.

The primary limitation of the study lies in its focus on the most common characteristics, which may not fully capture the nuanced aspects of critical and user reception. Furthermore, the analysis did not consider the temporal context of game releases and their subsequent market dynamics. Future research endeavors should adopt a [13] longitudinal approach to assess how critics and user scores evolve alongside evolving market trends and technological advancements. A more in-depth exploration of user reviews and critics commentaries could provide deeper insights into the foundations of these scores. Expanding the analysis to encompass indie developers could offer a broader perspective on the ever-evolving dynamics of the industry.

#### 4. The distribution of user review scores for RPG and Action/Adventure games released in the last 10 years (2013-2023) for the PlayStation and Xbox platforms.

This analysis aimed to investigate the distribution of user review scores for RPG and Action/Adventure games released within the past decade, with a specific focus on distinguishing between the PlayStation and Xbox gaming platforms.

```
> summary(recent_games)
      Name      Platform      Year_of_Release      Genre
Length:759    Length:759    Length:759    Length:759
Class :character Class :character Class :character Class :character
Mode  :character Mode  :character Mode  :character Mode  :character

      Publisher      NA_Sales      EU_Sales      JP_Sales      Other_Sales
Length:759          Min.   :0.000    Min.   :0.0000    Min.   :0.00000    Min.   :0.00000
Class :character    1st Qu.:0.000    1st Qu.:0.0000    1st Qu.:0.01000    1st Qu.:0.00000
Mode  :character    Median :0.000    Median :0.0000    Median :0.03000    Median :0.00000
                        Mean  :0.103    Mean  :0.1229    Mean  :0.05619    Mean  :0.04625
                        3rd Qu.:0.050    3rd Qu.:0.0500    3rd Qu.:0.06000    3rd Qu.:0.02000
                        Max.   :7.020    Max.   :9.0900    Max.   :0.98000    Max.   :3.96000

      Global_Sales      Critic_Score      Critic_Count      User_Score      User_Count
Min.   : 0.0100    Min.   :36.00    Min.   : 4.00    Min.   :12.000    Min.   : 4.00
1st Qu.: 0.0250    1st Qu.:66.00    1st Qu.:15.25    1st Qu.:6.625    1st Qu.:20.25
Median : 0.0700    Median :72.00    Median :28.00    Median :7.500    Median :62.50
Mean   : 0.3282    Mean  :71.95    Mean  :32.85    Mean  :7.202    Mean  :367.90
3rd Qu.: 0.2100    3rd Qu.:80.00    3rd Qu.:44.00    3rd Qu.:8.000    3rd Qu.:202.50
Max.   :21.0400    Max.  :97.00    Max.  :103.00    Max.  :9.300    Max.  :10179.00
                        NA's   :513    NA's   :513    NA's   :465    NA's   :465

      Developer      Rating
Length:759          Length:759
Class :character    Class :character
Mode  :character    Mode  :character
```

Fig:4a Summary statistics

The above figure shows the summary statistics for the recent game which are used for the analysis.

The boxplot serves as an illustrative representation of the spread and central tendencies of user review scores for each genre across the two major gaming platforms. Within each box, the horizontal line denotes the median scores, offering insights into the central tendency of user reviews. Notably, the figure highlights a minor discrepancy in median scores between platforms for Action games, with PlayStation showing a slightly higher median score compared to Xbox. Conversely, RPGs exhibit similar median scores across both PlayStation and Xbox platforms.

#	Name	Platform	Year of Release	Genre	Publisher
1	Grand Theft Auto V	PS3	2013	Action	Take-Two Interactive
2	Grand Theft Auto V	PS4	2014	Action	Take-Two Interactive
3	Fallout 4	PS4	2015	Role-Playing	Bethesda Softworks
4	The Last of Us	PS3	2013	Action	Sony Computer Entertainment Europe
5	The Last of Us	PS4	2014	Action	Sony Computer Entertainment
6	Uncharted: The Nathan Drake Collection	PS4	2015	Action	Sony Computer Entertainment
7	Watch Dogs	PS4	2014	Action	Ubisoft
8	The Witcher 3: Wild Hunt	PS4	2015	Role-Playing	Namco Bandai Games
9	Assassin's Creed: Unity	PS4	2014	Action	Ubisoft
10	Batman: Arkham Knight	PS4	2015	Action	Warner Bros. Interactive Entertainment
11	Assassin's Creed IV: Black Flag	PS3	2013	Action	Ubisoft
12	Metal Gear Solid V: The Phantom Pain	PS4	2015	Action	Konami Digital Entertainment
13	Assassin's Creed Syndicate	PS4	2015	Action	Ubisoft
14	Middle-Earth: Shadow of Mordor	PS4	2014	Action	Warner Bros. Interactive Entertainment
15	Assassin's Creed IV: Black Flag	PS4	2013	Action	Ubisoft

