


Performance analysis of the Croatian video game industry: Expansion amidst the COVID–19 pandemic

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SUMMARY

The Croatian video game industry demonstrated substantial growth amid the challenges posed by the COVID–19 pandemic. A descriptive statistics approach was utilized, encompassing all enterprises in the Croatian video game industry. Statistical tests for proportions significance were then applied to assess player satisfaction on the Steam platform with video games developed and/or published by the Croatian video game industry. The analysis indicated a concentration of the industry in Zagreb, accounting for 50% of enterprises and 77.4% of employees in 2022. Over the period from 2018 to 2022, total net profit surged from €4.95 million to €12.37 million. However, the average net profit per enterprise experienced a modest increase from €0.12 million to €0.15 million during the same period. Notably, 21% of enterprises maintained the highest AAA rating. County–level comparisons revealed insights into net profit, total revenue, and expenses. On Steam platform, players recommended remarkable 89% of video games developed or published by the Croatian industry.

KEYWORDS

business performances, COVID–19, Croatia, video game industry

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1. Introduction

The economic impact of the video game industry has garnered increasing attention as digital entertainment becomes a significant contributor to global economies (Marchand and Hennig–Thurau, 2013). Numerous scholarly studies emphasize the substantial economic contributions of the video game sector, examining its role in job creation, revenue generation, and technological innovation (Rykała, 2020; Perišić and Pahor, 2020; Bai et al., 2022; Goh et al., 2023). According to Statista (2024b), the global video game industry is projected to reach a revenue of 282.30 billion US dollars in 2024. More than 50% of this revenue is expected to be generated by China (94.49 billion US dollars), while the Croatian video game industry is estimated to generate a revenue of 96.15 million US dollars in the same year (Statista, 2024a,b). The forecasted annual growth rate of the global video game industry is 8.76%, while the revenue of the Croatian video game industry is expected to rise by an annual growth rate of 5.53% (Statista, 2024a,b).

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The COVID-19 pandemic officially began in Croatia with the revelation of the first infected person at the end of February 2020 and concluded two years later (Mataković, 2022). Throughout the pandemic, the video game industry faced both challenges and opportunities, including increased demand for gaming, impacts on game development, digital distribution and online gaming, e-sports and streaming and economic resilience. Due to lockdowns and social distancing measures, individuals were compelled to spend more time at home, leading to a surge in home entertainment, including video games. Consequently, this resulted in increased sales of gaming consoles, online gaming subscriptions, and a higher demand for video game content (Ortiz et al., 2020; Şener, et al., 2021; Chen, 2022). Simultaneously, game development studios, facing the challenges of COVID-19 lockdowns and distance measures, had to adapt to remote work for game developers. While some studios managed this situation effectively, others encountered difficulties, resulting in delays in game releases (Park, et al., 2022).

During the COVID-19 lockdown period, the use of digital distribution platforms saw a notable increase (Jarszak, 2021; Lopez-Orosco et al., 2023). Multiplayer games, in particular, experienced a surge in popularity (Barr and Copeland-Stewart, 2022). With many traditional sports events cancelled or postponed, the e-sports scene filled the void (Fakazli, 2020). Streaming platforms also experienced significant gains in the number of viewers seeking interactive content (Piñeiro-Chousa, et al., 2023). Despite these challenges, in contrast to some other sectors, the video game industry successfully adapted to the new situation and even enhanced its stability and financial results (Požani and Mansaku, 2022).

The aim of this paper is to investigate whether the Croatian video game industry improved its performance during the crisis period of the COVID-19 pandemic and in the post-COVID period. To achieve this, the main business results of the Croatian video game industry are examined not only during the COVID-19 pandemic period but also in the years 2018 to 2019. This broader time frame provides a better understanding of how the Croatian video games industry responded to the challenges posed by COVID-19. The study encompasses an observation of the Croatian video games industry at both the national and county levels, with an in-depth analysis conducted on the county level.

An additional research question is addressed, focusing on determining the perception and position of video games developed and/or published by the Croatian video game industry among players worldwide. Consequently, three research hypotheses have been formulated. The first hypothesis posits that the Croatian video game industry achieved a higher average net income in the post-COVID-19 era in 2022 compared to the pre-COVID-19 era in 2018 and 2019. The second hypothesis suggests that the Croatian video game industry is concentrated in the City of Zagreb, exhibiting the highest number of enterprises, employees, and the highest average net income. The third hypothesis proposes that more than 50% of video game players, in their reviews, recommend video games developed and/or published by the Croatian video game industry.

The paper commences with an introduction (Section 1) that sets the context for the study and foundation for the subsequent sections. Within this section, a literature review relevant to the topic is included. Section 2 is dedicated to introducing the data utilized in the study, accompanied by an explanation of the methodology employed in the research. In Section 3 statistical analyses are conducted, and commentary on the obtained results is provided. The discussion includes an interpretation of findings within the context of the research objectives (Section 4). The final section serves as the conclusion of the paper (Section 5).

