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THE IMPACT OF A MICROTRANSACTION SYSTEM ON DEVELOPMENT, QUALITY AND REVENUE IN THE INTERNATIONAL GAMING INDUSTRY

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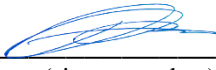
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(MASTER'S THESIS)**

***THE IMPACT OF A MICROTRANSACTION SYSTEM ON DEVELOPMENT,
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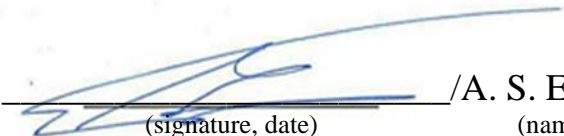
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ANNOTATION

Video games are becoming more and more popular every year. As the number of players grows, so do the revenues from the games. The video game industry is a very young industry, but even so, it is growing at a tremendous rate. In recent years earnings from the video game industry have exceeded the amount of money earned from the film and music industries combined. Games have long ceased to be just a hobby. They are now real works of art, on which huge budgets are spent. The video game industry is a huge separate world with a great variety of jobs. More and more IT giants are starting to invest huge budgets into video games industry, because it's hard to overestimate the influence of video games on the world economy. Not only the quality of games is changing, but also the ways of making profit from them. Video game developers are gradually shifting to a new kind of earning - microtransactions. The use of microtransactions in games makes it possible to profit from games over the years. Therefore, many developers are now opting to release conditionally free-to-play games with a focus on microtransactions. These facts underscore the relevance of this paper.

In order to maximize profits, video game developers use different types of microtransactions, depending on the genre and audience. The main goal of video game developers is to find a balance between profits and player feedback. Increasing average salaries and the number of players around the world will generate revenue, but negative criticism of video games with aggressive microtransaction systems can bring down such rapidly growing profits. Model building and forecasting can provide a complete picture of the impact of microtransactions on development, quality and revenues in the international gaming industry.

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INTRODUCTION

This topic is particularly relevant in recent years, because the field of computer video games is developing very quickly and had a great impact on the world economy. The example of a high-profile legal dispute over microtransactions between two IT giants Apple and Epic Games serves as a proof of that. Epic Games and Apple have been disputing Apple's decision to remove the game Fortnite from the App Store, with Apple withdrawing the popular Battle Royale shooter from its platforms after Epic Games added an unsanctioned payment method in a bid to avoid platform fees. Epic Games was forced to introduce a new direct-payment system in Fortnite to circumvent Apple's 30 percent fee.

The object of the study is a microtransaction system in the video game industry. The subject of the study is the relationship between microtransactions and the revenues of video game companies, as well as the quality of their games.

The purpose of this work is to study the impact of the microtransaction system on development, quality and revenue in the international gaming industry. With this research, the aim is to show how microtransactions affect the global video game industry. This is a paramount question, as the share of revenue for microtransactions forms a larger percentage of profit than for the sale of the game itself. Thanks to such high profits, microtransactions appear in almost all new games. The goal of this work is to show a relationship and its impact on the global world of video game entertainment. Several methods will be used to complete this work. For example: econometric for modeling, regression analysis method for building a model, statistical method.

The computer game industry is a sector of the economy associated with the development, promotion and sale of computer games. It includes a large number of specialties that employ tens of thousands of people around the world. The digital content market is a market for information and entertainment materials distributed digitally through communication channels intended for use on digital devices, such as a computer, mobile phone, specialized devices, etc. A video game - is an

electronic game that involves interaction with a user interface or input device such as a controller, keyboard, etc. to generate visual feedback for a player.

The computer game industry was created in the mid-1970s and continues to develop to this day. The computer game industry (game development, publishing, and promotion) is one of the fastest-growing computer technology industries and also the global entertainment sector. The number of gamers is growing every year, and gaming itself is becoming a highly paid profession. Also, video games are increasingly integrated into our world with the help of such physical objects as theme parks and souvenir goods.

The number of players is growing very fast every year, and the profit in this area is growing accordingly. In terms of growth, video games are ahead of all other types of entertainment. For example, in 2019, the video game industry made a profit of \$ 152 billion, when the film industry and the music industry together received only \$ 62 billion. According to the current trend, the difference between these indicators will grow every year. But unlike competing areas in the gaming industry, the method of monetization is unique. In its short time, the gaming industry has changed the way of earning money. So, for example, previously, games were traditionally a whole product. And the earnings were calculated by the number of games sold. But now the game distribution model includes microtransactions and paid add-ons. This allows game studios to create a completely free product for consumers, which will thereby attract a large number of players. And the earnings in such projects consist only on microtransactions.

Now the way to earn money in video games is very flexible and depends on the region of distribution and the desire of consumers. This is a young industry, but with a lot of experience and huge potential. Of course, the number of players and profits in this industry will grow annually. And it is already clear that the video game industry is so large and influential that it has an impact on other entertainment industries and on the global economy as a whole.

1 Theoretical approaches to the definition of microtransactions and their impact on the international gaming industry

1.1 Concept, tasks, functions of microtransactions in the international gaming industry

The success of video games is possible thanks to the mechanisms of retaining special attention. Attention retention mechanics - is a way of influencing the elements of a video game on the subconscious of players to generate their interest. This definition is closely related to the economy, because by attracting the attention of players, gaming companies make a profit. This profit is reflected in the company's annual financial results. Financial results - is a company's annual earnings report that includes information about video game and microtransaction sales for the current financial period.

Game development is the art of creating games and describes the design, development, and release of a game. When creating a game, it is important to think about the game mechanics, rewards, player engagement, and level design. Together, these factors guarantee financial success for the company. The gaming industry is a rapidly developing area, but despite this, certain trends can be traced. In recent years, the use of microtransactions in video games has become increasingly popular. Microtransaction - is a business model where users can buy virtual items for real money. It can be both add-ons to games and a cosmetic product for a game character or item.

In this way, development companies can use the attention retention mechanics to stimulate the purchase of microtransactions. These may be different mechanics that are used depending on the genre of the game and the strategy of the developer company. Here are some of the major video game genres:

Dynamic games – this is when the gamer requires maximum reaction speed and accuracy, but a minimum of intellectual tasks;

Simulation Games – this genre includes sports games of different sports (football, basketball, Boxing, baseball, wrestling, etc.). Most often, the main goal of these games is to compete with other players or with artificial intelligence;

Strategy game – the main thing in them is the development and assessment of the situation. At the same time, have to think not only about the current state of Affairs, but also about what can happen in the next moves and what advantages can be obtained in the future. The closest and most obvious parallel is chess;

Role-playing games (RPG) – describes ways to create, modify, and develop characters that increase their effectiveness in the game. Necessary and important elements of this genre are that the player controls one (incarnation, avatar) or several (group, party) unique characters that he creates himself. The player gradually improves characteristics and / or skills (through in-game values, most often experience points obtained for completing tasks, exploring the world. In the process of passing, there are checks of characteristics and / or abilities and skills. Characters can improve their stats and / or abilities and skills with items of equipment. The player must plan the development of the character (s).

Action games or adventure games – they may have elements of some of the above classes, but the goal is to advance through the story, not to defeat the enemy;

Puzzle Games – the main task of these games is to solve logical problems based on a common set of rules;

Each of these genres is unique and uses different in-game mechanics. Video game developers should take these features into account and use individual mechanics to hold the attention of players. In other words, attention retention mechanics cannot be the same for all games. But despite this, all games have one thing in common, it is the gameplay itself. If the player is not interested in playing, then no additional stimulation is able to hold his attention. Therefore, regardless of the genre, the game should be fun to play.

1.2 Methods for evaluating financial results of attention retention technologies in video games

Not so long ago, it was proved that video games provoke the release of dopamine in the brain. Dopamine is a neurotransmitter that causes feelings of happiness and

satisfaction. Its action is well traced in the gameplay of any game — at first a person gets pleasure from passing, and at the end satisfaction from the reward.

Scientists discovered a similar effect of dopamine on humans and animals in a series of experiments conducted more than thirty years ago. At the moment, it is proven that dopamine is the main chemical that makes us rejoice in victory and at the same time makes us strive for it. But as it became clear later, dopamine does not affect the pleasure of the reward or the desire to explore ways to get it. Dopamine causes the strongest motivation to possess a reward.

In this way, developers can encourage players to complete another level or challenge, because players know that there will be a reward at the end. The reward can be any, depending on the game. It can be a new costume or a character skill, it all depends on the type of game.

The human brain is easily influenced by this, so players are willing to spend a lot of time just to get a reward at the end.

A person who plays video games is often called a gamer. But this does not mean that a person is obsessed with games, rather just that a person likes to play games. Also, of course, there are those who spend most of their lives in games. But dopamine and motivation aren't the only things that make people spend months playing games.

The state in which gamers spend hours without looking up from the computer, in psychology, is called streaming. Flow, or the flow state, was discovered in 1970 by psychologist Mihaly Csikszentmihalyi.

In the course of the experiments, he found that the ratio of the level of skills and the complexity of the task forms different cognitive and emotional states of a person. When the skill level is too low, and the difficulty of the task is high, then people plunge into a preoccupied, anxious state. Conversely, if the task is too easy and the skill level is high, people get bored.

However, when the skill level and the degree of difficulty of the task are roughly proportional, people are immersed in the streaming state. Csikszentmihalyi identifies four characteristics that a task must meet in order to create a balance between skill and

difficulty, which increases the possibility of reaching the streaming state. Such tasks should:

- have specific goals and workable rules;
- to demand from a person such actions as are within his power;
- have a clear and timely feedback on actions and achievement of goals;
- contain a minimum of distractions and thus promote concentration.

These are the characteristics that game developers should follow if they want to increase the gamer's engagement in the gameplay. A detailed study of each of these characteristics will help to achieve the desired effect and it will make people spend hours playing.

The ability to effectively manage the player's attention is the basis for the success of any game. No matter how deep the mechanics of the game are, if the game can't attract the player, the player will simply drop it.

Former lead game designer of Naughty Dog, Richard Lemarchand, believes that the attention of the player is the foundation of video games, and its importance is difficult to overestimate. The gameplay itself is possible only when the game not only attracts, but also holds the attention.

Gordon Calleja, a professor at the University of Malta, has compiled a whole chart of the levels of player engagement. It shows that below the attention is only a psychological "awakening" — in other words, a sense of awareness, which the developer can't influence in any way. It is followed by attention, and only then by the engagement and immersiveness that developers strive for.

The player's attention is important to consider, but it is rarely talked about. Sometimes authors use the terms "engagement", "immersiveness" and "attention" interchangeably, although there are enough differences between them.

The three terms complement each other and describe the different degrees of immersion of the player in the gameplay. "Attention" implies that a person is concentrating on something specific. "Engagement" describes a state in which the player is simply engaged in the game. Immersiveness — when you are so involved that you

forget about the existence of the real world for a while: sometimes this is also called a transition to a state of flow.

Attention is well studied within the framework of cognitive psychology. And its theoretical and practical developments have long been used by game designers to make the gaming experience more pleasant.

It is very important to choose the right strategy for the development of the game, because it directly affects the financial results of the developer company.

1.3 Methodology for researching the financial results of microtransactions and their impact on the economic performance of a company of developers

Methods for evaluating the financial results of using attention-retention technologies in video games include:

The method of econometric modeling - one of the most important tools for analyzing and forecasting socio-economic systems, which is most effective in the case of systems with stable, stable development trends;

Observation - planned and purposeful perception of an object, process, phenomenon, etc., the results of which are recorded by the researcher (observer). The essence of observation is the accurate and complete recording of facts obtained with the help of the senses (sight, hearing, etc.), knowledge, skills and life experience;

Regression analysis method - method of studying the statistical relationship between one dependent quantitative dependent variable and one or more independent quantitative variables;

Collecting facts - the process of obtaining information necessary for further research.

All these methods are necessary to understand the work of attention retention mechanics and their impact on economic results. But these are not all the methods that can be used to study this topic. Another suitable method is - survey. A survey is a research method used for collecting data from a predefined group of respondents

to gain information and insights into various topics of interest. They can have multiple purposes, and researchers can conduct it in many ways depending on the methodology chosen and the study's goal.

Ubisoft Entertainment combines different attention retention mechanisms. This allows the game to release games with a different genre. Ubisoft Entertainment is a French computer and videogame developer and publisher with headquarters in Montreuil-sous-Bois, France. It was founded in 1986 by five brothers, of which Yves Guillemot serves as chairman and CEO.

Company presents on 5 continents with more than 40 development studios. This is international network with more than 108 nationalities and 55 spoken languages. The greatest inner creative force in the world. An industry with more than 80% of the team dedicated to creativity.

Ubisoft Entertainment is a simplified joint-stock company with a capital of 11,959,727 euros, registered in the Commercial Register of Companies of Bobigny in France. The company was founded by five brothers in 1986. Thanks to the cooperation with many game developers, the company managed to expand beyond its national market by the end of the decade and start working in Germany, the United States and the United Kingdom. The next stage in the development of Ubisoft Entertainment was the opening in 1994 of its own studio engaged in the development of video games. In 1996, the company, in addition to its central office in Montreal, officially opens another one – in Shanghai. Since 2000, the company has been actively buying up controlling stakes in small but promising game developers, as well as releasing several online gaming projects.

Today, Ubisoft Entertainment is one of the largest manufacturers in the market of computer games, with offices in many countries. Ubisoft Entertainment releases several big games every year. The company also makes a large-scale online project every few years, aimed at making a profit from microtransactions. This strategy helps the company maintain the largest market capitalization in Europe among all game studios. But this approach also negatively affects the development and quality of the game. This leads to unjustified sales or negative player ratings.

The main office of the company is located in France, but the company distributes the development load among all the main studios. Ubisoft Entertainment has a very specific organization of work, this is due to the fact that the staff for 2020 is more than 18 thousand people. This is a very large number, which allows to efficiently distribute the work and quickly achieve success.

The company is making progress mainly on its main franchises: «Assassin's Creed», «Watch Dogs», «Tom Clancy's», «Far Cry», «Just Dance», and some others. This financial success brings the company well-known franchises that have existed for many years. With popular titles and familiar characters, the company ensures the financial success of every part of its famous franchise. This tactic shows great financial success over the years. There are also additional factors that have a positive impact on the profit. The main one is the introduction of special attention retention mechanics. For example, in the last three games of the popular «Assassin's Creed» series («Assassin's Creed: Origins», «Assassin's Creed: Odyssey», «Assassin's Creed: Valhalla»), the company uses the mechanics of artificially slowing down the character's progress. That is, the game does not allow the player to enter a new story task until the player reaches the desired level, and for this the player has two options: a) buy the acceleration of the progress for real money (the company calls this "time saving"; b) spend time on additional missions, which are most often the same type and boring. For its other project, «Tom Clancy's Rainbow Six Siege», the company uses a different attention retention mechanics. It's basically customizing the characters and their weapons. For the game, «Just Dance» is a paid song or subscription that gives access to all possible songs.

