Regional Joint Doctoral Program in Entrepreneurship and SME Management DOCSMES

DOCTORAL DISSERTATION:

The potential of the gaming industry for investments in The Republic of North Macedonia

Candidate: Suzana Trajkovska Kocankovska **Mentor:** Prof Dr. Gjorgi Manceski

E-mail:trajkovskasuzana1@gmail.com**E-mail:**gmanceski@t-home.mk

Prilep, 2019

Contents

1. Intruduction

The video game industry is mass marvelobserved fromthe economical angle. The development of the industry is staggering, so the purpose is to understand why it is an important economic sector worldwide and in Republic of North Macedonia.

The gaming industry shows serious numbers:[1]

- by 2010, the gaming industry became larger than the music;
- It became a 42 billion business. (example: World of Warcraft makes about $ 82 million a month, and it needed 80 million to make the game itself);
- The average age of gamers is 20-40, which means it gets more serious than it was thought to be for children (the industry's target group is 37 year-old buyers);
- About 500,000 dollars a day turn into Second Life. In the game that is simulation of real life, there is Coca Cola and other big companies. IBM spent $ 10 million in the development of a business in Second Life;
- 43% are women players;
- 80% of the games have no violence, as opposed to the opinion of the public.

The diversity of the industry gives options for different aspects, even playing the video games can be considered as stream of revenue, for example in the BlizzCon tournament for Warcraft III and World of Warcraft: Arena prizes for the first place are$25,000US per player. If taken into account that there are teams of 3 or 5 players competing then is clear how much money is turning into electronic sports.

The prize pool for The International 9, the largest Dota 2 tournament of 2019, has broken the $30 USmillion. This is officially the largest prize pool at a single esports event ever.

1.1 Definition of the research issue

[1]Bramwel T.,“Console developers need to look at Dungeon Keeper and learn”, Eurogamer, February 8th 2014.

The main subject of the analysis is to review the global trends, global companies, regional dispersion, the situation in EU, Eastern EU countries and in the Republic of North Macedonia in the gaming industry. What attracts the investors? Are they attracted by revenues generated, the passion to be part of the global community? What is the position of Republic of North Macedonia in the set of the gaming industry?

The research aim is to clarify the importance of gaming for the business, and especially the impact, what are the highlights of gamers (developers, designers, artists in the gaming industry), to recruit youngsters for development and to open opportunities for gaming. The broader perspective is to evaluate the impact on national and global level.

The research questions address the concerns from the public hearing (2016), where a number of different opinions are open for discussion, from which, as key points are:

- gaming opens great business opportunities and needs to be exploited;
- there is a need for gaming to be legally regulated and appropriately financially supported;
- there is a need for support through a separate federation that will represent the interests of gamers;
- video games can find appropriate application in education, especially in creation of curriculum for master studies;
- need for procurement of accreditations and licenses;
- gaming can greatly improve the overlap of a group of skills (teamwork, foreign language learning, problem solving, gender awareness, etc.);
- gaming through participation in international tournaments is a great opportunity for popularization of the Republic of North Macedonia internationally;
- there is a need for organizing more debates in the future and for raising public awareness among citizens for this activity;
- The problem of security and the protection of personal data is related to the awareness of the activity gaming.

1.1.1.Contribution of the Doctoral Thesis

The doctoral thesis has developed a general framework of the video game industry. The potential for development trough adequate model in the Republic of North Macedonia, that focuses on development of video games for downloadable PC market. The model shows the growing aspect and the necessary support to the industry - the aspect of eco-system for gaming studios, including governmental and other support to create educational and vocational environment.

The thesis contributes with several generated models of the current state of the gaming industry. Through the evolution of the gaming industry including the mapping of the gaming studios in the Republic of North Macedonia. Further, it elaborates the future perspective by looking at communities that accepts fast changes in this industry. Entrepreneurs and investors are financing these experiments. This is the point, to elaborate the complexity of the investment and the rvenues from it.

It presents the pulse of the gaming industry in the Republic of North Macedonia, as response of a creativity developer's driver, which allows finding new practices and business models. It also show that the video games development needs to be recognised by the community.