2. Data and methods

The list of Croatian enterprises directly associated with the video game industry is extracted from the producer registry, managed by the Croatian Audiovisual Centre (CAC, 2023). According to the Regulation on the producer register (OG, 2022) this registry includes fundamental information about all natural and legal persons registered for the production of audiovisual works, based in the Republic of Croatia or involved in activities within the Republic of Croatia. The producer registry comprises two parts, with one specifically dedicated to video game producers. A video game producer is defined as a natural person entrepreneur or a legal entity initiating the video game production process, including creation, promotion, placement, and exploitation, and comprehensively overseeing it (OG, 2022). Video game producers are required to update their status within 15 days of any change occurrence (OG, 2022). Consequently, the producer's registry should be accurate and kept up-to-date.

There were 176 video game producers listed in the producer's registry on December 14, 2023. Unfortunately, records for six video game producers were not found in the commercial court register, where all entrepreneurs and enterprises should be registered. Among the remaining records, there were 86 natural person entrepreneurs, which will be omitted from further analysis. These entities are not obligated to make their business results publicly available, unlike capital enterprises that are required to submit financial reports annually. However, four capital enterprises commenced operations in 2023 and will be excluded since they did not conduct business during the COVID-19 pandemic period. Consequently, the paper will observe and analyze 80 enterprises. One enterprise closed its business in 2023. Although this enterprise was partially active during the observed period, it will be included in the analyses. However, actual data about the enterprise will not be available. The complete set of observed enterprises is not listed in the paper due to limitation reason, but it's available upon request from the author.

The producer registry provides only basic information, including title, personal identification number, contact person, or contact email of video game producers. To gather additional details about these producers, information will be extracted from other databases, such as the Digital Chamber of Commerce (DCC, 2023) and RGFI Public Posting (FINA, 2023). The comprehensive list of variables to be observed and analyzed is presented in Table 1.

Table 1. List of observed variables

Variable	Description	Observed period
Origin	Origin of capital	2022
County	County of business headquarters	2022
Employees	Number of employees	2022
Form	Legal form	2022
Profit	Net profit or loss for the business year, euros	2018 – 2022
Rating	Croatian Chamber of Economy levels rating	2022
Size	Size of the company	2022
Expense	Total expenses, euros	2018 – 2022
Revenue	Total revenues, euros	2018 – 2022

Note: financial variables (net profit, total expenses and total revenues) are retrieved from FINA source, while rest of the variables are retrieved from Center for Digital Development of Croatian Economy Chamber

The analysis will proceed through the following steps. Initially, the structure of enterprises will be examined from various perspectives. Subsequently, the business results of enterprises will be scrutinized over the period from 2018 to 2022. The COVID-19 pandemic began in Croatia in early 2020 and officially concluded in 2022. This structure allows for a meaningful comparison of data from 2018 and 2019 with the events during the COVID-19 pandemic in 2020 and 2021. Unfortunately, there is no available data on the business results of enterprises in 2023 at the time of writing this paper. This absence limits insights into the post-COVID-19 pandemic scenario for the Croatian video game industry. The analysis will delve into the development of the Croatian video game industry at both the country and county levels.

Steam is the largest digital video gaming platform for personal computers and global distributors, boasting over 400 million sold video games and reporting 33 million peak concurrent Steam users worldwide in 2023 (Clement, 2024). Consequently, it is justified to examine video game players' comments and attitudes towards video games developed and/or published by the Croatian video game industry on Steam. Players on Steam have the option to leave a review for the video games they have purchased and played, although writing a review is not mandatory. It is assumed that those who do write reviews represent the broader sentiments of all players who have engaged with the reviewed game. In other words, players who have not written a review are assumed to share similar opinions and attitudes towards the video game as those who have submitted a review.

3. Analysis and discussion

The number of enterprises in the Croatian video game industry from 2018 to 2022 is illustrated in Figure 1. According to the Croatian Audiovisual Centre (CAC, 2023), the first enterprise in the video game industry appeared in 2002. By the end of 2019, before the onset of the COVID-19 pandemic in Croatia, there were a total of 43 enterprises in the Croatian video game industry.