The main key to the success of the company is the competent use of different approaches to retain the attention of players. All this data is reflected in the company's annual reports, which are available on their official website. But Ubisoft Entertainment company uses specific terms for its financial statements. The main ones are presented in this table:

Table 1 – The main economic terms used by Ubisoft Entertainment in its annual report

Sales (IFRS 15)	Net bookings	Digital net bookings	PRI net bookings	Back-catalog net bookings -
Is an International Financial Reporting Standard (IFRS) promulgated by the International Accounting Standards Board (IASB) providing guidance on accounting for revenue from contracts with customers. It was adopted in 2014 and became effective in January 2018;	Is defined as the net amount of products and services sold digitally or sold-in physically during the period, and includes licensing fees, merchandise, in-game advertising, strategy guides and publisher incentives;	Is defined as the net amount of products and services sold digitally only during a certain period;	Player Recurring Investment includes sales of digital items, DLC, season passes, subscriptions and advertising;	Information about sales of games that were released earlier than this annual/quarterly sales report.

It is important to note that the company Ubisoft Entertainment in the annual financial results separately distinguishes digital sales and profits for microtransactions. In addition, the company calls microtransactions a special term «PRI net bookings», which stands for Player Recurring Investment. This definition makes it clear the company's attitude to microtransactions. (Table 1)

2 Research of the international video game market: development trends, comparative analysis of companies, assessment of competitiveness

2.1 Analysis of the macroeconomic industry of video games production

The computer game industry (also known as the interactive entertainment industry) is a sector of the economy associated with the development, promotion and sale of computer games. It includes a large number of specialties that employ tens of thousands of people around the world. The digital content market is a market for information and entertainment materials distributed digitally through communication channels intended for use on digital devices, such as a computer, mobile phone, specialized devices, etc.

The computer game industry was created in the mid-1970s and continues to develop to this day. The computer games industry (development, publishing and promotion of games) is one of the fastest growing branches of computer technology and at the same time the global entertainment sector. The number of gamers is growing (2.5 billion players in 2019), and gaming itself is becoming a highly paid profession. In addition, companies from related markets – electronics manufacturers (for example, Apple, Microsoft) or Internet corporations (for example, Google), which have the resources to bring promising gaming solutions to the market, also want to occupy their niche in this area.

As for the trends that determine the development of the global gaming industry, here, first of all, it is necessary to note the list of technologies: mobile, cloud, virtual, graphic, artificial intelligence, etc. For several years now, computer games have been integrated into social networks. There is also a reverse trend-they themselves become a kind of social networks. The popularity of cybersports is growing. esports tournaments can already be compared to championships in traditional sports in terms of prize money. For example, the prize pool of The International 2020 Dota 2 tournament reached \$ 34,330,500. It exceeded the figure of all previous years.

In addition, esports has become a catalyst for the development of such areas as streaming-online broadcasts of the game in real time, placed on special sites (for example, Twitch). Users are ready not only to play, but also to watch others play, because it is streaming that gives a complete idea of what a computer game is. In order to reach new market segments and find new sources of income, a number of industry participants are moving to material markets. In particular, we are talking about sales of products with brand symbols (T-shirts, bracelets, cups, etc.), theme park organizations (Angry Birds, Super Nintendo World parks in Japan, etc.), etc.

The global market for computer games (meaning sales of game content to users without taking into account the earnings of online casinos) is becoming deeper and larger. In the past five years, Newzoo [6] estimates that it has grown at an average rate of 11% per year and in 2019 reached the level of \$ 152 billion, overtaking a number of other competitive content markets, in particular, we are talking about the film and music industries, whose total market volume was only \$ 62 billion. Catalysts for rapid growth were the availability of the Internet and computerized devices, primarily smartphones, as well as the expansion of distribution channels. In 2020, according to preliminary estimates of analysts, the volume of the world market of computer games could grow by 18%, to 170–180 billion dollars. But the COVID-19 pandemic has made its own adjustments, acting as a kind of factor in the fall of the market in some areas and vice versa a sharp development in others. Nevertheless, analysts fear that in a difficult economic situation, users will begin to cut back on entertainment spending.

Regionally, the Asia-Pacific region continues to be the largest market (over \$ 70 billion in 2019). China and Japan are also the leading countries. In second place, according to Newzoo [6], is North America, the main position is occupied by the United States (about \$ 40 billion in 2019). At the same time, Eastern Europe (\$4.2 billion), which includes the Russian Federation, is the most underdeveloped gaming market in the world. However, according to experts, it is the Russian market that is most promising both on a regional and global scale.

At the same time, the largest segment of the global computer games market is mobile games (45%, or \$ 68.4 billion). According to analysts, this direction will only

grow. In second place in importance is the segment of games for consoles (32%, or \$ 48.6 billion). Desktop solutions occupy a total of 23% of the market (\$34.9 billion), of which 2% are browser-based online games, and the remaining 21% are downloadable or physical (disks, boxes, etc.) versions.

The choice of monetization model for computer games (sales of physical and digital copies, microtransactions, subscription fees, etc.) depends on the region and platform – console, smartphone/tablet or personal computer. In some countries, consoles are not popular, in others, the population is not ready to pay for original digital products due to the high level of Internet piracy. Also, most modern games use a hybrid approach to monetization: combined methods form a flexible model, where the disadvantages of one monetization method can provide opportunities for another.

According to analysts, the income of large gaming companies or corporations that have powerful gaming assets, according to analytical agencies, is from 6 to 18 billion dollars per year. Based on the results of 2019 The TOP 5 public companies with gaming assets in the world are Chinese giant Tencent, Japanese Sony, American Apple, Microsoft Studios and Activision Blizzard. Separately, it is necessary to note indie developers-independent producers of game content, which differs from high-budget games in greater originality and does not have restrictions on its functionality or storyline. Breakthroughs among indie games as of July 2020 are Braid (Number None, 2008), World of Goo (2D Boy, 2008), Minecraft (Mojang, 2009), Super Meat Boy (Team Meat, 2010) and Journey (Thatgamecompany, 2012).

Taking into account the variety of demand factors, analysis was based on three factors that most affect: average price of a PS4 game in the European Union expressed in euros (€), number of active video gamers worldwide expressed in billions, mean and median income in European Union expressed in euros (€). The data were taken for the period from 2015 to 2019, and growth was also analyzed. (Table 2)

Table 2 – The main indicators affecting the demand for the video game market [Eurostat]

Indicator	Years					Growth rate 2015 to 2019, %
	2015	2016	2017	2018	2019	
1	2	3	4	5	6	7=6:2
Average price of the game, €	69,99	69,99	69,99	69,99	69,99	0%
Number of active video gamers worldwide, (in billions)	1, 99	2, 11	2, 26	2, 42	2, 55	28%
Average salary in the European Union, €	16138	16530	16891	17441	17819	10%

From the table, we can draw the following conclusions:

Since the price growth rate for the game is 0%, it means that the price remains unchanged for 5 years, despite the rise in the cost of game development. Also, based on the data in the table, we see that the number of gamers is growing every year and the overall growth is 28%. An important part is taken by the data from the table on the average salary in the European Union, because thanks to the purchasing power, the number of players is growing.

From all this, the conclusion about study area industry with main trends that in general, the video game industry maintains a high rate of growth in popularity every year but without changing its pricing policy. And the growth of players highlights the fact that the average price per game remains acceptable for players.

In table 3, the analysis was based on three factors that have the most impact: total incoming tax, expressed in thousands of euros (€). The number of competitors in the European Union, which took into account the Studio which are located in territories a country outside the EU until 2019 and is active in the corresponding year. The third indicator is the average price for another product, in this case, a PC game in the digital game store Steam, the price is indicated in euros (€).

The data were taken for the period from 2015 to 2019, and growth was also analyzed. (Table 3)

Table 3 – The main indicators affecting supply in the video game market [Eurostat]

Indicator	Years					Growth rate 2015 to 2019, %
	2015	2016	2017	2018	2019	
1	2	3	4	5	6	7=6:2
Total income tax, (in € thousands)	53,094	29,654	51,457	69,241	48,418	-9%
The number of competitors in the European Union	184	182	178	178	177	-4%
Average price for another product (PC game on Steam in €)	7,64	7,34	7,23	6,79	8,11	6%

In table 3 analyzed the main factors affecting the supply of video games in the market, the main of which is the taxes paid by game studios, but according to the data the tax changes every year compared to the data for 2015, the tax decreased by 9% in 2019. The second factor is the number of competitors in the market. According to the data in the table, the number of game studios is very large. But because of the large number, has a lot of competition, some companies do not stand up to competition and close down. For example, in 2019, the number of active companies decreased by 4% compared to 2015. Another factor is the price of replacement products, for example, the average price for a PC game in 2019 is 8.11€, which is several times lower than a game for PS4. But despite this, the market for video game consoles does not lag behind in terms of the number of active users. (Table 3)

In conclusion, the history of computer games is a whole evolution of the entertainment genre into a large and integral part of modern life. In a short period of time, the history of video games has undergone a great evolution. The field of video games is developing in all directions, thereby creating new professions. Also, video games are increasingly integrated into our world with the help of such physical objects as parks and souvenir paraphernalia. The number of players is growing very fast every year, and the profit in this area is growing accordingly. In terms of growth, video games are ahead of all other types of entertainment. For example, in 2019, the video game industry made a profit of \$ 152 billion, when the film industry and the music industry together received only \$ 62 billion. According to the current trend, the difference between these indicators will grow every year. But unlike competing areas in the gaming industry, the method of monetization is unique. In its short time, the gaming industry has changed the way of earning money. So, for example, previously, games were traditionally a whole product. And the earnings were calculated by the number of games sold. But now the game distribution model includes microtransactions and paid add-ons. This allows game studios to create a completely free product for consumers, which will thereby attract a large number of players. And the earnings in such projects consist only on microtransactions. These can be both cosmetic components of the game (skins for the character, coloring for weapons, etc.). Now the way to earn money in video games is

very flexible and depends on the region of distribution and the desire of consumers. According to the analyzed data, the price of the game has not changed for several years, but despite this, the average salary in the European Union increases every year. The affordable price of video games is becoming one of the factors of rapid growth in the number of new players. So, for 2019, the number of players worldwide is 2.55 billion players. Due to factors such as competition, the number and quality of video games is growing. According to the analyzed data, every year there is a great competition among all game studios in the European Union. But a positive factor is the fact that the taxes paid by these studios are reduced.

In general, this is a young industry, but with a lot of experience and huge potential. Of course, the number of players and profits in this industry will grow annually. And it is already clear that the video game industry is so large and influential that it has an impact on other entertainment industries and on the global economy as a whole.

2.2 Comparative analysis of microtransactions in video games

According to the research, Ubisoft Entertainment is the leader among all game studios in Europe. Such a high status has its drawbacks. The company's strategy is aimed at constant profit. Ubisoft Entertainment releases several big games every year. The company also makes a large-scale online project every few years aimed at making a profit from microtransactions. This strategy helps the company to maintain the largest market capitalization in Europe among all the gaming studios. But this approach also has a negative impact on the development and quality of the game. This leads to unjustified sales or negative ratings from players. The main problem is that the company strongly distributes the development of one project to different studios around the world. It is very difficult to control the production of one game in all countries at once. Because of this inconsistency, the developers of different departments do not have a common vision for the project. It also has a negative effect on the video game developers themselves. Because Ubisoft Entertainment creates a system in which each developer is not a driving

force, but just an easily replaceable mechanism. Because of this approach, the developers' motivation and, accordingly, their performance decreases.

This negative trend is observed only in large projects, because small indie games of Ubisoft Entertainment are developed within the same game studio. This allows each developer to participate as much as possible in this project. In this approach, the developer is not just a part of the mechanism, but the main driving force. Thanks to the freedom of activity of each developer in this indie project, everyone can somehow influence the development of the game. For example, each developer can offer their own vision of the project. This helps to create unique and interesting projects that will differ from large projects by having a special part of each of the developers. This will help to give players an exciting experience.

Ubisoft Entertainment has several popular franchises, including: Assassin's Creed, Watch Dogs, Tom Clancy's, Far Cry, Just Dance, and some others. Some franchises already have dozens of games and they continue to be released annually. But the purpose of my research is to find out how appropriate such a strategy is. Because for players, the quality of the project is most often important, not its quantity.

Table 4 shows the ratio of the number and quality of video games from Ubisoft Entertainment from 2015 to 2019. The data in the table was taken from two online resources Annual Financial Report of the company Ubisoft Entertainment and Metacritic. The following terms are mentioned in the table: DLC - Downloadable content. Most often, these are paid large story additions to games or cosmetic additions to characters and locations (skins for the main character, for his weapons, and so on). Metacritic is an independent online resource where game journalists and players rate games. The indicator in the table is based on the ratings of game journalists.

Table 4 – The ratio of the number and quality of video games from Ubisoft Entertainment [Annual Financial Report and Metacritic]

Indicator	Years					Growth rate 2015 to 2019, %
	2015	2016	2017	2018	2019	
1	2	3	4	5	6	7=6:2
The number of games developed and DLC to them by Ubisoft Entertainment.	21	23	24	20	17	-19%
The average rating of all games on Metacritic for the year.	68/100	68,5/100	74/100	75/100	72/100	6%
Total income of the company Ubisoft Entertainment. (In millions of euros)	1464,00	1 394,00	1459,87	1731,89	1845,52	26%

According to the data from Table 4, it can be concluded that the number of released games and DLC for them grew until 2017. This decline is observed until 2019. So, in 2019, the number of games and DLC for them decreased by 19%. The second indicator evaluates the quality of released games and their DLC. According to Metacritic, the average rating of games and DLC for them increases annually until 2018, after which there is a drop. In 2019, this figure is 6% higher than in 2015. The third indicator in the table shows the profit of Ubisoft Entertainment from 2015 to 2019. There is an unstable

position in the profit, the lowest figure is 1394 million euros for 2016. The highest figure according to the annual financial report of Ubisoft Entertainment is 1,845. 52 million euros, which is 26% more than in 2015.