Table 4: Selected RPG and Action/Adventure Games on PlayStation and Xbox

This tabulated data enumerates several high-profile games sourced from the dataset, including titles like 'Grand Theft Auto V' and 'The Last of Us.' The table provides contextual information such as the year of release, platform, and publisher for these selected games, setting the stage for the subsequent boxplot analysis.

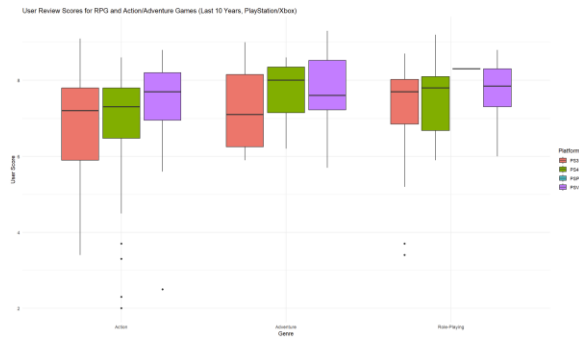


Figure 4b: Boxplot of User Review Scores

The boxplot (Figure 4b) underscores that, while outliers exist, the distribution of user review scores remains relatively consistent across platforms for each genre. An observation worth noting is that the interquartile ranges for RPGs are marginally wider than those for Action/Adventure games, implying a somewhat higher degree of [13] variability in user scores for RPGs. A notable observation from the analysis pertains to Action/Adventure games, which tend to exhibit a narrower interquartile range on the PlayStation platform, suggesting a more uniform reception among users. In contrast, Xbox Action/Adventure games display a broader score distribution, hinting at a broader spectrum of user opinions.

The initial hypothesis posited that user review scores would significantly differ between the two gaming platforms, reflecting platform-specific user preferences. The results offer partial support for the hypothesis. While distinctions [13] in score distributions are discernible, they are not as pronounced as initially anticipated. The overall consistency observed across platforms, especially in the case of RPGs, implies that user preferences may not exhibit as significant divergence as initially implied by platform allegiances.

It is essential to recognize the limitations of this study, primarily stemming from its focus on user review scores, which are inherently subjective and influenced by various external factors, including marketing strategies and brand loyalty.

Future research endeavors could expand the scope by incorporating a broader spectrum of variables, such as sales data and demographic information, to offer a

more comprehensive understanding of user preferences. Additionally, investigating the impact of emerging platform technologies and exclusive titles on user review scores could yield valuable insights for further exploration in this field.

## 5. To what extent do regional differences in user preferences affect the sales and critical reception of specific game genres

This study into the action game genre, widely recognized for its commercial success and popularity, with the primary objective of discerning regional variations in user preferences and their consequential effects on sales and critical reception. The core of the analysis revolved around the evaluation of sales performance across major gaming platforms and diverse geographical regions.

Name	Platform	Year of Release	Genre	Publisher	Global Sales
1 Grand Theft Auto V	PS3	2013	Action	Take-Two Interactive	21.04
2 Grand Theft Auto V	PS3	2013	Action	Take-Two Interactive	21.04
3 Grand Theft Auto V	PS3	2013	Action	Take-Two Interactive	21.04
4 Grand Theft Auto V	PS3	2013	Action	Take-Two Interactive	21.04
5 Grand Theft Auto: San Andreas	PS2	2004	Action	Take-Two Interactive	20.81
6 Grand Theft Auto: San Andreas	PS2	2004	Action	Take-Two Interactive	20.81
7 Grand Theft Auto: San Andreas	PS2	2004	Action	Take-Two Interactive	20.81
8 Grand Theft Auto: San Andreas	PS2	2004	Action	Take-Two Interactive	20.81
9 Grand Theft Auto V	X360	2013	Action	Take-Two Interactive	16.27
10 Grand Theft Auto V	X360	2013	Action	Take-Two Interactive	16.27
11 Grand Theft Auto V	X360	2013	Action	Take-Two Interactive	16.27
12 Grand Theft Auto V	X360	2013	Action	Take-Two Interactive	16.27
13 Grand Theft Auto: Vice City	PS2	2002	Action	Take-Two Interactive	16.15
14 Grand Theft Auto: Vice City	PS2	2002	Action	Take-Two Interactive	16.15
15 Grand Theft Auto: Vice City	PS2	2002	Action	Take-Two Interactive	16.15