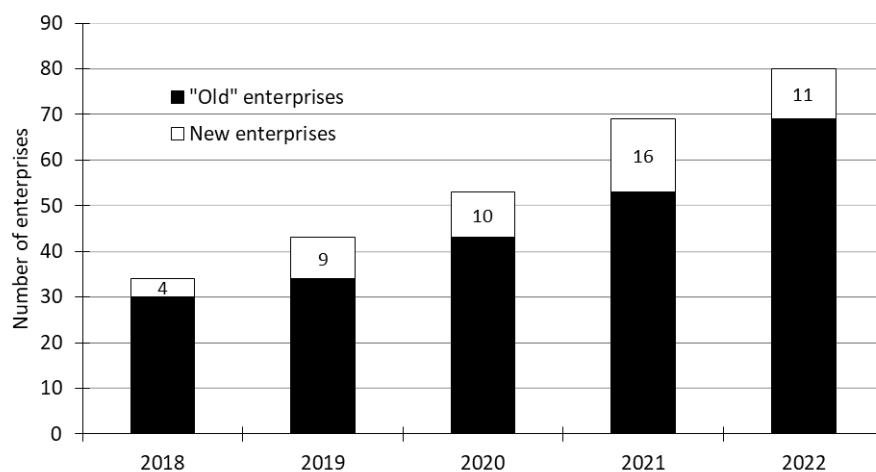


Figure 1. Number of Croatian video game industry enterprises, 2018–2022

Throughout the COVID-19 pandemic, spanning from 2020 to 2022, the number of enterprises in the Croatian video game industry surged by 37, marking an 86% increase. Consequently, by the end of 2022, there were a total of 80 enterprises in Croatia directly associated with the video game industry. Of this total, 57 enterprises (71.25%) adopted the legal form of limited liability enterprises, while the remaining 23 enterprises (28.75%) operated as simplified limited liability enterprises.

Table 2. Structure of Croatian video game industry enterprises and employees by county, 2022

County	Number of enterprises	Share of enterprises	Number of employees	Share of employees	Average number of employees
Istra	2	2.50%	4	0.80%	2.00
Krapina-Zagorje	1	1.25%	0	0.00%	0.00
Osijek-Baranja	8	10.00%	44	8.80%	5.50
Primorje-Gorski Kotar	3	3.75%	2	0.40%	0.67
Sisak-Moslavina	19	23.75%	32	6.40%	1.68
City of Zagreb	40	50.00%	387	77.40%	9.68
Varaždin	2	2.50%	5	1.00%	2.50
Zagreb	5	6.25%	26	5.20%	5.20
Total	80	100.00%	500	100.00%	6.25

According to Table 2 half of the enterprises in the Croatian video game industry have their headquarters located in the City of Zagreb. Approximately a quarter of the Croatian video game industry (23.75%) is situated in Sisak-Moslavina county. This is a direct result of the initiation of the PISMO Business Incubator project in Novska within the Sisak-Moslavina county in 2016, with a primary focus on educating new video game developers and supporting video game start-up companies (Inkubator, 2021). It is noteworthy that enterprises in the Croatian video game industry are not distributed across all Croatian counties but are concentrated in only seven of them, in addition to the City of Zagreb.

Out of all employees 387 (77.40%) are working in enterprises located in the City of Zagreb in 2022. Enterprises in Osijek-Baranja county employ 44 individuals (8.80%) in the video game industry. Consequently, these two regions have the highest average number of employees. Enterprises located in the City of Zagreb had an average of 9.68 employees in 2022, while those in Osijek-Baranja county had an average of 5.50 employees. Upon observing the average number of employees across all counties, it can be concluded that the Croatian video game industry maintains a relatively small workforce per enterprise.

Table 3. Distribution of Croatian video game industry enterprises by size and capital origin

Sizes of enterprises	Capital origin			Total
	Domestic with 100% share of domestic capital	Foreign with 100% share of foreign capital	Mixed – predominantly foreign capital	
Medium	0	0	1	1
Small	6	4	0	10
Micro	68	0	0	68
Total	74	4	1	79

Note: one enterprise that closed its business in 2023 was omitted

The results from [Table 3](#) reveal that enterprises in the Croatian video game industry are generally small in size. Specifically, 86% of these enterprises fall into the category of micro-enterprises, with an additional 13% classified as small enterprises. The only medium-sized enterprise identified has a mixed capital origin, predominantly influenced by foreign capital. A significant majority of enterprises, 94%, have a 100% share of domestic capital, while 5% are under 100% foreign ownership.

The business results of enterprises in the Croatian video game industry will be examined, with a focus on total revenue, total expenses, and net profit indicators from 2018 to 2022. This approach allows for a direct comparison of business results before the onset of the COVID-19 pandemic (in 2018 and 2019) with those at the end of the pandemic in Croatia (in 2022).

The total revenue of enterprises in the Croatian video game industry was 30.85 million euros, whereas the total expenses were 24.91 million euros in 2018. Consequently, the net income of the Croatian video game industry was 4.95 million euros in 2018. In 2019, total expenses rose faster than total revenues, leading to a net income of 2.95 million euros, which was 40% lower than the previous year. In 2020, the total revenue was 106%, and total expenses were 89% higher than in 2019. The net income in 2020 was 12.64 million euros, which is 329% more than in 2019. The total revenues and total expenses in 2021 and 2022 are almost at the same level but lower than in 2020. Despite the decrease in total revenues and total expenses, the net income of the Croatian video game industry remained above 10 million euros in both years, with 11.39 million euros in 2021 and 12.37 million euros in 2022.