Taking into account the variety of demand factors, the analysis was based on the three factors that most affect: the number of active video games worldwide, expressed in billions. Average and median income in the European Union, expressed in euros. The average price of a PS4 game in the European Union, expressed in euros. The data was taken for the period from 2015 to 2019, and growth was also analyzed. (Table 5)

Table 5 – The problem of the average salary and the number of players [Eurostat]

Indicator	Years					Growth rate 2015 to 2019, %
	2015	2016	2017	2018	2019	
1	2	3	4	5	6	7=6:2
Number of active video gamers worldwide, (in billions)	1, 99	2, 11	2, 26	2, 42	2, 55	28%
Average salary in the European Union, €	16138	16530	16891	17441	17819	10%
Average price of the game, €	69,99	69,99	69,99	69,99	69,99	0%

According to the data in Table 5, the number of players is growing every year. This indicator has a great impact on the entire gaming industry. According to this trend, there are 2.55 billion players worldwide in 2019. The growth of this indicator is accompanied by the following two indicators. This is the average salary in the European Union. Because the more money people have, the more likely they are to spend that

money on entertainment. This trend is interrelated and proportional to the previous indicator, for example, in 2019, the average salary in the European Union is 17,819 euros. This is 10% more than in 2015. Although the third indicator is stable throughout the years from 2015 to 2019, this indicator has a great impact on the first indicator. For example, if the price of games grew faster than the average wage, people would not be able to spend money on games. Accordingly, the number of players would decrease. But the stability of this indicator positively affects the entire video game sphere. This means that the price of the game remains affordable for most people.

In conclusion, the main indicators of Ubisoft Entertainment are analyzed. Based on this data, the company's strategy is studied. Ubisoft Entertainment's tactics, which are based on the quantity rather than the quality of the products produced, were studied. The analyzed data shows the growth of the company's profit and average player ratings based on Metacritic. This means that the company's strategy is successful and the players are satisfied with the products they produce. Based on this trend, we can predict the success of the company over the next few years. But it is important to note that the company makes progress mainly on its main franchises: Assassin's Creed, Watch Dogs, Tom Clancy's, Far Cry, Just Dance, and some others. This financial success brings the company well-known franchises that have existed for many years. Thanks to popular titles and familiar characters, the company ensures financial success with each numbered part of its famous franchise. This tactic shows great financial success over the years. There are also additional factors that have a positive effect on the profit. These factors are interrelated with each other. The main one is the average salary and the fixed price for games. Thanks to the increasing average salary index and the fixed price of the game, the number of new players increases every year. All these components are interconnected and have an impact on each other.

2.3 Microeconomic assessment of Ubisoft Entertainment

Ubisoft Entertainment is a simplified joint stock company with a capital of 11,959,727 euros, registered in the Commercial Register of Companies of Bobigny under

the number 432,573,624, with its registered address: 28, rue Armand Carrel, 93100 Montreuil-sous-Bois, France.

Ubisoft Entertainment is a French computer and videogame developer and publisher with headquarters in Montreuil-sous-Bois, France. It was founded in 1986 by five brothers, of which Yves Guillemot serves as chairman and CEO.

Company presents on 5 continents with more than 40 development studios. This is international network with more than 108 nationalities and 55 spoken languages. The greatest inner creative force in the world. An industry with more than 80% of the team dedicated to creativity.

Ubisoft Entertainment SA is a France-based company active in the video game industry by developing, publishing and distributing video games for consoles, PCs (personal computers), smartphones and tablets in both physical and digital formats. It owns several brands and a diversified portfolio of franchises, including Assassin's Creed, The Crew, Far Cry, For Honor, Tom Clancy's Ghost Recon, Tom Clancy's Rainbow Six Siege, Tom Clancy's The Division and Watch Dogs. The Company, through its subsidiaries is active globally.

The Company Ubisoft relies intensively on internal competition to push its competing studios across the world to innovate and create state-of-the-art video games. As a high-tech company, Ubisoft has undergone the typical development phases of start-ups in this sector. For instance, just after Rayman was released in 1995, it went through a growth phase marked not only by business expansion (opening of new studios, increase of teams working on projects), but also structuring, task specialization and introduction of supervisory mechanisms. Therefore, Ubisoft was organized logically into a decision-making structure with production being arranged into big projects with a lightweight corporate cross disciplinary configuration. Teams are divided amongst various studios across the world and engaged to work on game projects which can bring together several hundred people while remaining in competition on other projects. Relying on internal competition to launch new project, Ubisoft appears as an interesting set up to study the tensions

generated by internal competition and the use of specific management tools or structures (such as a broker) to manage these tensions.

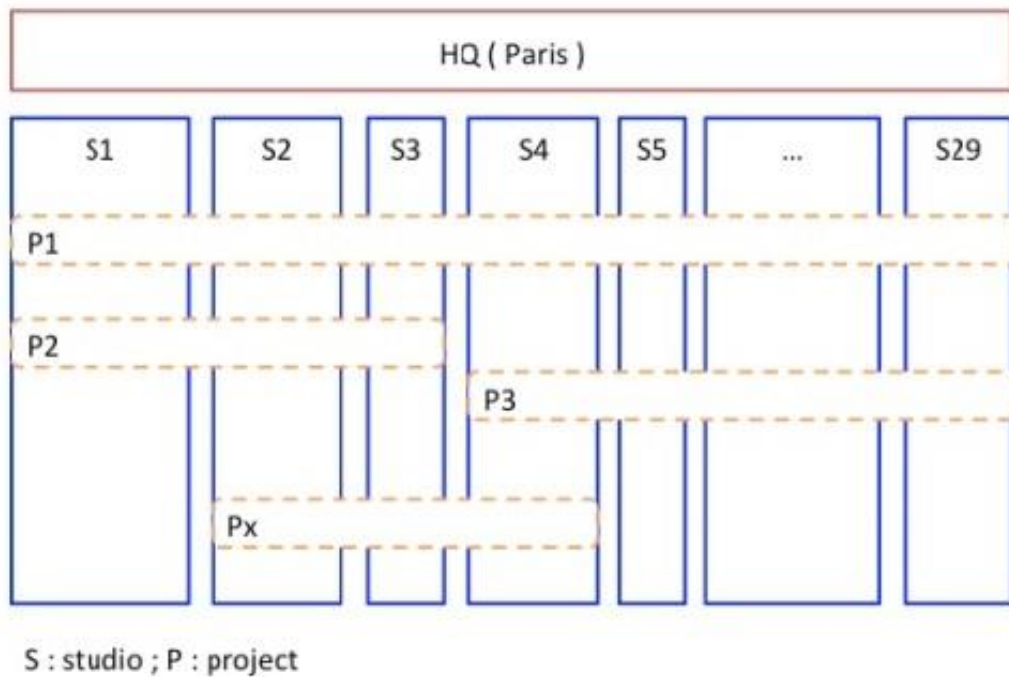


Figure 1 – Organization of the Company's Studios and Project. [1]

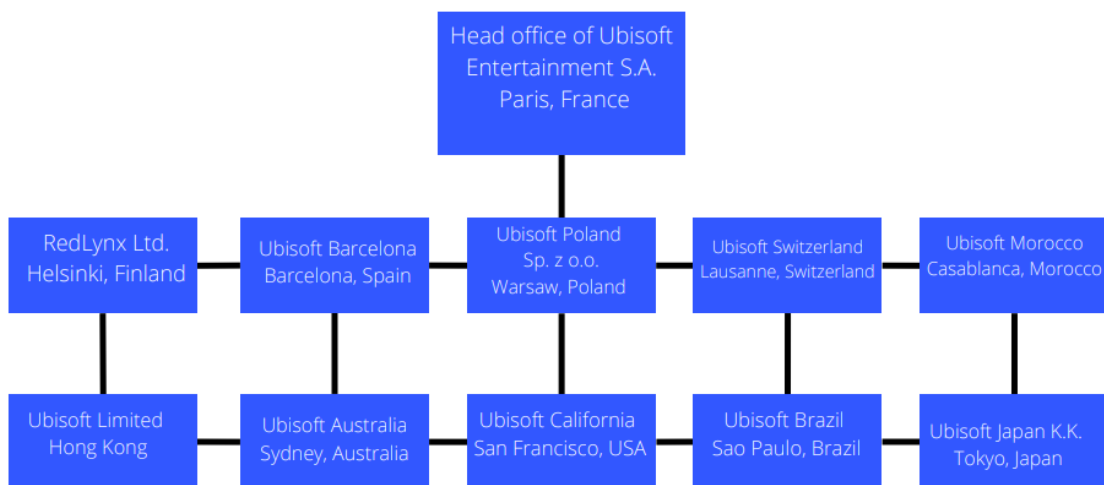


Figure 2 – Organization structure of the Company's Studios and Project

Management structure of the Ubisoft Entertainment company:

1) Yves Guillemot (Co-founder & CEO)

In 1986 Yves Guillemot and his four brothers founded Ubisoft convinced that video games were the future of entertainment. The Guillemot brothers understood early on that if they were to succeed, they would have to focus on creating original content and developing their own brands, while attracting and growing top in-house talents. For more

than 30 years, Yves has led Ubisoft to continually greater heights in an industry in constant transformation. Under his wings, Ubisoft's passionate teams have been able to take advantage of regular tech disruptions to innovate and to engage players in new ways. Driven by the strong belief that video games can enrich people's lives, Yves' goal is to bring games to billions all over the world so that even more players can have fun, shine and express their individuality

2) Alain Corre (Executive Director, EMEA Territories)

Alain Corre has served as Executive Director for EMEA (Europe, Middle East, Asia-Pacific) territories since 2000. Alain received his business degree from the Paris "Ecole Supérieure de Gestion" business school and joined Ubisoft as a marketing trainee in 1987. He quickly became Marketing Assistant, Marketing Director for France, Sales Director for Europe and then Managing Director for France. As Executive Director for the EMEA zone, Alain drives business, publishing operations and business development in mature markets while also promoting Ubisoft's growing presence in developing markets. In an increasingly expansive and competitive market, Alain and his teams succeeded in making Ubisoft one of the leading independent publisher in Europe EMEA territories. Alain is a Board member of the Interactive Software Federation of Europe association.

3) Laurent Detoc (President of Ubisoft, Americas)

Since joining Ubisoft in 1991, Laurent Detoc has never stopped pushing the boundaries to take Ubisoft games and services to more players around the world. With his strong leadership and pioneering spirit he successfully established Ubisoft's presence in Belgium and the Netherlands in 1993, and built a solid foundation that enabled the company to expand its footprint in Europe. His passion for the video game industry lies in the fast pace at which it evolves, one that perfectly reflects and matches his energetic mindset. This active mentality combined with his strong experience in Europe led him to San Francisco to solidify Ubisoft's business operations in North America. Bringing Ubisoft's global presence to new heights, Laurent was named President for the North, Central and South America territories in 1998. Under his leadership, Ubisoft became one of the most respected software publishers in the region, consistently ranked in the top

five entertainment software publishers in the U.S. With his tenured experience, he's considered a true asset in today's gaming industry, and serves on the Board of Directors for the Entertainment Software Association.

4) Virginie Haas

Virginie Haas became Chief Studios Operating Officer and a member of Ubisoft's Executive Committee in September 2020. Her mission in this role is to empower Ubisoft's teams to create the best games possible by implementing the group's production strategy at the studio level and managing its projects and creative talents. After a distinguished career of more than 30 years in the technology sector, she brings to Ubisoft an expertise in the fundamental technological transformations driving the video game industry, such as cloud computing and digital services. She gained invaluable experience in the development and transformation of rapidly growing companies during her time spent in several management positions at IBM's global office and French subsidiary, before joining Shift Technology in 2016. As Chief Revenue Officer, she contributed to the success of the French scale-up company, a member of the Next 40, by developing the business in more than 25 countries. Virginie Haas has been a member of Ubisoft's Board of Directors since 2017.

5) Frédéric Duguet (Chief Financial Officer)

When Frédéric Duguet integrated Ubisoft back in 2009 as Chief Financial Planning Officer, it was not only an opportunity to join a group of creative minds, but also express his belief in the growth potential and forward thinking nature of the video games industry, and its position at the crossroads of creativity, innovation and technology. Over the years, Frédéric's expertise and management skills have been instrumental in helping the company shift its business model and drive its digital transformation. Today, serving as Chief Financial Officer, his deep knowledge of Ubisoft and its creative vision, as well as the gaming industry, are key assets in enabling the group to unlock all the necessary value creation levers that support its strategy for its current and future development.

To fully analyze both the external and internal environment of Ubisoft Entertainment S. A., should use such strategic planning tools as SWOT analysis.

Overall, a fairly strong market position and broad global reach provide a broader revenue base, as well as reduce business risks by reducing vulnerability to country - specific risks. However, intense competition can negatively affect the company's market share, as well as its performance and profitability in general.

Table 6 – SWOT-analyze «Ubisoft Entertainment» company

	Strengths (S)	Weaknesses (W)
Internal factors	<ul style="list-style-type: none"> - Growth through acquisitions; - The group has operations in 30 countries 	<ul style="list-style-type: none"> - Lack of scale
External factors	<ul style="list-style-type: none"> - Strong market position and widespread business operations 	<ul style="list-style-type: none"> - Dependence on console manufacturers
Opportunities (O) <ul style="list-style-type: none"> - Active growth of the mobile gaming market; - Steady growth in the gaming software market; - Growing presence in emerging markets 	Strengths SO <ul style="list-style-type: none"> - To focus on the development of new mobile games; - Create high-quality and competitive games in popular genres; - Release frequent updates and improvements for games; - Focus on games for the next generation of consoles; - Create games with support for new relevant technologies 	Weaknesses WO <ul style="list-style-type: none"> - Release of games in the same period with other studios; - High price per game compared to competitors; - An advertising company targeting an erroneous target audience; - Use of microtransactions in story games
Threats (T) <ul style="list-style-type: none"> - Intense competition; - Technological changes and transition to solutions of game console manufacturers; - Increased computer piracy in terms of software 	Strengths ST <ul style="list-style-type: none"> - An active advertising campaign; - Regional pricing policy; - Create unique games; - Use up-to-date and strong protection of games from piracy; - Reduce the price of games 	Weaknesses WT <ul style="list-style-type: none"> - Higher price than the competitor; - Release of the same type of games every year; - Using the microtransaction system; - The lack of updates; - No free upgrade for the new generation of consoles

1. Strengths

Strong market position and broad global reach;

Ubisoft has established a strong market position in the gaming industry over the years. According to its annual report, it is the third independent video game publisher in the UK video game market. In the third quarter of fiscal 2015, Ubisoft became the third independent publisher in the United States and Europe with 10.1% and 14.3% market shares, respectively. In addition, the corporation has increased its presence in social networks, in gaming communities, and has more than a million fans on Facebook and 74 million players through the Uplay service, its own online platform for distributing content and providing services regarding their software.