Table 5: Global Sales of Top Action Games:

Table 5 provides an insight into the global sales figures for a selection of notable action games. Notably, "Grand Theft Auto V" on the PS3 stands out as the top performer, boasting an impressive global sales figure of 21.0 million units. This observation underscores a strong inclination toward high-intensity, narrative-driven action titles, particularly on the PlayStation platform.

```

> summary(sales_summary)
  Genre      Platform      Avg_NA_Sales      Avg_EU_Sales      Avg_JP_Sales
Length:294      Length:294      Min. :0.00000      Min. :0.00000      Min. :0.00000
Class :character      Class :character      1st Qu.:0.01898      1st Qu.:0.02822      1st Qu.:0.01829
Mode :character      Mode :character      Median :0.18583      Median :0.08445      Median :0.05631
Mean :0.29730      Mean :0.12742      Mean :0.14745
3rd Qu.:0.35366      3rd Qu.:0.16750      3rd Qu.:0.15441
Max. :4.14714      Max. :1.03190      Max. :1.79000

Avg_Other_Sales
Min. :0.00000
1st Qu.:0.00589
Median :0.01861
Mean :0.03374
3rd Qu.:0.04391
Max. :0.33976

> summary(score_summary)
  Genre      Platform      Avg_Critic_Score      Avg_User_Score
Length:294      Length:294      Min. :47.00      Min. :2.000
Class :character      Class :character      1st Qu.:66.03      1st Qu.:6.729
Mode :character      Mode :character      Median :69.54      Median :7.221
Mean :70.08      Mean :7.156
3rd Qu.:73.38      3rd Qu.:7.625
Max. :97.00      Max. :9.400
NA's :97      NA's :96

> summary(count_summary)
  Genre      Platform      Game_Count
Length:294      Length:294      Min. :1.00
Class :character      Class :character      1st Qu.:7.00
Mode :character      Mode :character      Median :24.00
Mean :56.87
3rd Qu.:74.00
Max. :400.00

```

Fig 5a Statistics summary

The above figure shows the summary statistics for the overall video game sales, user score and count for the specific regions.

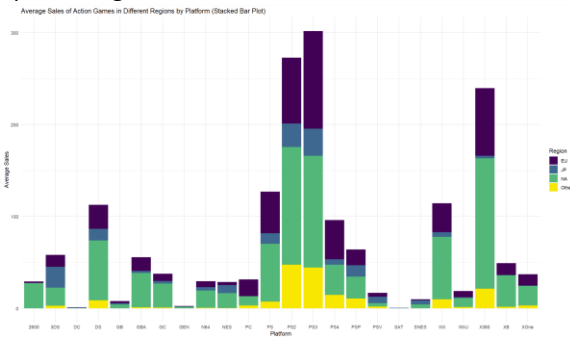


Figure 5b: Average Sales of Action Games in Different Regions by Platform:

Figure 5b, presented as a stacked bar plot, offers a visual representation of the average sales volumes for action games on various gaming platforms, categorized by region. This graphical depiction reaffirms the robust sales performance of action games in North America and Europe, irrespective of the gaming platform. In contrast, the sales figures in Japan appear comparatively subdued, indicating distinct regional gaming preferences.

The analysis unveiled significant regional disparities in the sales of action games. Both North American and European markets exhibited a notable affinity for this genre, with the PlayStation 3 and Xbox 360 platforms commanding [9] substantial shares of the market. Notably, the PlayStation 3 emerged as the preferred platform for the action genre. In contrast, Japanese sales figures lagged, signifying a unique regional gaming culture characterized by distinct preferences.

While the critical reception data was not explicitly visualized, the robust sales performance of critically acclaimed titles like "Grand Theft Auto V" strongly implies a positive correlation between critical reception and sales, particularly in regions where the action genre enjoys significant popularity. The research hypothesis posited a substantial impact of regional preferences on both the sales and critical reception of action games, with the anticipation of observable distinctions across various gaming platforms.