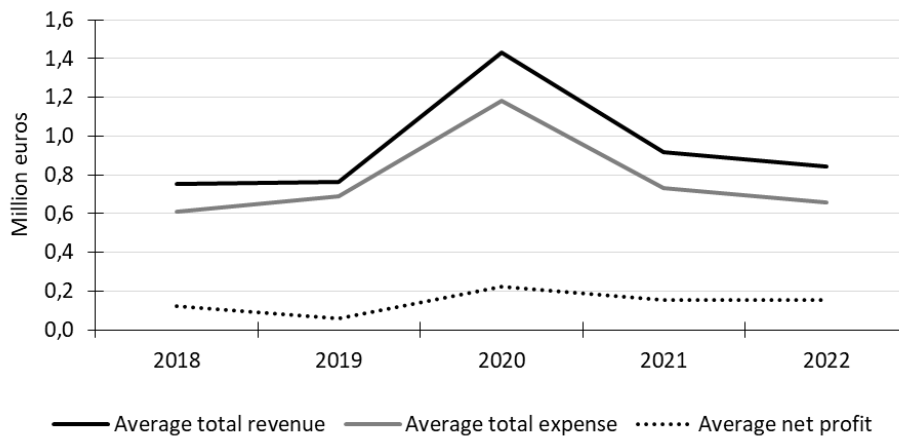


Figure 2. Average financial metrics of Croatian video game industry enterprises, 2018–2022

[Figure 2](#) displays an average revenue, expense, and net profit, taking into account the number of enterprises in the Croatian video game industry from 2018 to 2022. A noticeable spike in all three observed variables is evident in 2020. In 2020, the average total revenue per enterprise surged to 1.43 million euros, an 87% increase compared to 2019. Similarly, the average total expense rose to 1.18 million euros, reflecting a 72% increase compared to 2019. The average net profit of enterprises in the Croatian video game industry was 0.23 million euros in 2020, marking a substantial 290% growth from 2019. Post-2020, both the average total revenue and average total expense of enterprises in the Croatian video game industry began to decrease, nearly returning to pre-2020 levels. Despite this, the average net profit of enterprises did not experience a drastic decline, standing at 0.16 million euros in 2021

and 0.15 million euros in 2022. Consequently, the first research hypothesis, that the Croatian video game industry achieved a higher average net income in the post-COVID-19 era in 2022 compared to the pre-COVID-19 era in 2018 and 2019, can be accepted.

The rating process, conducted by Croatian Economy Chamber, evaluates businesses based on scores representing a quantitative assessment of their anticipated performance in meeting obligations over the next 12 months. A higher score indicates a lower probability of the enterprise encountering issues related to business risks and insolvency. Enterprises are categorized based on their scores (CEC, 2021). According to the rating, 20.51% of enterprises fall into the highest rating category (AAA), implying that approximately one-fifth of Croatian video game industry enterprises are unlikely to face significant business problems in the coming 12 months. In the combined rating categories of AAA, AA, and A, 52.56% of enterprises in the Croatian video game industry are positioned. Therefore, more than 50% of these enterprises are expected to have a high-quality business with low levels of risk regarding business survival in the next 12 months. Conversely, 11.54% of enterprises in the Croatian video game industry are in the rating categories CCC and CC, indicating a higher likelihood of encountering challenges in their regular business operations. Based on these results, it can be concluded that the Croatian video game industry, as a whole, faces a very low risk of discontinuation of business in the short-term period.

Furthermore, the business performance of the Croatian video game industry at the county level is examined. The Croatian video game industry situated in the City of Zagreb had the highest shares in total revenue, total expenses, and net profit throughout the period from 2018 to 2022. This outcome was anticipated, given that half of the Croatian video game industry is located in the City of Zagreb. However, in 2022, the Croatian video game industry in Zagreb County managed to achieve a higher net profit than enterprises located in the City of Zagreb.

Table 4. Net profit mean and standard deviation (2018–2022) in thousand euros, by headquarters location

County	2018		2019		2020		2021		2022	
	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
Istra	-1	-	-2	-	14		-1	2	-4	4
Krapina-Zagorje	5	-	0	-	4	-	0	-	0	-
Osijek-Baranja	5	15	8	15	3	11	7	11	25	59
Primorje-Gorski Kotar	2	-	-8	9	3	0	14	1	39	53
Sisak-Moslavina	90	88	37	74	14	41	6	25	1	10
City of Zagreb	159	440	77	538	352	1541	282	1003	147	452
Varaždin	-	-	-	-	11	-	16	16	44	43
Zagreb	44	65	60	77	51	7	251	250	1213	2327

To better understand the variations among enterprises in the Croatian video game industry across counties, Table 4 presents key descriptive statistical measures for the net profit from 2018 to 2022. During the period from 2018 to 2021, the average net profit was highest in the City of Zagreb. However, in 2022, the average net profit was significantly higher in Zagreb County (1.213 thousand euros). It's important to note that, in all cases, the standard deviations indicate considerable differences in net income values among enterprises within the same counties. This suggests that some enterprises achieved significantly higher net income than others. For instance, in 2022, Pine Studio d.o.o. achieved almost 97% of the total net

profit attained by enterprises from Zagreb County, while the remaining net profit was generated by four other enterprises. However, based on the results presented here and in chapter 3.1, it can be concluded that, currently, the Croatian video game industry is concentrated in the City of Zagreb. Therefore, the second research hypothesis can be accepted.