The Group has offices in 30 countries in North America, the Middle East and Africa, as well as in the Asia-Pacific region. The extensive distribution network created by Ubisoft, thanks to its effective international activities, shows quite good results. The company's international operations are managed by local subsidiaries that develop and market products based on local preferences. Ubisoft also offers direct. Distribution through the Uplay service, digital distribution, software rights management, multiplayer and communication services. Thanks to its global achievements, the company has also become a major global distributor and supplier of video games.

Growth through acquisitions Ubisoft has already taken a leading position in the IT and gaming industry through non-organic growth strategies.

In 2013, the group acquired THQ Montreal and two companies specializing in shareware video games, including Digital Chocolate and Future Games of London. These acquisitions allowed Ubisoft to develop and distribute casual games for mobile devices and social networks. Other acquisitions in 2011 include the acquisition of Owlent, a company specializing in the development of shareware games, and RedLynx, which develops freely downloadable games. These acquisitions were part of the company's strategy to take the position of the creator and developer of online games in the international market. Previous acquisitions by Ubisoft have also been linked to this strategy. These acquisitions include the Nadeo studio, the purchase of the Tom Clancy

brand for video games and related products, and the Massive Entertainment studio. The group previously acquired Red Storm Entertainment and Blue Byte Software. These acquisitions have made Ubisoft one of the leading independent IT publishers.

The non-organic growth strategy allowed the company to strengthen its position in the gaming and IT markets, as well as significantly diversify its product range. This will allow the company to manage the growth of the already growing online gaming market.

If talk about business diversification, Ubisoft is focused on business diversification and occupies a leading position in the entertainment industry. In line with this strategy, in February 2014, Ubisoft and Sony Pictures Entertainment jointly developed a feature-length animated feature film based on the game Rabbids. The company launched Rabbids TV in 25 countries. Later, it was noted that it was viewed more than 300 million times during the first nine months of broadcasting and, thus, it took a position in the top ten of the world's 200 best animated films. In addition, Ubisoft has signed an agreement to produce the second season in partnership with Nicklelodeon (animated channel) and France Televisions. The group also focuses on producing feature films based on its franchises, developed in close collaboration with New Regency, Fox, Sony and Warner Bros. In addition, Ubisoft has marked its presence in theme parks with the opening of the Rabbids Ride in the French park Futuroscope. The company also intends to develop merchandising activities, especially in the field of toys and clothing. The Group focuses on business diversification, which will allow the company to compensate for the ongoing decline in the console market, as well as diversify cash flows and maintain a steady income flow, which will help focus on future investment growth.

2. If talking about disadvantages, then we can distinguish the following features:

Dependence on game console manufacturers. A significant portion of the company's revenue comes from the sale of video games for consoles. Ubisoft buys media and game media from manufacturers such as Sony, Nintendo and Microsoft. Delivery is subject to prior approval of the manufacturers, taking into account the production of these media in sufficient quantities and the establishment of the amount of license fees. Any changes in the terms of sale by manufacturers may have a significant impact on the

Group's results of operations. console manufacturers are big players and leaders in the video game market, so they have a higher market power compared to Ubisoft and, thus, increase the vulnerability to revenue and profitability of operating profit.

Lack of scale of activity. The Group lacks scale compared to competitors operating in the same industry the group reported revenues of \$1,349 million in fiscal year 2014 by comparison, Activision Blizzard had revenue of \$4.408 million for 2014 (the year ended December 2014).

Ubisoft Entertainment also commented on the negative operating profit margin (9.7%) and negative net profit margin of 6.5% in FY2014. By comparison, the company's direct competitor, Activision Blizzard, has an operating profit margin of 26.8% and a net profit of 18.9% for FY2014.

A negative margin indicates an inefficient allocation of the group's funds. In addition, the large scale of activities allows competitors to effectively use their funds and technologies to conclude larger contracts, as well as to further expand the scope of activities. Ubisoft's lack of scale limits its ability to implement a large-scale expansion plan for its business operations.

3. Opportunities.

Active growth of the mobile gaming market.

The mobile gaming industry is expected to experience record high growth rates in the coming years. In 2019, global revenue from mobile games grew to \$ 68.5 billion. According to experts, by the end of 2020, this figure will reach 76.7 billion dollars — an increase of 12%. Moreover, Western Europe, North America and the Asia-Pacific region are expected to remain the most attractive markets for mobile game publishers.

The company focuses on strengthening its presence in the mobile gaming industry. It has made significant investments in recent years to increase its presence in the mobile gaming market. The group released the game Trials Frontier in FY2014, which had over 10 million downloads on iOS, indicating a growing presence in the mobile gaming market. later, in June 2014, Ubisoft released just dance 2015 for consoles and just dance now, which allows players to play just dance tracks from their smartphones, as well as any internet-connected monitor.

In addition, the company is also developing mobile games that will have a cloud-based save system that allows gamers to change devices without interrupting the gameplay.

Steady growth in the gaming software market. The global software market experienced strong growth during 2013 and is projected to continue to grow strongly through 2017. According to MarketLine, the global software market will grow at a 4% average annual growth rate during 2013-17 and reach \$34.6 billion in 2017.

The group offers a range of games that suit both mainstream and casual gamers. The portfolio of these games includes a combination of graphics, storylines and characters, along with a variety of adventures and gameplay, as well as advanced artificial intelligence.

Growing presence in emerging markets. Ubisoft opened a new Russian division based in Moscow in October 2014. Through this step, the group intends to provide development to the Russian community and support Russian customers, as well as work closely with partners to develop marketing and sales growth in the emerging video game market. The Russian market continues to expand in almost all formats and on all platforms.

According to industry estimates, the online gaming market is booming and is expected to grow by 20% by 2016. In addition, the number of mobile gamers in Russia is expected to increase annually to reach the mark of 60 million by 2016. In addition, Russia recorded the largest number of active players from the total number within the game the crew.

4. Threats.

Intense competition. Ubisoft Entertainment S. A. operates in the highly competitive interactive software industry.

Competition in this industry is based on:

- 1) innovations, key features, playability, the quality of the product;
- 2) the recognition of the brand;
- 3) compatibility with popular platforms;
- 4) access to distribution channels;

- 5) competitive prices;
- 6) effective marketing;
- 7) quality customer service.

The main competitors of Ubisoft Entertainment:

- 1) Electronic Arts;
- 2) Nintendo Co., Ltd.;
- 3) Activision Blizzard, Inc.;
- 4) Take-Two Interactive Software, Inc.;
- 5) Tencent Holdings Limited;
- 6) Sony Interactive Entertainment;
- 7) CD Projekt RED;
- 8) Konami Corporation;
- 9) Xbox Game Studios.

According to this data, Ubisoft Entertainment has quite strong competition. There are many giant studios that also have their own representative offices in different countries. The main competitors in the industry are the products of publishers such as Electronic Arts and Activision. We are talking about the series of video games Battlefield and Call of Duty, breaking records for popularity around the world. Thanks to the possibilities of online play, they are becoming more popular every day.

Recently, there has been strong competition with CD Projekt RED. In February 2020, CD Projekt RED became the second-largest video game company by capitalization in Europe. But in May of the same year, CD Projekt RED was able to overtake Ubisoft Entertainment. So, the capitalization of CD Projekt RED was 8 billion euros, and Ubisoft Entertainment 7.8 billion. This position of both companies did not last long. After the disastrous release by CD Projekt RED of one of the most anticipated games of this year — Cyberpunk 2077, the company's capitalization and shares went down sharply. But Ubisoft Entertainment has a completely different situation, because the launch of a new game in the Assassin's Creed series called Valhalla was very successful for the company and its capitalization is still growing. Now CD Projekt RED is no longer the most expensive gaming company in Europe — this title has returned to Ubisoft Entertainment.

To date, the market capitalization of Ubisoft Entertainment is €10.5 billion. When CD Projekt RED has €6.6 billion.

As can be seen from the information studied above, Ubisoft Entertainment is a strong and influential company, one of the leaders in the market of entertainment content for personal computers and mobile platforms. The company produces truly great projects, and most importantly spectacular games for fans of virtual battles. The company's goal is to continue making money from its popular franchises, such as Assassin's Creed, Watch Dogs, Tom Clancy's, Far Cry, and so on. The company is obtained to make a successful game continuation of the famous series thereby creating a pipeline of production. According to the plans, the company does not plan to stop there and will continue to make money on the nostalgia of players using well-known names and heroes. Based on the latest news, Ubisoft Entertainment has plans to revive the old Prince of Persia and Splinter Cell franchises (which is a division of the Tom Clancy's franchise).

Of all the above, it is important to note that the company adheres to the principle of quantity, not quality. Therefore, the games are released almost every year, but their quality does not improve much. The addition of microtransactions to single-player games also has a negative impact. This approach of the company spreads the players, it causes negative ratings from gamers and can negatively affect profits.

The table below shows an analysis of the sales performance of Ubisoft Entertainment for 3 years (from 2018 to 2020). The table shows 6 indicators: sales, profits, assets, asset turnover, marginal profit, ROA. The data is given in millions of euros.

Table 7 – Analysis of the efficiency of the Company’s sales Ubisoft Entertainment [Annual Financial Report for last 3 years]

Year	Sales, €	Profits, €	Assets, €	Asset Turnover	Profit Margin	ROA
1	2	3	4	5	6	7
2020	1,594,831	1,341,754	3,604,841	0,4	29%	13%
2019	1,845,522	1,516,550	3,288,759	0,6	41%	23%
2018	1,731,894	1,435,074	2,805,122	0,6	45%	28%

*(in € thousands)

According to the data in the table, it is possible to understand the sales performance of Ubisoft Entertainment over the past 3 years. The difference in sales between 2020 and 2018 was EUR 137,063, a decrease of 7.04698%. According to the company's reports, sales declined in 2020 due to the pandemic. Income compared to previous years also fell in 2020, so for example, the income difference between 2020 and 2018 is 93,320 euros, which is less by 25%. This can be explained by the negative factors of the epidemic, which has had a negative impact on the world economy.

Based on the above data, in order to improve the performance of Ubisoft Entertainment, it is necessary to focus on digital sales. Because the pandemic slows down the production and sale of physical versions of games. This can be done by reducing the cost of only digital versions of games to make the purchase of games more affordable. An additional incentive may be the release of free add-ons and updates for games. This is necessary to maintain interest in the games. Also, one of the important problems is the illogical implementation of microtransactions in all projects. This can damage not only sales but also the status of the company. To improve the financial profit of the company, you need to carefully listen to the opinions of players, especially in games that are positioned as games services.

Table 8 shows the following indicators: operating cash flow; investment cash flow; financial cash flow. All data is expressed in millions of euros.

Table 8 – Capital Budgeting of Development Directions of the Company Ubisoft Entertainment [Annual Financial Report for last 3 years]

Project	Time				PV 1 to 3, €	NPV, €	PI
	0	2018	2019	2020			
1	2	3	4	5	6	7	8
A Cash Flow, €	619,77	493,13	798,7	493,13	448,30	258,31	1,58
B Cash Flow, €	-847,11	-743,25	-532,39	-624,2	-675,68	-389,32	1,58
C Cash Flow, €	25,07	354,46	-32,68	39,23	322,24	185,67	1,58

According to this table 8, the output is capital budgeting of development directions of the company Ubisoft Entertainment. Present value from operating activity became equal to 448,30 from investment -675,68, from financial 322,24. PI of the company in all three cases is more than 1, so the projects are successful and have a place to be.

The finite present value of a perpetuity is used by an analyst to determine the exact value of a company if it continues to perform at the same rate. This table analyzes 4 indicators, Present Value and Cumulative PV are calculated independently using formulas.

Table 9 – Perpetuity Stream with Interest Rate of the Company Ubisoft Entertainment for the 2018–2020 year, € [Annual Financial Report for last 3 years]

Time	Cash Flow (CF), €	Discount Factor (DF)	Present Value (PV), €	Cumulative PV, €
1	2	3	4	5
2020	600,358	0,91	545,78	0,91
2019	972,374	0,91	883,98	1,74
2018	600,358	0,91	545,78	2,49

*(in € thousands)

Discount Factor was taken from the Annual Financial Report of Ubisoft Entertainment. It specifies a risk-free discount rate of exactly 0.91%. The present value was calculated using the formula Cash Flow multiplied by the discount factor. Cumulative PV calculated by the formulas in the first year, it is equal to 0,91, in the second – 1,74 and the third - 2,49.

Table 10 shows the Perpetuity Stream with Interest Rate and Growth Rate of the Company Ubisoft Entertainment for the 2018-2020 years. Perpetuity in the financial system is a situation where a stream of cash flow payments continues indefinitely or is an annuity that has no end. In valuation analysis, perpetuities are used to find the present value of a company’s future projected cash flow stream and the company’s terminal value. Essentially, a perpetuity is a series of cash flows that keep paying out forever.

Table 10 – Perpetuity Stream with Interest Rate and Growth Rate of the Company Ubisoft Entertainment for the 2018–2020 year [Annual Financial Report for last 3 years]

Time	Cash Flow, €	Discount Rate	Discount Factor	Present Value, €	Cumulative PV, €
1	2	3	4	5	6
0	-	-	-	-	-
1	600,358	7,7%	0,93	558,33	0,93
2	972,374	7,7%	0,93	904,31	1,79
3	600,358	7,7%	0,93	558,33	2,59
				Net Present Value (Sum)	2020,97

This table analyzes 5 indicators, cash flow is taken from the annual report of Aeroflot, the discount rate is taken as the base - 7,7%, the discount factor is calculated

according to the formula and is equal to 0,93. The present value in time 1 is 558,33, in the second 904,31 and in the third 558,33. Net present value, you need to add up the numbers. The result is 2020,97.

Table 11 shows data on – Discounted Cash Flow of the Company Ubisoft Entertainment for the last 3 years. Discounting cash flows (DCF) is the reduction of the value of future (expected) cash payments to the current point in time. Discounting cash flows is based on the important economic law of the decreasing value of money. In other words, over time, money loses its value compared to the current one, so it is necessary to take the current moment of valuation as a reference point and bring all future cash receipts (profits/losses) to the present time. For these purposes, a discount factor is used. This data was taken from a real project of the company.