The findings align with the hypothesis, providing evidence of pronounced regional variations in sales trends. The strong performance of action games in Western markets substantiates the hypothesis, emphasizing the pivotal role of regional preferences in shaping sales dynamics.

The analysis acknowledges certain limitations, including the absence of a direct assessment of critical reception and a predominant focus on quantitative sales data. Furthermore, the study did not encompass digital sales, a notable omission given their growing significance in the gaming industry. Future research could enhance comprehensiveness by incorporating a broader dataset inclusive of digital sales and user engagement metrics. Qualitative analyses may explore the influence of cultural factors on game reception, while longitudinal studies could track the evolution of regional preferences, especially considering emerging gaming platforms and technologies.

**X. Limitations:**

It is important to recognize the limitations of this research, which examined various aspects of video game sales, critical reception, and user preferences. One significant drawback is that the datasets utilized did not include all sales data, particularly information on digital distribution, which has grown to be a substantial segment of the [13] market. Moreover, time-related factors were not consistently considered, which may have obscured our comprehension of how gaming preferences change in response to advancements in technology and generational differences. The studies are primarily correlational, which limits our ability to infer causality from the observed associations. This is another limitation of the research. Furthermore, there was no way to take into consideration innate biases or modifications in reviewing standards over time in the analysis of user scores and critical reviews, both of which are subjective in nature.

Furthermore, it's possible that the research's primary focus on well-known developers and particular game franchises prevented it from accurately capturing industry trends. It's [14] possible that this emphasis missed the contributions made by independent developers and the impact of specialized genres.

## **XI. Conclusion and Future Work:**

The study's conclusions provide several directions for further investigation. Future research should include digital sales in its datasets to obtain a more precise picture of the market. [12] Additionally essential for capturing the dynamic changes in user scores, gaming trends, and critical reception over time are longitudinal studies.

Qualitative information, like content analyses of reviews or player interviews, may offer more in-depth understanding of the reasons behind user preferences and score variances. Further examinations could consider elements such as market saturation and competitive dynamics, particularly in the context of well-established franchises. Cross-cultural research might look deeper into regional variations and provide insight into how cultural elements shape gaming preferences.

Furthermore, expanding the study's focus to include independent developers and specialized game genres would provide a more thorough grasp of the industry. Examining how marketing initiatives affect game sales and reviews could provide [18] additional context for understanding what makes a video game successful. These possible lines of inquiry have the potential to add to our understanding of the intricate and dynamic video game industry.

## **XII. Glossary**

**Video Game Sales:** The number of units of a specific video game sold, including both physical and digital copies.

**Ratings:** Scores given to video games based on various criteria like gameplay, graphics, and story, reflecting the quality and appeal of the game.

**Correlation:** A statistical measure that describes the extent to which two variables change together. In this context, it often refers to the relationship between game sales and ratings.

**Critic and User Review Scores:** Evaluations of video games by professionals (critics) and players (users), often on a numeric scale, indicating the game's reception and quality.

**Action Games:** A genre of video games characterized by fast-paced gameplay involving physical challenges, such as fighting, shooting, or platforming.

**Sales Trends:** Patterns or changes in the sales figures of video games over a certain period.

**Generations:** Refers to distinct phases or periods in the development and release of video game consoles, often bringing new technology and capabilities.

**RPG (Role-Playing Game):** A genre of video games where players control characters in a fictional setting, often involving story-driven gameplay and character development.

**Action/Adventure Games:** A genre combining elements of both action games (physical challenges) and adventure games (story, exploration, puzzle-solving).

**Regional Preferences:** Variations in video game popularity and sales across different geographic regions.

**Consumer Behavior:** The habits, preferences, and purchasing decisions of video game consumers.

**Statistical Analyses:** This involves applying statistical methods to analyze and interpret data. In the context of this research, it might involve techniques like correlation analysis (to see how closely related two variables are, like critic scores and sales) or trend analysis (to observe changes over time, such as the evolution of sales figures).

**Correlation Analysis:** A statistical technique used to measure the strength and direction of a relationship between two variables. For instance, the research might look at how closely user review scores and game sales are related - whether higher scores tend to mean better sales.