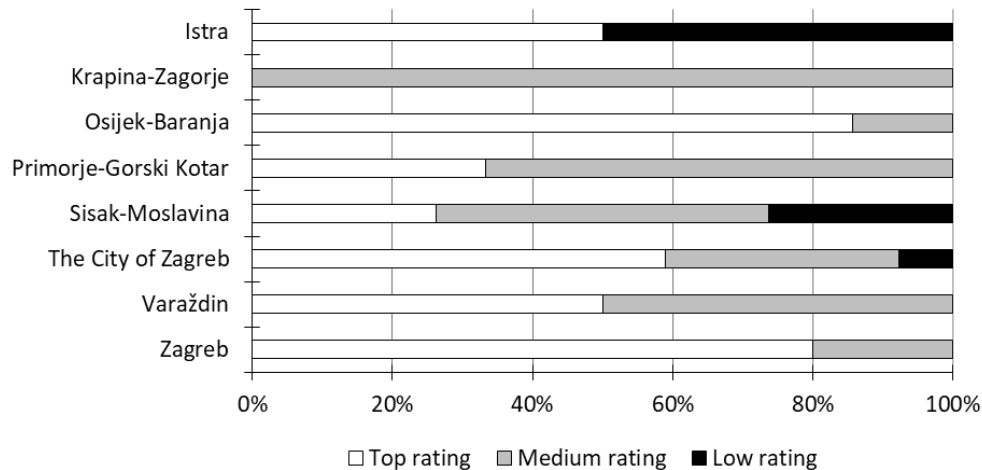


Figure 3. Rating of Croatian video game industry enterprises in 2022, by headquarters location

Figure 3 presents the distribution of Croatian video game industry enterprises by the Croatian Chamber of Economy rating in 2022, categorized by their headquarters' location. The highest proportion of enterprises in the top rating categories (AAA, AA, and A), indicating a high-quality business with low levels of risk for business survival in the next 12 months, is observed in Osijek-Baranja County (86%) and Zagreb County (80%). Conversely, the highest percentage of enterprises in the lowest rating categories (CCC and CC), indicative of a low-quality business with high levels of risk for business survival in the next 12 months, is found in Istria County (50%), Sisak-Moslavina County (26%), and the City of Zagreb (8%).

On January 18, 2024, 55 video games developed and/or published by the Croatian video game industry were listed on Steam. Some enterprises developed and/or published more than one video game on Steam, while others from the Croatian video game industry did not publish their games on this platform. There were instances where two or more enterprises collaborated on certain video games. The complete list of video games developed and/or published by the Croatian video game industry on Steam is available in Table A2. This table includes information about the publication year, price, and a direct hyperlink to the Steam webpage for each game.

For each listed video game, information about the number of reviews written by players who played the game on Steam has been collected. Data regarding the number of positive reviews, indicating the number of players who recommend the video game to others, has also been gathered. Statistical proportion tests were then conducted based on this information. The assumption underlying these tests is that more than 50% of players who have experienced video games developed and/or published by the Croatian video game industry on Steam would recommend the video games. The outcomes of these conducted tests are detailed in Table 5.

Table 5. Significance of positive comments on Steam games published by the Croatian video game industry