Table 11 – Discounted Cash Flow of the Company Ubisoft Entertainment [Annual Financial Report for last 3 years]

Time	Project Cash Flow, €	Interest Rate, %		Discount Factor	Present Value, €
		average	total		
1	2	3	4	5	6
Today	-118,1				
Year 1	91,8	7,7%	7,7%	0,93	85,37

Continuation of table 11

Year 2	329,4	7,7%	7,7%	0,93	306,34
Year 3	365,1	7,7%	7,7%	0,93	339,54
				Net Present Value (Sum):	731,26

According to this table, if at the moment the company " Ubisoft Entertainment" will invest 118,1 thousand of euros in the project, it will be profitable. The main rates are 7,7%. The discount factor was calculated using the formula and is equal to 0,93. In this case, the present value for the first year will be equal to 85,37, for the second 306,34, for the third 339,54. Net Present Value be equal 731,26 €.

Table 12 analyzes Ubisoft Entertainment's financial statements. The main source of information is the annual reports for 2018-2020. Financial statements are written records that convey the business activities and the financial performance of a company. Financial statements are often audited by government agencies, accountants, firms, etc. to ensure accuracy and for tax, financing, or investing purposes. Financial statements include:

- performance Measures (6 indicators);
- efficiency Measures (7 indicators, one of this can't be analyzing on Ubisoft Entertainment Company);
- leverage Measures (5 indicators);
- liquidity Measures (4 indicators).

Table 12 – Common-Size Financial Statement of the Company Ubisoft Entertainment [Annual Financial Report for last 3 years]

#	Indicator	Meaning			Growth rate (+, -), %
		1 year	2 year	3 year	
1	2	3	4	5	6
Part 1 Performance Measures					
1.1	Market Value Added, €	8,886	8,243	12,05	74%
1.2	Market-to-book-ratio	8,42	9,39	6,04	139%
1.3	EVA, €	99,65	123,99	143,24	70%
1.4	Return on capital ROC, %	10,39%	5,93%	2,41%	431%
1.5	Return on equity (ROE), %	14,89%	10,58%	-11,14%	-134%
1.6	Return on assets (ROA), %	5,53	3,15	-3,61	-153%
Part 2 Efficiency Measures					
2.1	Asset turnover	0,69	0,58	0,46	67%
2.2	Inventory turnover	14,05	12,19	11,24	125%
2.3	Days in inventory	25,98	29,95	32,48	80%
2.4	Receivables turnover	2,69	2,78	3,67	73%
2.5	Average collection period (days)	91,8	94,27	70,28	131%

Continuation of table 12

2.6	Profit margin	17,3	24,2	15,1	115%
2.7	Operating profit margin	15,04	11,28	2,59	581%
Part 3 Leverage Measures					
3.1	Long-term debt ratio	1,136	993,85	1,076	106%
3.2	Long-term debt-equity ratio	0,33	0,27	0,33	100%
3.3	Total debt ratio	1,46	1,46	1,08	135%
3.4	Times-interest-earned				
3.5	Cash coverage ratio	14,69	9,95	2,28	644%
Part 4 Liquidity Measures					
4.1	Net-working-capital-to-total-assets	-99,67	267,8	70,43	-142%
4.2	Current ratio	1,67	1,33	1,71	98%
4.3	Quick ratio	1,65	1,31	1,69	98%
4.4	Cash ratio	1,06	0,89	1,37	77%

The following conclusions can be drawn from the table. Market Value Added it has quite large indicators, and has grown by 74% in three years. The higher the MVA value, the better. The high value of market value added indicates that the company has created significant value for share-holders. The market - to-balance ratio shows that the indicator is not stable because there are ups and downs, but the company's shares are valuable all these years.

Return on Equity (ROE) — shows the efficiency of the company's use of equity. In other words, ROE shows how much net profit a company makes on its invested capital. We can observe the negative dynamics of the indicator, it has decreased over 130% in 3 years.

Return on Assets (ROA) – shows the efficiency of the company's use of assets. In other words, ROA shows how much net profit a company generates from its own assets. This indicator is within the normal range, except for the last year, although in 3 years it has fallen by 153%.

Asset turnover-demonstrates the intensity of using the company's assets to generate revenue. Simply put, it is the ratio of revenue to the weighted average value of the company's assets. There is a negative trend, but in the end the indicator reaches 67%.

The receivables turnover ratio is an accounting measure used to quantify a company's effectiveness in collecting its receivables or money owed by clients. The ratio shows how well a company uses and manages the credit it extends to customers and how quickly that short-term debt is collected or is paid. This indicator increased by 73% and overall, there is a positive trend in the use of funds.

Operating profit margin increased by 581%, which indicates the rational use of resources for profit.

Leverage Measures in general shows that liabilities are used within the norm, indicators calculated using formulas are within the norm, although changes are very jumpy.

Liquidity Measures and in particular the Quick ratio and Cash ratio have a fairly low performance. The normal value of the quick liquidity ratio is considered to be 1 – this means that the company is fully equipped with sufficient current assets for immediate liquidation to repay its current liabilities. If the company's indicator is less than 1, it may not be able to fully repay its current liabilities in the short term, and this is a bad signal for the investor. Most often, the normal value of the absolute liquidity ratio of the company is considered to be 0.2 – this means that the company is able to fully cover 20% of liabilities with a period of up to 12 months at the expense of cash and cash equivalents. If the company has an absolute liquidity ratio of less than 0.2 – this indicates that the company does not have enough "instant" liquidity, but this does not mean that the company has problems. According to the data in the table, the liquidity is almost 1.5%. And the percentages are very high, which indicates the success of the company.

Ubisoft Entertainment is a popular global game studio, with a large budget and high income. It is one of the leaders among all the world's game studios. Profit for 2019 was 2,028.6 million euros, up 17.1% year-on-year, in line with a target of around 2,050

million euros. But in 2020, revenues amounted to 1,534. 0, which is 24.4% less than last year. A major role in this was influenced by the global pandemic. In general, Ubisoft Entertainment is a dynamically developing company that occupies a significant share in the video game market.

In general, the dynamics of indicators reflecting the financial and economic activities of Ubisoft Entertainment is positive, revenue and sales of games, special digital content, which includes microtransactions, are growing. However, in 2020, there was a significant decline in profitability, which led to the fact that the company received a significant loss at the end of the year. Therefore, it should be noted that, despite the successful financial activities of Ubisoft Entertainment, there are individual crises, such as c, fixed costs, a sharp drop in profitability, which makes it important and necessary to take into account these factors.

In the conclusion of chapter, summing up, it is necessary to highlight the main conclusions on the chapter. Ubisoft Entertainment is a simplified joint stock company with a capital of 11,959,727 euros, registered in the Commercial Register of Companies of Bobigny in France. The company was founded by five brothers in 1986. Thanks to the cooperation with many game developers, the company managed to expand beyond its national market by the end of the decade and start working in Germany, the United States and the United Kingdom. The next stage in the development of Ubisoft Entertainment was the opening in 1994 of its own studio engaged in the development of video games. In 1996, the company, in addition to its central office in Montreal, officially opens another one – in Shanghai. Since 2000, the company has been actively buying up controlling stakes in small but promising game developers, as well as producing several online game projects. Today, Ubisoft Entertainment is one of the largest manufacturers in the market of computer games, with offices in many countries. The company has several major franchises of popular games and thanks to each new part of one of these franchises, the company's capital becomes more and more. The main office of the company is located in France, but the company distributes the development load among all the main studios. Ubisoft Entertainment has a very specific organization of work, this is due to the fact that the staff for 2020 is more than 18 thousand people. This is a very

large number, which allows you to distribute work efficiently and quickly achieve success. But at the same time, this is a serious problem, because Ubisoft Entertainment operates several offices in different countries at once, which leads to the fact that people have language barriers and misunderstandings. It is very difficult to work on one project without having a constant connection with the participants of this project. This also applies to the overall vision of the project, for example, in one office, a team of developers works on one part of the project, and another on another, and they do not have a common connection and understanding of the project. This can have a bad effect on the quality of the product. But Ubisoft Entertainment shows very high production rates. Thanks to the distribution of labor, the company produces several large projects every year. This contributes to a large reach of consumers and high profits. Ubisoft Entertainment combines strengths and weaknesses. But it is the company's strengths that allow it to take the first place among all gaming companies in Europe. Competition with other companies helps the development of Ubisoft Entertainment. This is reflected in the company's indications indicated in the study. According to this data, the company maintains a high profit every year. Also, based on all calculations, the company has high success rates and a relatively small percentage of risk. Such indicators help to predict the successful strategy of the company for several years ahead.

2.4 Impact of microtransactions on Ubisoft Entertainment company

The subject of the study is Ubisoft Entertainment. Ubisoft Entertainment is a France-based company active in the video game industry by developing, publishing and distributing video games for consoles, PCs (personal computers), smartphones and tablets in both physical and digital formats.

It owns several brands and a diversified portfolio of franchises, including Assassin's Creed, The Crew, Far Cry, For Honor, Tom Clancy's Ghost Recon, Tom Clancy's Rainbow Six Siege, Tom Clancy's The Division and Watch Dogs. The Company, through its subsidiaries is active globally. Registered address at 28, rue Armand Carrel, 93100 Montreuil-sous-Bois, France.

Table 13 shows data about the income of Ubisoft Entertainment for 2015-2020. All data is taken from the company's annual reports. The data in table 4 is shown in millions of euros.

Table 13 – Data about the profits of the company Ubisoft Entertainment in million EUR [22]

Indicator	Years						Growth rate 2015 to 2020, %
	2015 31/03	2016 31/03	2017 31/03	2018 31/03	2019 31/03	2020 31/03	
1	2	3	4	5	6	7	7=6:2-100%
Total revenue	1464,00	1 394,00	1459,87	1731,89	1845,52	1594,83	8,94
Cost of Revenue, Total	337,07	305,07	270,89	296,82	328,97	253,08	-24,92
Gross profit	1178,17	1 088,93	1188,99	1435,07	1516,55	1341,75	13,88

According to this data, the company's profit is growing every year, but the exception is 2020. The decline in performance is due to a global pandemic that affects the production of physical copies of games and consequently reduces profits. But despite this, the indicators remain quite high. For example, the total revenue of Ubisoft Entertainment in 2020 amounted to 1594,83 million euros, which is 8,94% more than in 2015. The gross profit indicator also increased to 1341,75 in 2020, which is 13,88% higher than in 2015. But despite this, the cost of revenue in 2020 fell by 24,92% compared to 2015, amounting to only 253,08.

Ubisoft Entertainment ranks first in Europe in terms of capitalization among all studios in Europe. Popular game series and microtransactions help the company to do this. Every year, the company releases many large projects. This is possible thanks to the large number of studios and employees around the world. Ubisoft

Entertainment creates an efficient distribution of labor that allows you to create many prototype games at the same time. But in addition, an important role is played by the company's policy, which is aimed at obtaining additional profit from microtransactions. The company uses this approach not only for online games, but also for single-player story projects. Recently, this is increasingly becoming the main cause of discontent among fans. The company not only adds microtransactions to the game, but also literally forces the player to buy them. For example, developers specifically make the game too complex and stretched so that players have a reason to buy the so-called "time savings" for real money.

The very idea of such microtransactions is very useful because it can help people who do not play games well or for people who do not have much time for games. But the company Ubisoft Entertainment creates the game in such a way as to force even professional players to buy it. This problem has been discussed several times in the media. Sometimes, due to a lot of criticism, the company listens to the players and changes the game's economy to make the game easier for all players. But if this is so damaging to the company's status and image, then why does Ubisoft Entertainment continue to add microtransactions to all of its games? The answer to this question can be found in the following table and its conclusions.

Table 14 presents information on the sales of games of Ubisoft Entertainment in 2015 - 2020. The data was obtained from the annual reports. All data in the table is expressed in millions of euros. Total annual sales are the company's total sales for the year. Annual digital revenue is only the company's digital sales for the year from the total sales, this includes not only games in digital format, but also additional downloadable content (DLC) and microtransactions. PRI net bookings-this is the sale of only additional digital content, it includes directly add-ons to games and microtransactions. Ubisoft Entertainment company gives the following definition of PRI - Player Recurring Investment includes sales of digital items, DLC, season passes, subscriptions and advertising.

Table 14 – Data on the number of total and digital sales of Ubisoft Entertainment in million EUR [22]

Indicator	Years						Growth rate 2015 to 2020, %
	2015 31/03	2016 31/03	2017 31/03	2018 31/03	2019 31/03	2020 31/03	
1	2	3	4	5	6	7	7=6:2- 100
Total annual sales	1463,8	1394,0	1459,9	1731,9	2028,6	1 534,0	4,80
Annual digital revenue	382,7	446,7	729,3	1004,7	1396,6	1261,3	229,58
PRI net bookings	186,6	202,2	304,0	482,5	644,0	702,4	276,42

According to the data in the table, total annual sales are growing every year, with the exception of 2020, but such a sharp jump down is caused by a worldwide pandemic that negatively affects the global economy. Despite this, total sales for 2020 are 1534 million euros, which is 4.80% higher than the figure for 2015. Annual digital revenue is growing every year at a high rate, even in 2020, a large figure of 1261,3 million euros is 229,58% more than the figure for 2015. This trend shows an increase in the demand for digital content. PRI net bookings also maintains a strong growth rate, with sales of microtransactions and game add-ons accounting for 702,4 of total sales in 2020. This is a very high figure, which is 276,42% higher than in 2015.

In conclusion, it is important to note the growing popularity of digital content and microtransactions in particular. This trend is evident not only in Ubisoft Entertainment, but also around the world. Digital content is expanding and providing more opportunities for players. Also growing in popularity is the popularity of microtransactions that create new economic policies in the video game industry. According to the analyzed data, microtransactions account for more than half of the total number of sales of digital goods. It also accounts for a large percentage of total

sales. According to this trend, digital sales and microtransactions will grow every year, which underlines the relevance of this topic.