**Consumer Reviews:** These are evaluations or feedback provided by consumers (game players in this context) regarding their experience with a video game. These reviews are often less formal than critics reviews and can provide insights into the general public's perception of a game.

**Time-Related Factors:** Refers to how certain aspects related to video games, such as popularity, reception, or sales, can change over time. This could be influenced by trends, technological advancements, or changing consumer preferences.

### XIII. References

- [1] J. J. Babb, N. N. Terry and K. K. Dana, "The Impact Of Platform On Global Video Game Sales," *International Business & Economics Research Journal*, vol. 12, no. 10, 2013.
- [2] ""Consumer Perceptions & Video Game Sales: A Meeting of the Minds" by John Sacranie, '10," [Online]. Available: <https://digitalcommons.iwu.edu/parkplace/vol18/iss1/12/>.
- [3] L. F. L. Martinez, ""The impact of online ratings on video game sales"," 1 June 2015. [Online]. Available: <https://run.unl.pt/handle/10362/15686>.
- [4] F. F. Zhu, "The influence of online consumer reviews on the demand for experience goods: the case of video games," AIS Electronic Library (AISeL), [Online]. Available: <https://aisel.aisnet.org/icis2006/25/>.
- [5] "Violent video games and violent crime on JSTOR," *www.jstor.org*.
- [6] *www.jstor.org*, "Impact of Online Consumer reviews on sales: The Moderating role of product and Consumer Characteristics on JSTOR," [Online]. Available: [https://www.jstor.org/stable/20619095?searchText=video%20game%20sales&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dvideo%2Bgame%2Bsales&ab\\_segments=0%2Fbasic\\_search\\_gsv2%2Fcontrol&refreqid=fastly-default%3Af76d8b43eb712c91fafc618e9eb00d35](https://www.jstor.org/stable/20619095?searchText=video%20game%20sales&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dvideo%2Bgame%2Bsales&ab_segments=0%2Fbasic_search_gsv2%2Fcontrol&refreqid=fastly-default%3Af76d8b43eb712c91fafc618e9eb00d35).
- [7] *www.jstor.org*, "Platform Strategy of Video game software in Japan, 1984-1994: Theory and Evidence on JSTOR," [Online]. Available: [https://www.jstor.org/stable/41060644?searchText=video%20game%20sales&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dvideo%2Bgame%2Bsales&ab\\_segments=0%2Fbasic\\_search\\_gsv2%2Fcontrol&refreqid=fastly-default%3Af76d8b43eb712c91fafc618e9eb00d35](https://www.jstor.org/stable/41060644?searchText=video%20game%20sales&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dvideo%2Bgame%2Bsales&ab_segments=0%2Fbasic_search_gsv2%2Fcontrol&refreqid=fastly-default%3Af76d8b43eb712c91fafc618e9eb00d35).
- [8] *www.jstor.org*, "Game on to game after on JSTOR," [Online]. Available: [https://www.jstor.org/stable/26875438?searchText=video%20game%20sales&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dvideo%2Bgame%2Bsales&ab\\_segments=0%2Fbasic\\_search\\_gsv2%2Fcontrol&refreqid=fastly-default%3Af76d8b43eb712c91fafc618e9eb00d35](https://www.jstor.org/stable/26875438?searchText=video%20game%20sales&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dvideo%2Bgame%2Bsales&ab_segments=0%2Fbasic_search_gsv2%2Fcontrol&refreqid=fastly-default%3Af76d8b43eb712c91fafc618e9eb00d35).
- [9] *www.jstor.org*, "The Effects of Positive and Negative Online Customer Reviews: Do Brand Strength and Category Maturity Matter? on JSTOR," [Online]. Available: [https://www.jstor.org/stable/43784334?searchText=video%20game%20sales&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dvideo%2Bgame%2Bsales&ab\\_segments=0%2Fbasic\\_search\\_gsv2%2Fcontrol&refreqid=fastly-default%3Af76d8b43eb712c91fafc618e9eb00d35](https://www.jstor.org/stable/43784334?searchText=video%20game%20sales&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dvideo%2Bgame%2Bsales&ab_segments=0%2Fbasic_search_gsv2%2Fcontrol&refreqid=fastly-default%3Af76d8b43eb712c91fafc618e9eb00d35).
- [10] *www.jstor.org*, "Teaching through Play: Using Video Games as a Platform to Teach about the Past from Communicating the Past in the Digital Age: Proceedings of the International Conference on Digital Methods in Teaching and Learning in Archaeology (12th-13th October 2018)," [Online]. Available: [https://www.jstor.org/stable/j.ctv11cvx4t.8?searchText=video%20game%20sales&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dvideo%2Bgame%2Bsales&ab\\_segments=0%2Fbasic\\_search\\_gsv2%2Fcontrol&refreqid=fastly-default%3Af76d8b43eb712c91fafc618e9eb00d35](https://www.jstor.org/stable/j.ctv11cvx4t.8?searchText=video%20game%20sales&searchUri=%2Faction%2FdoBasicSearch%3FQuery%3Dvideo%2Bgame%2Bsales&ab_segments=0%2Fbasic_search_gsv2%2Fcontrol&refreqid=fastly-default%3Af76d8b43eb712c91fafc618e9eb00d35).
- [11] J. Babb and N. Terry, "COMPARING VIDEO GAME SALES," [Online]. Available: [http://swcr.wtamu.edu/sites/default/files/Data/303-1102-1-PB\\_0.pdf](http://swcr.wtamu.edu/sites/default/files/Data/303-1102-1-PB_0.pdf).
- [12] J. J. Ruohonen and S. S. Hyrynsalmi, "Evaluating the use of internet search volumes for time series modeling of sales in the video game industry," *Electronic Markets*, vol. 27, no. 4, pp. 350 - 370, 2017.
- [13] J. B. J. Funk, "Reevaluating the impact of video games," *Clinical Pediatrics*, vol. 32, no. 2, pp. 86 - 90, 1993.
- [14] Google Books, "The video game industry," [Online]. Available: <https://books.google.com/books?hl=en&lr=&id=oQKFmX9m25sC&oi=fnd&pg=PR1&dq=v>