Game title	Number of comments	Positive comments	Proportion	Standard error	Empirical z-value
A Long Road Home	39	34	0.8718	0.0801	4.64***
Ace of Words	831	540	0.6498	0.0173	8.64***
Agenda	48	27	0.5625	0.0722	0.87
All You Can Eat	365	291	0.7973	0.0262	11.36***
Antisphere	97	61	0.6289	0.0508	2.54***
Bear With Me – Episode One	946	831	0.8784	0.0163	23.28***
Bear With Me: The Lost Robots	112	98	0.8750	0.0472	7.94***
Cats in Time	965	930	0.9637	0.0161	28.81***
Chaos on Wheels	14	10	0.7143	0.1336	1.60*
Chop Chop Princess!	3	2	0.6667	0.2887	0.58
Daemonical	219	144	0.6575	0.0338	4.66***
Daily Thread: The Sewing of Discontent	16	16	1.0000	0.1250	4.00***
Earth Rising	28	21	0.7500	0.0945	2.65***
Escape Simulator	13470	12672	0.9408	0.0043	102.31***
Exile Squadron	21	18	0.8571	0.1091	3.27***
Faraway: Arctic Escape	8	6	0.7500	0.1768	1.41*
Faraway: Jungle Escape	10	8	0.8000	0.1581	1.90**
Faraway: Puzzle Escape	84	60	0.7143	0.0546	3.93***
FPV SkyDive: FPV Drone Simulator	1171	946	0.8079	0.0146	21.07***
Gas Guzzlers Extreme	3887	3343	0.8600	0.0080	44.89***
Gas Guzzlers: Combat Carnage	115	101	0.8783	0.0466	8.11***
General Horse and Package of Doom	50	48	0.9600	0.0707	6.51***
Grim Quest – Old School RPG	110	103	0.9364	0.0477	9.15***
Grim Tides – Old School RPG	25	22	0.8800	0.1000	3.80***
I Hate Running Backwards	216	168	0.7778	0.0340	8.16***
Inked: A Tale of Love	204	175	0.8578	0.0350	10.22***
Interactive Empathy	12	5	0.4167	0.1443	-0.58
Julie’s Sweets	8	7	0.8750	0.1768	2.12**
Kingdom Eighties	2212	1670	0.7550	0.0106	23.98***
Kingdom Two Crowns	23058	21044	0.9127	0.0033	125.32***
Last Encounter	42	31	0.7381	0.0772	3.09***
Monster Adventure	9	8	0.8889	0.1667	2.33***
Need to Know	275	182	0.6618	0.0302	5.37***
Paws of Coal	46	42	0.9130	0.0737	5.60***
Phageborn: Online Card Game	117	91	0.7778	0.0462	6.01***
Raid: World War II	2198	1204	0.5478	0.0107	4.48***
Roll Player – The Board Game	79	69	0.8734	0.0563	6.64***
Rolling Arcade	10	9	0.9000	0.1581	2.53***
Saint Kotar	167	132	0.7904	0.0387	7.51***
Saint Kotar: The Crawling Man	24	24	1.0000	0.1021	4.90***
Saint Kotar: The Yellow Mask	317	233	0.7350	0.0281	8.37***
Scum	98513	73298	0.7440	0.0016	153.20***
Serious Sam: Tormental	217	172	0.7926	0.0339	8.62***
Seum: Speedrunners from Hell	2891	2744	0.9492	0.0093	48.30***
Slide Ride Arcade	8	5	0.6250	0.1768	0.71
Speed Limit	187	160	0.8556	0.0366	9.73***
The Academy: The First Riddle	73	49	0.6712	0.0585	2.93***
The Hand of Merlin	335	242	0.7224	0.0273	8.14***
vApe Escape	113	106	0.9381	0.0470	9.31***
Viktor, a Steampunk Adventure	61	56	0.9180	0.0640	6.53***
VR Summer Sports	4	3	0.7500	0.2500	1.00
Zero Reflex: Black Eye Edition	234	183	0.7821	0.0327	8.63***
Zotrix	199	119	0.5980	0.0354	2.76***
Zotrix – Solar Division	52	37	0.7115	0.0693	3.05***

Note: significance levels are denoted as *** 0.01, ** 0.05, * 0.10.

The number of comments reflects the number of players who have played the game. The more players engage with the game, the more comments are expected. In this regard, the most played Croatian game on Steam is SCUM, a hardcore survival action game, with almost 100 thousand written comments on the platform. However, SCUM is not the highest rated Croatian game on Steam due to its ongoing development, which means it is prone to bugs and other issues that affect players. Among other notable games are the following: Escape Simulator (a digital escape room game with logical and intriguing riddles), SEUM: Speedrunners from Hell (a speedrunner game featuring hardrock music), and Saint Kotar (a mystery game set in Croatia). The games listed in Table 5 cover various genres, catering to different gaming audiences. Therefore, it is evident that games aimed at a broader gaming audience tend to have a higher number of players or greater popularity compared to those targeted at a narrower gaming niche.

According to the results presented in Table 5, out of the 55 video games, statistical significance was observed in favor of more than 50% of players recommending the video game for 49 of them (89%). This indicates that, in these 49 video games developed and/or published by the Croatian video game industry on Steam, more than 50% of players would left positive reviews. Thus, the third research hypothesis, stating that more than 50% of video game players recommend video games developed and/or published by the Croatian video game industry in their reviews, can be accepted.

Conversely, for 5 video games, the conducted statistical tests, at commonly used significance levels, indicated that the proportion of players recommending the video game was either lower or equal to 0.5. However, it's important to note that in 4 out of these 5 cases, the total sample sizes (i.e. the number of players who provided reviews) were very small, ranging from 3 to 12. For the video game "Epic Eon" no reviews were available, likely due to its recent publication on December 27, 2023, and therefore, a statistical test could not be conducted for that specific case.

4. Conclusion

The analysis revealed a notable increase in the number of enterprises in the Croatian video game industry during the pandemic, marking an 86% increase from 2019 to 2022. The City of Zagreb concentrated the majority of these enterprises, accounting for 50% of the total. Sisak-Moslavina County also played a significant role, representing 23.75% of the industry. The distribution of employees reflected a similar trend, with the majority (77.40%) working in enterprises located in the City of Zagreb.

The financial performance of video game enterprises has demonstrated positive trends. The total revenue of the industry increased by 218.16% from 2018 to 2022. Although net profit showed fluctuations, it increased by 250.21% during the same period. These financial indicators suggest that the Croatian video game industry not only weathered the challenges posed by the COVID-19 pandemic but also experienced growth in terms of revenue and profitability.