3 Econometric Modeling and Forecasting of the impact of microtransactions on computer gaming industry

3.1 Panel Data Set on sales of copies of video games and its selection, processing the percentage of micropayments from all revenue

The global audience of gamers on all gaming platforms exceeds 2 billion people, which is played by every fourth person on the planet. And this number is constantly growing—thanks to young people who use the mobile Internet almost from birth. Unlike older generations, young people from Generation Z around the world do not just play games, for them it is a way of communicating with the outside world and friends, which makes gaming a potentially attractive marketing channel for global corporations. The COVID-19 epidemic also contributed to the popularity of gaming: in the absence of real entertainment, people of different generations play more virtual games. According to Bloomberg data for June, the number of users increased by 35% during the pandemic. Research company NewZoo predicts a 20% increase in sales of the global gaming market by the end of 2020 — up to \$175 billion and up to \$256 billion—by the end of 2025. For comparison, Russia's revenues from oil exports in a successful 2019 amounted to \$122 billion.

According to these data, this is a very popular and rapidly developing area of the economy. The field of video games is very different from other areas of the economy, so for example, video games, according to the previous chapters of this work, have two main ways of profit. The first is the sale of games as a separate and independent product, the so-called standard method. And the second more new and demanded method of profit is microtransactions. Thanks to the microtransaction system, profits from video games are coming in large numbers and over a long period of time.

Microtransactions are the most debatable way to profit at the moment. Because thanks to this method of profit, video game companies receive tens of thousands of times more profit than for selling games. This is due to the fact that with the help of small but frequent payments, a person becomes more and more

involved in this system. This is especially popular among young children. So very often in the media it was discussed that children spend a lot of money from their parents' bank card on microtransactions. For example, for real money, the child is offered to buy a special costume for his favorite character in the game. This costume will be special and different from the usual free ones, so it is difficult for children and even adults to resist the temptation. But this is just one example out of a thousand possible variations of microtransactions.

Table 15 below provides an econometric analysis of 18-year sample data (from 2002 to 2019) Ubisoft Entertainment company. The variables are: PRI net bookings expressed in millions of euros; Net bookings expressed in millions of euros; Number of active video gamers worldwide expressed in millions; Average salary in the European Union also expressed in millions of euros. All data is specified in the selected time period.

According to the appendix 1, the annual growth of PRI net bookings is due to the influence of three variables. The annual growth of active players (according to the table) has a big impact on the number of microtransactions, in addition, this growth supports the increase in average wages in the European Union.

Based on these data, there is a positive trend due to increasing sales revenues (Net bookings), but based on the data in the table, this relationship is not always evident. For example, in the last 4 years, there is a trend of growth of only one indicator (PRI net bookings), despite the stagnation or even a decrease in the second indicator (Net bookings). This indicates that the profit from microtransactions brings more and more revenue every year. According to forecasts, the percentage of profit from microtransactions in the coming years will be able to match the profit from real sales of products. There is no denying that in the near future, the profit for microtransactions will be higher than the profit for selling the product.

These data were selected to demonstrate the relationship between microtransactions and the factors that affect them. The table data shows that the selected data is balanced. This means that the indicators were selected correctly. Based on this, it follows that the calculations are correct.

Table 15 shows Ubisoft Entertainment's «y» - PRI net bookings between 2002 and 2019, and the same company's «x₁» -Net bookings over the same time period. The data is given in millions of euros.

Table 15 – Variables for the construction of the Simple Liner Regression Model [22]

Year	x ₁ , millions of euros	y, in million euros
2002	201,6	32,3
2003	250,3	37,50
2004	286,4	46,70
2005	360,7	48,90
2006	452,4	50,20
2007	612,7	57,10
2008	639,5	62,30
2009	512,8	68,60
2010	673,6	72,10
2011	718,1	80,20
2012	913,5	128,4
2013	721,8	152,5
2014	1126,7	191,3
2015	1088,9	223,3
2016	1189,0	304,0
2017	2050,0	482,5
2018	2028,6	644,0
2019	1534,0	702,4

According to the data in the table, both indicators are growing every year. From the regular relationship of indicators, it is clear that x₁ affects y. This is a logical conclusion because game sales also mean a possible increase in microtransactions. But it is important to note that sometimes microtransactions grow regardless of the number of games sold. This trend can be traced according to the table.

For the construction of the dot plot, the basis was a non-linear trend line, which is most often used, and a polynomial one, since the approximation coefficient achieves the best results in this variant.

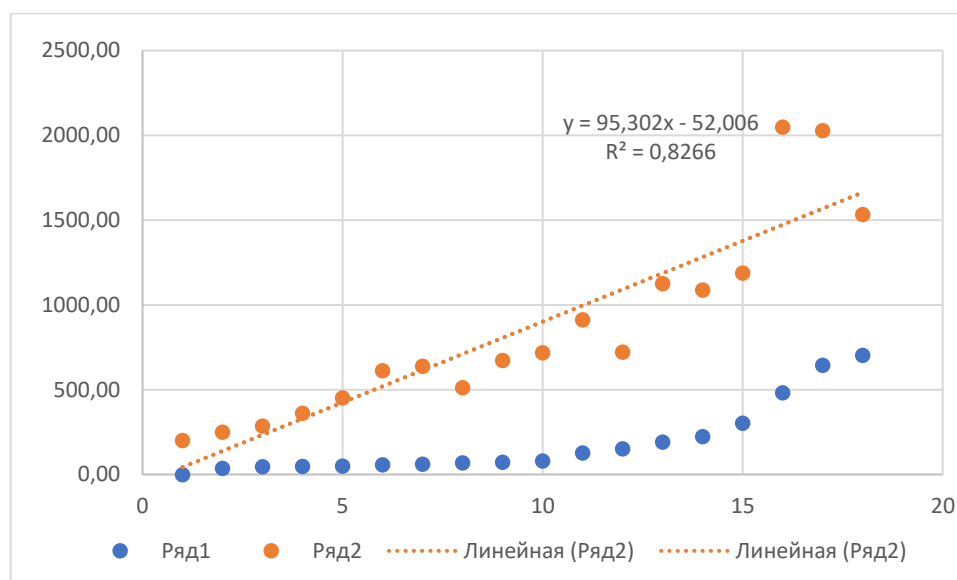


Figure 3 – Linear function for x_1

As can be seen from the dot plot, the approximation coefficient $R^2 = 0,8266$. This is a high approximation factor, because it is in the range of 0,7–0,9, so it means a successful data sample.

The term "panel data" came from surveys of individuals, and in this context, a "panel" was a group of individuals who were regularly monitored over a period of time. Currently, panel data analysis methods have become widespread, and the understanding of panel data has become much broader. Along with the term "panel data", the term "longitudinal data" is sometimes also used.

Panel data consists of repeated observations of the same sample units that are made in consecutive time periods. As objects of observation there may be individuals, households, firms, countries, etc. Examples of panel data may be annual surveys of the same households or individuals (for example, to determine changes in their well-being), quarterly data on the economic activities of individual companies, annual socio-economic indicators for regions of one country or for a group of countries, etc.

Table 16 shows Ubisoft Entertainment's «y» - PRI net bookings between 2002 and 2019 expressed in millions of euros., the second indicator is « x_2 » - the number of active video gamers around the world expressed in millions, over the same time period.

Table 16 – Variables for the construction of the Simple Liner Regression Model

Year	x_2 , in millions	y, in million euros
2002	121,0	32,3
2003	264,0	37,50
2004	407,0	46,70
2005	550,0	48,90
2006	693,0	50,20
2007	836,0	57,10
2008	979,0	62,30
2009	1122,0	68,60
2010	1265,0	72,10
2011	1408,0	80,20
2012	1551,0	128,4
2013	1694,0	152,5
2014	1837,0	191,3
2015	1990,0	223,3
2016	2110,0	304,0
2017	2260,0	482,5
2018	2420,0	644,0
2019	2550,0	702,4

According to this table, both indicators are growing every year, especially in x_2 . This is due to the fact that every year new technologies develop and become more popular. For the above figures in 18 years, a very large jump in new gamers is visible. But it is worth noting that the growth is smooth.

From the data shown above, it can be seen that x_2 directly affects y. This is a logical conclusion, because with the number of new players, the number of people who will use microtransactions increases. This trend can be traced in the entire

period of time, it is shown on the table.

For the construction of the dot plot, the basis was a non-linear trend line, which is most often used, and a polynomial one, since the approximation coefficient achieves the best results in this variant.

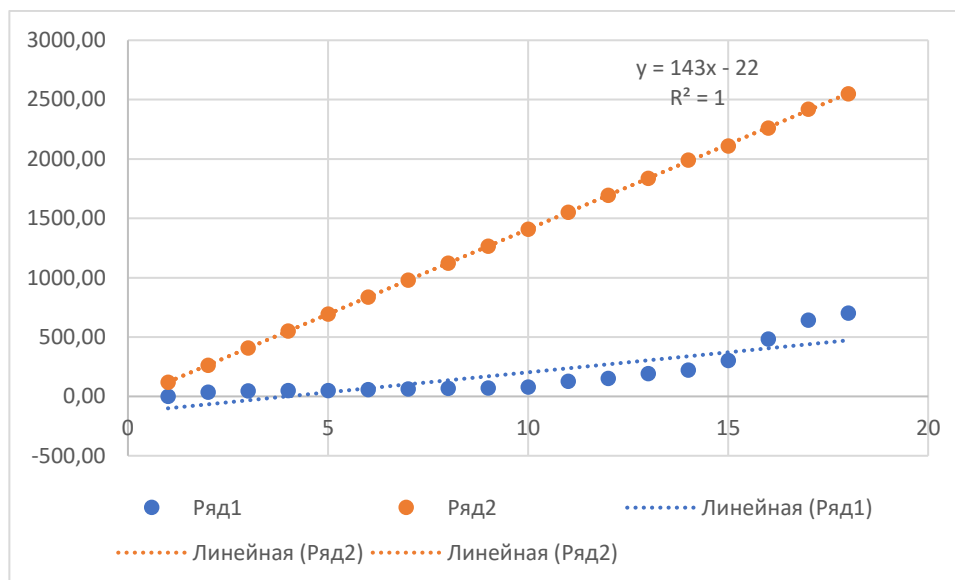


Figure 4 – Linear function for x_2

According to the graph, the approximation coefficient $R^2 = 1$. This means that the line lies exactly on a straight line, which means that this model accurately describes the available data. Thus, the data selection is successful.

Panel data allows you to design and test more complex behavioral models than spatial data and time series alone. For example, technical efficiency is better studied and modeled with panel data. Also, the panels may impose fewer restrictions on distributed lag models, which are usually considered in time series.

Table 17 shows Ubisoft Entertainment's «y» - PRI net bookings between 2002 and 2019, and the same company's « x_3 » - average salary in the European Union over the same time period. The data is given in millions of euros.

Table 17 – Variables for the construction of the Simple Liner Regression Model

Year	x_3 , in million euros	y, in million euros
2002	11964,5	32,3
2003	12297,8	37,50
2004	12631,0	46,70
2005	12964,2	48,90
2006	13297,4	50,20
2007	13630,7	57,10
2008	13963,9	62,30
2009	14297,1	68,60
2010	14841,0	72,10
2011	14960,0	80,20
2012	15456,0	128,4
2013	15433,0	152,5
2014	15790,0	191,3
2015	16138,0	223,3
2016	16530,0	304,0
2017	16891,0	482,5
2018	17441,0	644,0
2019	17819,0	702,4

According to the data in the table, both indicators are growing every year.

But x_3 keeps a slow growth rate every year, despite this indicator is considered very high. Comparing the average wage in the European Union and other countries, it turns out a big difference in indicators. It is important to note that the price for 1 game is the same in all countries and is 69.99 euros. Therefore, the purchasing power of people from the European Union is much higher than that of buyers from other countries. This trend can be traced in the table.

For the construction of the dot plot, the basis was a non-linear trend line, which is most often used, and a polynomial one, since the approximation coefficient achieves the best results in this variant.

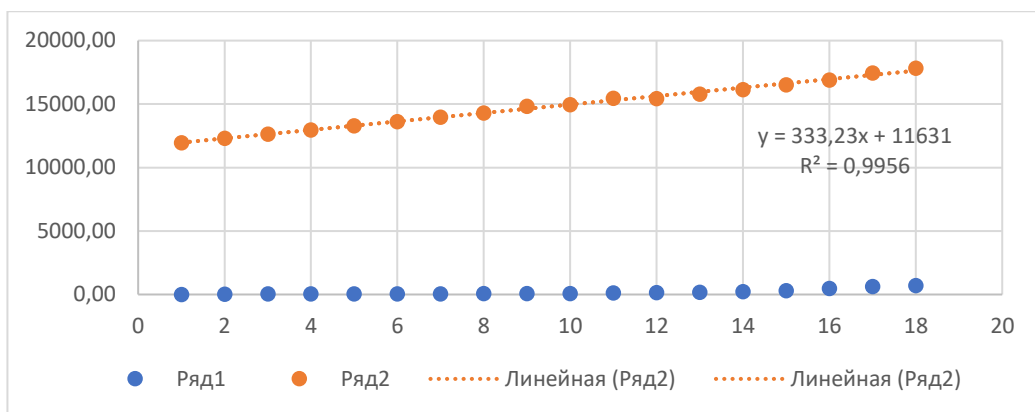


Figure 5 – Linear function for x_3

As can be seen from the dot plot, the approximation coefficient $R^2 = 0,9956$. This is a very high approximation factor, because it is in the range of 0,9–0,99, so it means a successful data sample.

The next step is to calculate the parameters of a simple linear regression. According to the selected indicators, x - is Ubisoft Entertainment's net bookings; y - is Ubisoft Entertainment's PRI net bookings. All data is presented in millions of euros.

Table 18 – Calculation of the Simple Liner Regression Model's Parameters

i	x_1	y	$x*y$	x^2	y^2
1	201,6	32,30	6511,68	40 643	1043,29
2	250,3	37,50	9386,25	62 650	1406,25
3	286,4	46,70	13374,88	82 025	2180,89
4	360,7	48,90	17638,23	130 104	2391,21
5	452,4	50,20	22710,48	204 666	2520,04
6	612,7	57,10	34985,17	375 401	3260,41
7	639,5	62,30	39840,85	408 960	3881,29
8	512,8	68,60	35178,08	262 964	4705,96
9	673,6	72,10	48566,56	453 737	5198,41
10	718,1	80,20	57591,62	515 668	6432,04
11	913,5	128,4	117293,4	834 482	16486,56
12	721,8	152,5	110074,5	520 995	23256,25
13	1126,7	191,3	215537,71	1 269 453	36595,69
14	1088,9	223,3	243151,37	1 185 703	49862,89
15	1189,0	304,0	361456	1 413 721	92416,00
16	2050,0	482,5	989125	4 202 500	232806,25
17	2028,6	644,0	1306418,4	4 115 218	414736,00
18	1534,0	702,4	1077481,6	2 353 156	493365,76

	Σx	Σy	$\Sigma x \times y$	Σx^2	Σy^2
n					
18	15 360,6	3384,30	4706321,78	18 432 046	1392545,19

$$(\Sigma x)^2 \qquad (\Sigma y)^2$$

235 948 032,4	11453486,49
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slop, m=	95,302
y-int, b=	52,006
r=	0,8887
$R^2=$	0,8266

Table 18 provides an analysis of the assessment of the significance of the indicators. Check the adequacy of the model was successful. The metrics satisfy this model.