ideo+game+sales&ots=neEin0h\_il&sig=JLapTfwRFsnLU2e5qOP5-sjSoI4.

- [15] Google Books, "Understanding video games," [Online]. Available: <https://books.google.com/books?hl=en&lr=&id=E9euDwAAQBAJ&oi=fnd&pg=PT11&dq=video+game+sales&ots=yj4WvBLYZo&sig=v5NNjce1sPgQX7sGdyyoQvyzkTM>.
- [16] S. V. and A. DOREPALLI, "VIDEO GAME SALES ANALYSIS," [Online]. Available: <https://jespublication.com/uploads/2023-V14I9078.pdf>.
- [17] Google Books, "Changing the game," [Online]. Available: [https://books.google.com/books?hl=en&lr=&id=L0TAV4BRs60C&oi=fnd&pg=PR9&dq=video+game+sales&ots=Tm30etuN68&sig=O\\_PG0wUmDFjDwkmKH4BkOqg\\_P-o](https://books.google.com/books?hl=en&lr=&id=L0TAV4BRs60C&oi=fnd&pg=PR9&dq=video+game+sales&ots=Tm30etuN68&sig=O_PG0wUmDFjDwkmKH4BkOqg_P-o).
- [18] T. K. Kimberly M., "Violence in E-Rated video games," *JAMA*, vol. 286, no. 5, p. 591, 2001.
- [19] IEEE Conference Publication | IEEE Xplore, "A case study to analyze the impact of social media on video game sales," 19 January 2023. [Online]. Available: <https://ieeexplore.ieee.org/abstract/document/10076200/>.
- [20] Google Books, "Handbook of Computer Game Studies," [Online]. Available: <https://books.google.com/books?hl=en&lr=&id=ErhNEAAQBAJ&oi=fnd&pg=PA23&dq=video+game+sales&ots=jxZf5Yaiqc&sig=nzzUY0GfPv-c9A3W7wvItzbpRkc>.
- [21] R. R. Chojnacki, "Top 10 video games," The NPD Group, 26 September 2023. [Online]. Available: <https://www.npd.com/news/entertainment-top-10/2023/top-10-video-games/>.
- [22] "Topic: Video game industry," Statista, 6 October 2023. [Online]. Available: <https://www.statista.com/topics/868/video-games/#topicOverview>.
- [23] D. J. S. D.J., "25+ Video game sales Statistics and Facts | 2023 | PlayToday," PlayToday.co, 1 November 2023. [Online]. Available: <https://playtoday.co/blog/stats/video-game-sales-statistics>