The study also explored the international visibility and recognition of the Croatian video game industry through an analysis of Steam user reviews. The results of sentiment analysis revealed that more than 50% of comments on Croatian-developed and/or published games were positive. Proportion tests further supported this finding, indicating that players were more likely to recommend these games. The high proportion of positive comments and

recommendations suggested that the Croatian video game industry has been successful in delivering enjoyable and well-received games to the global gaming community.

In conclusion, the Croatian video game industry demonstrated resilience and growth during the COVID-19 pandemic, as evidenced by the increased number of enterprises, and positive financial performance. The industry's ability to adapt to changing conditions, leverage digital platforms, and produce high-quality games contributed to its success. The findings of this study provide insights into the dynamics of the Croatian video game industry, highlighting its economic impact and global recognition. As the industry continues to evolve, it is essential to monitor trends, support innovation, and foster an environment conducive to sustained growth.

Despite the valuable insights gained from this study, certain limitations should be considered. First, the analysis focused on quantitative data, such as the number of enterprises, employees, and financial indicators. While these metrics provide a comprehensive overview of the industry's performance, qualitative data, such as interviews with industry professionals, could offer deeper insights into the challenges and strategies employed by video game enterprises during the pandemic. Second, the study primarily relied on data available up to the knowledge cutoff date in 2022. As such, the analysis does not capture developments or changes in the Croatian video game industry beyond that date. Future research could explore more recent data to assess the continued trajectory of the industry and its response to evolving challenges and opportunities. Third, the analysis of Steam user reviews focused on sentiment analysis and proportion tests for positive comments. While these methods provide valuable information about players' perceptions of Croatian-developed games, a more in-depth analysis of player feedback, including specific themes and preferences, could enhance the understanding of the factors contributing to a game's success.

Despite these limitations, this study contributes to the emerging literature on the economic impact of the video game industry at both the national and global levels. The findings offer valuable insights for researchers, policymakers, and industry professionals interested in understanding the dynamics of the Croatian video game industry and its resilience during challenging times. It is evident that there is insufficient relevant data about the Croatian video game industry. Therefore, in future studies, researchers should conduct interviews with video game developers to better understand the problems and challenges they face on both the global and local scales. Additionally, policymakers should support innovation and the establishment of startup enterprises due to the increasing importance of the video game industry worldwide. Moreover, video game developers should continue their education, not only in the field of video game development but also in other areas such as marketing and finance.

References

- Bai, D., Chen, L., Shang, Z., Wang, Y., & Guan, G. (2022). Esports industry, video game industry and economic growth: An empirical research in China. *SSRN Electronic Journal*, 1–18. doi: [10.2139/ssrn.4074000](https://doi.org/10.2139/ssrn.4074000)
- Barr, M. & Copeland-Stewart, A. (2022). Playing video games during the COVID-19 pandemic and effects on players' well-being. *Games and Culture*, 17(1):122–139. doi: [10.1177/15554120211017036](https://doi.org/10.1177/15554120211017036)

- CAC, (2023). *Register of Video Game Producers*. Croatian Audiovisual Centre. <https://ocevidnici.havc.hr> [accessed November 21, 2023]
- CEC, (2021). *HGK Bonitetno izvješće*. Croatian Economy Chamber. <https://hgk.hr/hgk-bonitetno-izvjesce> [accessed November 21, 2023]
- Chen, H. (2022). The impact of the Covid-19 on the video game market. *Advances in Economics, Business and Management Research*, 226:70–78. doi: 10.2991/978-94-6463-052-7_9
- Clement, J. (2024). *Steam gaming platform – Statistics & Facts*. Statista. <https://www.statista.com/topics/4282/steam> [accessed January 10, 2024]
- DCC, (2023). *Center for Digital Development, Croatian Chamber of Economy*. Digital Chamber of Commerce. <https://digitalnakomora.hr> [accessed November 21, 2023]
- Fakazli, A. E. (2020). The effect of Covid-19 pandemic on digital games and eSports. *International Journal of Sport Culture and Science*, 8(4):335–344. doi: 10.14486/IntJSCS.2020.621
- FINA, (2023). *RGFI Public Posting*. Financial Agency. <https://rgfi.fina.hr/JavnaObjava-web> [accessed November 21, 2023]
- Goh, E., Al-Tabbaa, O. & Khan, Z. (2023). Unravelling the complexity of the video game industry: An integrative framework and future research directions. *Telematics and Informatics Reports*, 12:1–18. doi: 10.1016/j.teler.2023.100100
- Inkubator, (2021). *EU project – the best in Croatia in 2020*. Inkubator – PISMO. <https://inkubator-pismo.eu/projekt> [accessed November 21, 2023]
- Jarszak, A. (2021). Digital entertainment in the face of COVID-19. *Journal of Computer Sciences Institute*, 21:362–366. doi: 10.35784/jcsi.2748
- Lopez-Orosco, L. A., Solano-Guevara, V. A., Turriate-Guzman, A. M., & Alarcón-Llontop, L. R. (2023). *Analysis of digital data consumption of video streaming platforms during COVID-19*. In Shakya, S., Papakostas, G. & Kamel, K. A. (Eds.), *Mobile Computing and Sustainable Informatics*, 23–36. Springer: Singapore. doi: 10.1007/978-981-99-0835-6_2
- Marchand, A. & Hennig-Thurau, T. (2013). Value creation in the video game industry: Industry economics, consumer benefits, and research opportunities. *Journal of Interactive Marketing*, 27(3):141–257. doi: 10.1016/j.intmar.2013.05.001
- Mataković, H. (2022). Implementation of containment and closure measures during COVID-19 pandemic and their effect on tourism in Croatia. *Internal Security*, 14(1):23–46. doi: 10.5604/01.3001.0016.0370
- OG, (2022). *Regulation on the producer register*. Official Gazette No. 2. https://narodne-novine.nn.hr/clanci/sluzbeni/2022_01_2_13.html [accessed November 21, 2023]
- Ortiz, L., Tillerias, H., Chimbo, C. & Toaza, V. (2020). Impact on the video game industry during the COVID-19 pandemic. *Revista Athenea en Ciencias de la Ingeniería*, 1(1):5–13. doi: 10.47460/athenea.v1i1.1
- Park, S., Kultima, A., Lehtonen, M. J. & Krath, J. (2022). Everywhere but nowhere: Development experiences of the international game developers in Finland during the Covid-19 pandemic and remote work. *Proceedings of the ACM on Human-Computer Interaction*, 6(233):1–14. doi: 10.1145/3549496
- Perišić, A. and Pahor, M. (2020). Extended RFM logit model for churn prediction in the mobile gaming market. *Croatian Operational Research Review*, 11(2):249–261. doi: 10.17535/crorr.2020.0020
- Piñeiro-Chousa, J., López-Cabarcos, M. Á., Pérez-Pico, A. M. & Caby, J. (2023). The influence of twitch and sustainability on the stock returns of video game companies: Before and after COVID-19. *Journal of Business Research*, 157(113620):1–10. doi: 10.1016/j.jbusres.2022.113620