The next step is to calculate the parameters of a simple linear regression. According to the selected indicators, x - number of active video gamers worldwide expressed in millions; y - PRI net booking of Ubisoft Entertainment.

Table 19 – Calculation of the Simple Liner Regression Model's Parameters

i	x_2	y	$x \cdot y$	x^2	y^2
1	121,0	32,30	3908,3	14 641	1043,29
2	264,0	37,50	9900	69 696	1406,25
3	407,0	46,70	19006,9	165 649	2180,89
4	550,0	48,90	26895	302 500	2391,21
5	693,0	50,20	34788,6	480 249	2520,04
6	836,0	57,10	47735,6	698 896	3260,41
7	979,0	62,30	60991,7	958 441	3881,29
8	1122,0	68,60	76969,2	1 258 884	4705,96
9	1265,0	72,10	91206,5	1 600 225	5198,41
10	1408,0	80,20	112921,6	1 982 464	6432,04
11	1551,0	128,4	199148,4	2 405 601	16486,56

Continuation of table 19

12	1694,0	152,5	258335	2 869 636	23256,25
13	1837,0	191,3	351418,1	3 374 569	36595,69
14	1990,0	223,3	444367	3 960 100	49862,89
15	2110,0	304,0	641440	4 452 100	92416,00
16	2260,0	482,5	1090450	5 107 600	232806,25
17	2420,0	644,0	1558480	5 856 400	414736,00
18	2550,0	702,4	1791120	6 502 500	493365,76
	Σx	Σy	$\Sigma x \times y$	Σx^2	Σy^2
n					
18	24 057,0	3384,30	6819082	42 060 151	1392545,19

$(\Sigma x)^2$	$(\Sigma y)^2$
578 739 249,0	11453486,49

slop, m=	143
y-int, b=	22
r=	0,876
$R^2=$	1

Table 19 provides an analysis of the assessment of the significance of the indicators. Check the adequacy of the model was successful. The metrics satisfy this model.

The next step is to calculate the parameters of a simple linear regression. According to the selected indicators, x - average salary in the European Union; y - PRI net booking of Ubisoft Entertainment. All figures are given in millions of euros.

Table 20 – Calculation of the Simple Liner Regression Model's Parameters

i	x_3	y	x^*y	x^2	y^2
1	11964,5	32,30	386454,0352	143 149 768	1043,29
2	12297,8	37,50	461165,6818	151 234 692	1406,25
3	12631,0	46,70	589866,8509	159 541 702	2180,89
4	12964,2	48,90	633949,9727	168 070 796	2391,21
5	13297,4	50,20	667531,6097	176 821 975	2520,04
6	13630,7	57,10	778311,4127	185 795 239	3260,41
7	13963,9	62,30	869951,1588	194 990 588	3881,29
8	14297,1	68,60	980783,3467	204 408 022	4705,96

Continuation of table 20

9	14841,0	72,10	1070036,1	220 255 281	5198,41
10	14960,0	80,20	1199792	223 801 600	6432,04
11	15456,0	128,4	1984550,4	238 887 936	16486,56
12	15433,0	152,5	2353532,5	238 177 489	23256,25
13	15790,0	191,3	3020627	249 324 100	36595,69
14	16138,0	223,3	3603615,4	260 435 044	49862,89
15	16530,0	304,0	5025120	273 240 900	92416,00
16	16891,0	482,5	8149907,5	285 305 881	232806,25
17	17441,0	644,0	11232004	304 188 481	414736,00
18	17819,0	702,4	12516065,6	317 516 761	493365,76

	Σx	Σy	$\Sigma x \times y$	Σx^2	Σy^2
n					
18	266 345,6	3384,30	55523264,57	3 995 146 254	1392545,19

$$(\Sigma x)^2 \qquad (\Sigma y)^2$$

70 939 988 324,7	11453486,49
------------------	-------------

slop, m=	333,23
y-int, b=	11631
r=	0,764
R ² =	0,9956

Table 20 provides an analysis of the assessment of the significance of the indicators.

Check the adequacy of the model was successful. The metrics satisfy this model.

In conclusion of 3.1 point, there is an increase in many indicators, in particular, the profit from microtransactions. According to the calculations, this trend will be observed for many years in the future. Various factors contribute to this. Based on the data in the calculations, microtransactions bring more and more profit every year. According to this, in terms of profit, microtransactions can overtake real sales of games. This will lead to changes not only in the company's policies, but also affect future games of Ubisoft Entertainment. In most cases, the dot plot shows an approximation factor of 1 or close to it. This means that the line

lies exactly on a straight line or is close to it. This means that this model accurately describes the available data. Thus, the data selection is successful. Thus, thanks to the calculations, reliable data is predicted.

3.2 Algorithms of the Econometric Modeling Process of the impact of microtransactions on the quality of video games

The purpose of econometric modeling is usually considered to be the analysis of the economic object (process) under study; the forecast of its economic indicators, the simulation of the development of the object at different values of exogenous variables (reflecting their random nature, change in time), the development of management decisions.

There are usually six main stages of econometric modeling: staged, a priori, parameterization, information, and identification and verification of the model.

Stage 1 (staged). The research goal is formed, and the set of economic variables involved in the model is determined. When choosing economic variables, a theoretical justification of each variable is necessary (it is recommended that the number of them is not very large and at least several times less than the number of observations). Explanatory variables should not be linked by a functional or close correlation, as this may lead to the inability to estimate the model parameters or to obtain unstable, meaningless estimates, i.e., to the phenomenon of multicollinearity.

Stage 2 (a priori). The analysis of the essence of the object under study, the formation and formalization of a priori (known before the modeling) information is carried out.

Stage 3 (parameterization). Direct modeling is carried out, i.e. the choice of the general model type, the identification of the relationships included in it. The main task to be solved at this stage is to choose the type of function $f(X)$ in the econometric model (1.1), in particular, the possibility of using a linear model as the simplest and most reliable. The success of all econometric modeling largely depends

on how well the problem of model specification is solved.

Stage 4 (informational). The necessary statistical information is collected — the observed values of economic variables. There may be observations obtained with or without the participation of the researcher (under the conditions of an active or passive experiment).

Stage 5 (model identification). Statistical analysis of the model and estimation of its parameters is carried out. The problem of identification of the model should not be confused with the problem of identifiability, i.e., the problem of the possibility of obtaining by far the defined parameters of the model, a given system of simultaneous equations (more precisely, the parameters of the structural form of the model, revealing the mechanism of formation values for the endogenous variables, the parameters given the form of the model in which the endogenous variables are expressed in terms of predefined variables).

Stage 6 (model verification). Verification of the truth and adequacy of the model is carried out. It turns out how well the problems of specification, identification and identifiability of the model are solved, what is the accuracy of calculations for this model, and ultimately, how well the constructed model corresponds to the real economic object or process being modeled. It should be noted that if there are statistical data that characterize the modeled economic object at this and previous points in time, then to verify the model built for the forecast, it is enough to compare the real values of the variables at subsequent points in time with their corresponding values obtained on the basis of the model under consideration according to the data of previous moments.

Description of the Simple Linear Equations (Models) for each variable:

$$y = 7,2012x + 13443 \quad (24)$$

Where:

y – dependent variable;

x – independent variable;

$r = 0,9841$;

$R^2 = 0,7258$.

Table 21 shows data for a period of 18 years, the period was taken from 2002 to 2019. Y - independent variable - PRI net bookings for 1 year expressed in millions of euros. X_1 - Net bookings of Ubisoft Entertainment for the year, expressed in millions of euros. X_2 - the Number of active video gamers worldwide expressed in millions. X_3 - Average salary in the European Union expressed in millions of euros.

Table 21 – Data set for the multiple linear regression model

Number of observations	y	x_1	x_2	x_3
1	32,3	201,6	121,0	11964,5
2	37,50	250,3	264,0	12297,8
3	46,70	286,4	407,0	12631,0
4	48,90	360,7	550,0	12964,2
5	50,20	452,4	693,0	13297,4
6	57,10	612,7	836,0	13630,7
7	62,30	639,5	979,0	13963,9
8	68,60	512,8	1122,0	14297,1
9	72,10	673,6	1265,0	14841,0
10	80,20	718,1	1408,0	14960,0
11	128,4	913,5	1551,0	15456,0
12	152,5	721,8	1694,0	15433,0
13	191,3	1126,7	1837,0	15790,0
14	223,3	1088,9	1990,0	16138,0
15	304,0	1189,0	2110,0	16530,0
16	482,5	2050,0	2260,0	16891,0
17	644,0	2028,6	2420,0	17441,0
18	702,4	1534,0	2550,0	17819,0

In this table, we analyzed a set of data for multiple linear regression over 18 years of follow-up.

Table 22 analyzes the regression statistics of multiple linear regression obtained in MS EXCEL. There are 5 statistics indicators here Multiple R, R-square, Adjusted R-square, Standard Error, Observations.

Table 22 – Regression statistics

#	Indicator	Volume
1	Multiple R	0,921944736
2	R-square	0,849982096
3	Adjusted R-square	0,817835402
4	Standard Error	90,0196795
5	Observations	18

R-correlation coefficient is equal to 0.8 or 80%, on a scale of Chedoke, so we can talk about a high correlation with a direct connection. The multiple correlation coefficient is determined from the table 15: $R = 0,922$.

Adjusted R-square –adjusted for the number of degrees of freedom.

The standard error is an unbiased estimate of the mean square deviation of the observed values of the effective feature from the theoretical values calculated by the model. The value of the standard regression error characterizes the average dispersion of the observed values of the variable y near the regression line. Standard error = 90,02.

Observations – number of observations n .

Table 23 –ANOVA

#	Indicator	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	Significance <i>F</i>
1	Regression	3	642790,7872	214263,5957	26,44073139	5,01E-06
2	Residual	14	113449,5978	8103,542698		
3	Total	17	756240,385			

Column *df* is the number of degrees of freedom equal to:

$df = 1$ for the Regression row;

$df = n - 1$ for the Residual string;

$df = n - 1$ for the Total line.

The column *SS* – sum of squares of deviations.

Column MS -variances determined by the formula $\frac{df}{SS}$ factorial regression for the row; residual - for the Remainder line.

Column F is the observed value of Fisher's F -test.

The Significance column F is the significance level value corresponding to the calculated F -statistics. If the significance of F is less than the given significance level α , then R^2 is statistically significant.

The evaluation of the overall goodness-of-fit measures. R -square = 0,85. Where k – overall number of regressors, Adjusted R -square = 0,818.

The evaluation of the standard error of the regression. The standard error here refers to the estimated standard deviation of the error term u . It is sometimes called the standard error of the regression. It is not to be confused with the standard error of y itself (from descriptive statistics) or with the standard errors of the regression coefficients given below. $R^2 = 0,85$ means that 80.5% of the variation of y_i around \bar{y} (its mean) is explained by the regressors x_{1i} and x_{2i} .

Interpreting the ANOVA table. The ANOVA (analysis of variance) table splits the sum of squares into its components. Total sums of squares = Residual (or error) sum of squares + Regression (or explained) sum of squares. Where \hat{y}_i is the value of y_i predicted from the regression line and; \bar{y} is the sample mean of y

Checking the significance of the regression equation is based on the use of F -criteria of Fisher. The actual value of the criterion is taken from Table - 16. $F_{ob} = 26,440$

Interpreting the regression coefficients table.

1. β_j denotes the coefficient of the j th regressor (intercept, x_1 and x_2).
2. Column "Coefficient" gives the least squares estimates of β_j .
3. Column "Standard error" gives the standard errors (i.e. the estimated standard deviation) of the least squares estimates b_j of β_j .

Column "t Stat" gives the computed t -statistic for $H_0: \beta_j = 0$, against $H_a: \beta_j \neq 0$. This is the coefficient divided by the standard error. It is compared to a t with $(n-$

k) degrees of freedom where here $n = ?$ and $k = ?$.

For a one-sided test divide this p-value by 2 (also checking the sign of the t-Stat).

Columns "Lower 95%" and "Upper 95%" values define a 95% confidence

The Multiple Regression Model has the next form:

$$y = -3679,45 + 0,28x_1 - 0,67x_2 + 0,31x_3 \quad (25)$$

Where:

y – The dependent variable;

x_1 – Net bookings;

x_2 – Number of active video gamers worldwide;

x_3 – Average salary in the European Union;

In Chapter 3.2, the modeling process was considered by its stages. In WED. In Excel, the regression model was built on a set of data for the period from 2002 to 2019 for Ubisoft Entertainment. The regression statistics table showed that the approximation coefficient is 0,85, which means that it has a high approximation. ANOVA was analyzed, its results were calculated and interpreted.

3.3 Forecasting of the future subject area computer gaming industry

Econometric forecasting is based on the principles of economic theory and statistics: the calculation of forecast indicators is carried out on the basis of statistical estimation coefficients for one or more economic variables that act as forecast factors; it allows you to consider the simultaneous change of several variables that affect the forecast indicators.

The most common methods of forecasting:

1. The trend method, which assumes that some groups of income and expenses depend only on the time factor, proceeds from constant rates of change (the trend of constant growth rates) or constant absolute changes (a linear time trend). The disadvantage of this method is that it ignores economic, demographic, and other

factors.

2. The method of expert assessments involves the generalization and mathematical processing of expert assessments on a particular issue. The effectiveness of this method depends on the professionalism and competence of the experts. Such a prediction can be quite accurate, but expert assessments are subjective, depend on the "feelings" of the expert and are not always amenable to rational explanation.

In this course work, the least squares method will be used. The general meaning of least squares estimation is to minimize the sum of the squared deviations of the observed values of the dependent variable from the values predicted by the model. More precisely, the least squares (NC) estimates of the parameter q are obtained by minimizing the function Q by:

$$Q = \sum [Y_i - f_i(\theta)]^2 \quad (26)$$

Where:

$f_i(\theta)$ – this is the well-known function θ ;

i – from 1 to n , are random variables (for example, measurement errors), the average of which is usually assumed to be 0.

Table 24 – Forecast

X (time)	y	x*y	x ²	y ²	y predicted (Y)	error
1	32,3	201,6	121,0	11964,5	-93,53	3,90
2	37,50	250,3	264,0	12297,8	-60,41	2,61
3	46,70	286,4	407,0	12631,0	-27,28	1,58
4	48,90	360,7	550,0	12964,2	5,84	0,88
5	50,20	452,4	693,0	13297,4	38,96	0,22
6	57,10	612,7	836,0	13630,7	72,09	-0,26

Continuation of table 24

7	62,30	639,5	979,0	13963,9	105,21	-0,69
8	68,60	512,8	1122,0	14297,1	138,33	-1,02
9	72,10	673,6	1265,0	14841,0	171,46	-1,38
10	80,20	718,1	1408,0	14960,0	204,58	-1,55
11	128,4	913,5	1551,0	15456,0	237,70	-0,85
12	152,5	721,8	1694,0	15433,0	270,82	-0,78
13	191,3	1126,7	1837,0	15790,0	303,95	-0,59
14	223,3	1088,9	1990,0	16138,0	337,07	-0,51
15	304,0	1189,0	2110,0	16530,0	370,19	-0,22
16	482,5	2050,0	2260,0	16891,0	403,32	0,16
17	644,0	2028,6	2420,0	17441,0	436,44	0,32
18	702,4	1534,0	2550,0	17819,0	469,56	0,33

a	33,12
b	-126,7

In column 3, x is multiplied by y . In columns 4 and 5, the indicators are squared. In column 7, the error is calculated according to the formula, as can be seen from these indicators, the error is minimal. After calculating the indicators a and b using the formula (25-26), can start forecasting using the least squares method.

Time series smoothing by the least squares method is used to reflect the regularity of the development of the phenomenon under study. In the analytical expression of the trend, time is considered as an independent variable, and the levels of the series act as a function of this independent variable. It is clear that the development of a phenomenon does not depend on how many years have passed since the starting point, but on what factors influenced its development, in what direction and with what intensity. The development of the phenomenon in time is the result of the action of these factors.

Correctly establishing the type of curve, the type of analytical dependence on time is one of the most difficult tasks of pre-forecast analysis.

Using the least squares method, you can predict for several years ahead. In this study, the forecast was based on 10 years.

Table 25 – Forecast for PRI net bookings of Ubisoft Entertainment to 10 years

19	502,69
20	535,81
21	568,93
22	602,06
23	635,18
24	668,30
25	701,43
26	734,55
27	767,67
28	800,80
29	833,92

According to the table, we can conclude that in 10 years - in 2029-the number of PRI net bookings of Ubisoft Entertainment will be 833.92. Given the low error rate. To visualize the dynamics of the forecast, you need to build a graph.

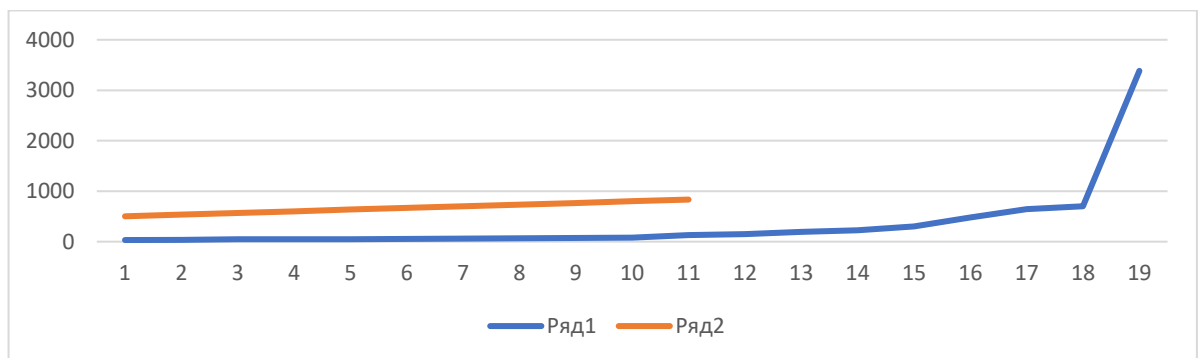


Figure 6 – Predicting the PRI net bookings of Ubisoft

The blue line is the statistically collected material. The orange line is the predicted total of crime changes for 10 years until 2029. As can be seen from the visual graph, the predicted number of crimes will remain approximately at the same level.

Disadvantages of the least squares method:

– When trying to describe the economic phenomenon under study using a mathematical equation, the forecast will be accurate for a short period of time and the regression equation should be recalculated as new information becomes available;

– The complexity of the selection of the regression equation, which is solvable when using standard computer programs.

In Chapter 3.3 one of the main forecasting methods in econometrics, the least squares method, was analyzed, the main functions for the method were given, and the coefficients a and b were calculated.

Based on this method, an attempt was made to predict the change in the PRI net bookings of Ubisoft Entertainment based on the available data in the company's annual financial statements. The forecast was made for 10 years. The initial data for PRI net bookings of Ubisoft Entertainment in 2002 amounted to 32.3 million euros, and according to the forecast in 2029, statistics will show 833.92 thousand dollars, but do not forget about the disadvantages of this method of calculation.

In the conclusion of the 3rd chapter, the data were analyzed and the prediction was calculated. According to these calculations, PRI net bookings of Ubisoft Entertainment will grow every year. These figures may change due to the rapid evolution of the video game market. In general, this indicator will maintain a high growth rate. Several interrelated factors contribute to this. For example, the growth of players will help to increase the profit from microtransactions. But you also need to take into account the situation in the video game market and player reviews. It is very important to maintain positive feedback from players because this directly depends on whether players will spend their money in microtransactions. Ubisoft Entertainment must strike a balance between microtransactions and positive player feedback. According to the analyzed data, players are generally satisfied with the company's policy and support the company's projects by buying microtransactions

in games. Online video games are also growing in popularity amid the global pandemic. This means that microtransactions may also grow because a larger percentage of microtransactions come from online projects.

CONCLUSION

In conclusion, the gaming industry is a very young industry compared to other areas of entertainment. But despite this, the video gaming industry has made a difficult transformation from ordinary video slot machines to a real giant in the international economic arena. This topic contains special terminology and knowledge in the field of video games, which are necessary to study this topic. This paper provides all the basic terms and directions in the video game industry. Different ways of making a profit from video games were also analyzed. In addition, the diploma thesis contains definitions that video game companies use in their financial statements. All this is necessary for a thorough analysis of the chosen topic.

The relevance of this topic has been repeatedly confirmed not only by data on financial indicators, but also by important events in the world community.

Attention retention technologies in video games plays a big role in the profit from microtransactions. If understand how the brain works and how stimulate the release of dopamine, then possible manipulate the player's desire to spend money on microtransactions. These can be multi-colored skins for items or characters inside the game. Now there is a huge variation in the manifestation of microtransactions in video games. The way they are used depends on the genre of the video game and the purpose of the video game developer. Video games must meet special requirements to make the player's progress understandable and achievable. Also, the game should not be too simple or too complicated. It is necessary to maintain a balance in all aspects of game production in order to make the gameplay interesting and exciting for players.

The company selected for analysis, Ubisoft Entertainment, is a major international video game developer. This company has many offices around the world, employing a large 20,000 people in total. This company was chosen because it has a great contribution to the gaming industry, in addition, according to annual reports, microtransactions make up most of the company's profits, which makes it a

valuable object of research. Ubisoft Entertainment is a good example of how microtransactions in video games were born and changed. The company has many popular franchises, which are released almost every year. Initially, these games did not have microtransactions, but with the development of trends for in-game purchases, the company began to add microtransactions to all its games. Now even games designed for a single story narrative have a system of in-app purchases. It turns out that the player must buy not only the game itself, but also spend real money in the store inside the game. This approach is very controversial in the modern gaming society. Some consider it a trick from the developer to earn more money. But some believe that in this way you can additionally thank the developer for the work done. Negative assessments of players show that the introduction of an aggressive microtransaction model that directly affects the gameplay is perceived by players extremely unkindly. Therefore, video game developers need to listen to the players and adjust the microtransaction model for each game individually. In addition, I want to say that microtransactions are becoming more popular every year and the income from them increases in proportion to the growth of players and the growth of the average salary in Europe. But in my opinion, it is impossible to separate these indicators, because they are all interconnected. To build a simple linear regression model, three indicators were identified that affect the object of study. And if we talk about linear regression, we see that according to the graph, the approximation coefficient $R^2 = 1$. This means that the line lies exactly on a straight line, which means that this model accurately describes the available data. According to this trend, digital sales and microtransactions will grow every year, which underlines the relevance of this topic.

According to my prediction calculations, Ubisoft Entertainment's microtransactions will grow even faster in the future and will contain almost all of the company's revenue. Therefore, this company needs to pay attention to the field

of microtransactions and listen to the opinion of the players in order to make maximum revenue and have a good reputation.

In general, most players are satisfied with the quality of games from Ubisoft Entertainment. COVID-19 also stimulates online sales. Due to the global lockdown, people spend more time at home and play games accordingly. Because video games are one of the best ways to relieve stress or spend time with friends who may be in another city or another country now.

According to the forecasts of PRI netbooks of Ubisoft Entertainment for the next 10 years, microtransactions will actively grow. According to calculations, earnings from microtransactions will account for almost half of the company's total earnings. This is an important indicator that emphasizes the relevance of the topic.

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APPENDIX A

Variation of the dependent variable (PRI net bookings) and regressors [22]

<i>Id</i>	<i>Time</i>	<i>Variable</i>	<i>Individual mean</i>	<i>Overall mean</i>	<i>Overall Deviation</i>	<i>Between deviation</i>	<i>Within deviation</i>	<i>Within Deviation (modified)</i>
<i>i</i>	<i>t</i>	x_{it}	\bar{x}_i	\bar{x}	$x_{it} - \bar{x}$	$\bar{x}_i - \bar{x}$	$x_{it} - \bar{x}_i$	$\frac{x_{it} - \bar{x}_i}{\bar{x}}$
1	2002	201,6	853,37	5662,3	-5461	-4809	-652	5011
1	2003	250,3	853,37	5662,3	-5412	-4809	-603	5059
1	2004	286,4	853,37	5662,3	-5376	-4809	-567	5095
1	2005	360,7	853,37	5662,3	-5302	-4809	-493	5170
1	2006	452,4	853,37	5662,3	-5210	-4809	-401	5261
1	2007	612,7	853,37	5662,3	-5050	-4809	-241	5422
1	2008	639,5	853,37	5662,3	-5023	-4809	-214	5448
1	2009	512,8	853,37	5662,3	-5149	-4809	-341	5322
1	2010	673,6	853,37	5662,3	-4989	-4809	-180	5483
1	2011	718,1	853,37	5662,3	-4944	-4809	-135	5527
1	2012	913,5	853,37	5662,3	-4749	-4809	60	5722
1	2013	721,8	853,37	5662,3	-4940	-4809	-132	5531
1	2014	1126,7	853,37	5662,3	-4536	-4809	273	5936
1	2015	1088,9	853,37	5662,3	-4573	-4809	236	5898
1	2016	1189,0	853,37	5662,3	-4473	-4809	336	5998
1	2017	2050,0	853,37	5662,3	-3612	-4809	1197	6859
1	2018	2028,6	853,37	5662,3	-3634	-4809	1175	6838
1	2019	1534,0	853,37	5662,3	-4128	-4809	681	6343
2	2002	121,0	1336,50	5662,3	-5541	-4326	-1216	4447
2	2003	264,0	1336,50	5662,3	-5398	-4326	-1073	4590
2	2004	407,0	1336,50	5662,3	-5255	-4326	-930	4733
2	2005	550,0	1336,50	5662,3	-5112	-4326	-787	4876
2	2006	693,0	1336,50	5662,3	-4969	-4326	-644	5019
2	2007	836,0	1336,50	5662,3	-4826	-4326	-501	5162
2	2008	979,0	1336,50	5662	-4683	-4326	-358	5305
2	2009	1122,0	1336,50	5662	-4540	-4326	-215	5448
2	2010	1265,0	1336,50	5662	-4397	-4326	-72	5591
2	2011	1408,0	1336,50	5662	-4254	-4326	72	5734
2	2012	1551,0	1336,50	5662	-4111	-4326	215	5877
2	2013	1694,0	1336,50	5662	-3968	-4326	358	6020
2	2014	1837,0	1336,50	5662	-3825	-4326	501	6163
2	2015	1990,0	1336,50	5662	-3672	-4326	654	6316
2	2016	2110,0	1336,50	5662	-3552	-4326	774	6436

APPENDIX A (CONTINUED)

2	2017	2260,0	1336,50	5662	-3402	-4326	924	6586
2	2018	2420,0	1336,50	5662	-3242	-4326	1084	6746
2	2019	2550,0	1336,50	5662	-3112	-4326	1214	6876
3	2002	11964,5	14796,98	5662	6302	9135	-2832	2830
3	2003	12297,8	14796,98	5662	6635	9135	-2499	3163
3	2004	12631,0	14796,98	5662	6969	9135	-2166	3496
3	2005	12964,2	14796,98	5662	7302	9135	-1833	3830
3	2006	13297,4	14796,98	5662	7635	9135	-1500	4163
3	2007	13630,7	14796,98	5662	7968	9135	-1166	4496
3	2008	13963,9	14796,98	5662	8302	9135	-833	4829
3	2009	14297,1	14796,98	5662	8635	9135	-500	5162
3	2010	14841,0	14796,98	5662	9179	9135	44	5706
3	2011	14960,0	14796,98	5662	9298	9135	163	5825
3	2012	15456,0	14796,98	5662	9794	9135	659	6321
3	2013	15433,0	14796,98	5662	9771	9135	636	6298
3	2014	15790,0	14796,98	5662	10128	9135	993	6655
3	2015	16138,0	14796,98	5662	10476	9135	1341	7003
3	2016	16530,0	14796,98	5662	10868	9135	1733	7395
3	2017	16891,0	14796,98	5662	11229	9135	2094	7756
3	2018	17441,0	14796,98	5662	11779	9135	2644	8306
3	2019	17819,0	14796,98	5662	12157	9135	3022	8684