- Pojani, B. & Mansaku, I. (2022). The Covid-19 effects on the video game industry – A comparative ratio analysis on Activision-Blizzard, Electronic Arts and Konami. *Canadian Institute of Technology Review Journal*, 1(1):64–73. doi: [10.59380/crj.v1i1.2750](https://doi.org/10.59380/crj.v1i1.2750)
- Rykała, P. (2020). The growth of the gaming industry in the context of creative industries. *Biblioteka Regionalisty – Regional Journal*, 20:124–136. doi: [10.15611/br.2020.1.10](https://doi.org/10.15611/br.2020.1.10)
- Şener, D., Yalçın, T. & Gulseven, O. (2021). The impact of COVID-19 on the video game industry. *SSRN Electronic Journal*, 1–13. doi: [10.2139/ssrn.3766147](https://doi.org/10.2139/ssrn.3766147)
- Statista, (2024a). Video Games – Croatia. <https://www.statista.com/outlook/dmo/digital-media/video-games/croatia> [accessed January 10, 2024]
- Statista, (2024a). Video Games – Worldwide. <https://www.statista.com/outlook/dmo/digital-media/video-games/worldwide> [accessed January 10, 2024]
- Vanhalla, J. (2023). *Video gaming industry stocks' reaction to the COVID-19 pandemic – An event study of the US stock market*. Master's Thesis, Lappeenranta-Lahti University of Technology, 1–67. https://lutpub.lut.fi/bitstream/handle/10024/166202/Pro_Gradu_Vanhala_Jere.pdf

Analiza performansi hrvatske industrije videoigara: ekspanzija usred COVID-19 pandemije

SAŽETAK

Hrvatska industrija videoigara demonstrirala je značajan rast usred izazova koje je postavila COVID-19 pandemija. Korišten je deskriptivno statistički pristup koji je obuhvatio sva poduzeća u hrvatskoj industriji videoigara. Zatim su primijenjeni statistički testovi o značajnosti proporcija kako bi se procijenilo zadovoljstvo igrača na platformi Steam videoigrama koje je razvila i/ili objavila hrvatska industrija videoigara. Analiza je pokazala koncentraciju industrije u Zagrebu, koja čini 50% poduzeća i 77,4% zaposlenih u 2022. godini. U razdoblju od 2018. do 2022. godine ukupni neto profit porastao je s 4,95 milijuna eura na 12,37 milijuna eura. Međutim, prosječni neto profit po poduzeću doživio je skroman porast s 0,12 milijuna eura na 0,15 milijuna eura tijekom istog razdoblja. Naime, 21% poduzeća zadržalo je najviši rejting AAA. Usporedbe na županijskoj razini otkrile su uvid u neto profite, ukupne prihode i rashode. Na Steam platformi igrači su preporučili nevjerojatnih 89% videoigara koje je razvila ili objavila hrvatska industrija.

KLJUČNE RIJEČI

poslovne performanse, COVID-19, Hrvatska, industrija videoigara

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