Investors are developers that do the funding but major players are venture funds, crowdfunding services like Kickstarter and Indigogo, EU and national funds.

The contribution is significant for all shareholders or interested parties in the video gaming industry such as:

- the business investors to evaluate the opportunities for entering this industry as the examples in the global analyses shown;
- Young IT professionals, passionate gamers, artist to take entrepreneurial adventure and create game development studio;
- Educational institutions to create cross-sectoral curricula or courses for game development education;
- blue print basics for the policy makers for generating adequate laws and budgets for supporting entrepreneurs in this industry.

1.1.2 Theoretical Framework

Definition of Video Games and the video game industry

Trough literature review, the general perspective for the video games and video game industry is given the meaning from aspect of programming, art, culture to a commodity and service on the market. The research combines the worldwide secondary data, a number of electronic libraries and websites, key industry platforms for algorithm analyses have been used to provide access to published papers, blogs, reviews and research. A video game is, generally speaking, any game that is played with the use of computer equipment and video display. It can be played on a computer, a cell phone or a console (a terminal with a keyboard and a video display).[2]This definition reflects the understanding of the term "digital play", not sufficient to provide real insight into such a complex medium.

What's behind a good video game? Why are some games so successful and popular as the top-ranked films, and other games fail in this end? What makes video games so appealing and to attract so much attention?[3]

The video game industry has many economic aspects, including the development process, employment, the release period, advertising, marketing, and intellectual property (IP) rights.[4]Current progress in the field of games, as well as the increase in the quality and number of titles produced each year along with the rapid evolution of changes in new game technologies, make their classification more and more difficult. However, it is interesting to observe how most of the general types of games that we can design, have some educational potential. However, which genre will best fit into a particular educational context depends mostly on several parameters, such as the learning entity, learning material, pedagogical goals, etc.[5]There are different types of genres in video games and there is no standard classification. The industry, the developers and the academy all use a different classification, so within this topic a wide model is presented with all genres and subgenres.

[2]Consalvo, M. “Cheating: Gaining Advantage in Videogames. cambridge, ma: the mit press”, 2007.
[3]Garris,R., Ahlers,R., and Driskell, J.E“Games, motivation, and learning: A research and practice model”,2002
[4]Edery and Mollick, “Changing the Game: How Video Games Are Transforming the Future of Business”, 2009
[5]Raph Koster, Will Wright, “ATheory of Fun for Game Design”, 2004

The distinction is made to understand the relations and processes, all the stakeholders included in every stage of development, placing on the market, customer relationship with the video game. The content presents the complexity of the product and the industry although it looks like a simple downloading and having fun with the game.

Investments in video gaming industry, potential of the gaming industry and financial benefits

This research objective and ***research question are in the focus***:What is the potential of the gaming industry as investment and the expected financial benefits? Searching by keywords related to the research problem, it has resulted in a number of papers and data that are for wider perspective of the industry, while for the Republic of North Macedonia there are only several publication for this industry and none related to the chosen topic – the economic aspect. The keywords used in the search are - video games revenues, investments in gaming industry, video game developers and education in video games.

The gaming industry has experienced high growth in a relatively short period and the forecast is to grow higher, so it makes the gaming market attractive for investors.Back in 2012, the global gaming market had revenues of $70.6 billion USD, since then in 2018 it generated $137.9 billion USD in revenues and for 2021 it is forecasted to generate **$180.1 billion USD in revenues.** The attractive revenue streams come with high investments. The topic gives an overview of the cost of production for some video games from $100 million for “Red Dead Redemption” to $500 million for the video game “Destiny”. Major share in this numbers are the production and distribution of video games. These two lines make the video game studios high-risk venture, because the outcome of the game depends on the positive response of video games consumers. Video game is the product of highly competitive industry, but they also have beneficial effects on players and society as a whole.[6]

Based on research of secondary data, the doctoral thesis uses a scientific approach to research and generate a general conclusion about the research phenomenon. For the data analysis there is a number of scientific research methods, such as deductive methods, starting with the global trends in the gaming industry in general, to the more specific explanation for the regional, specific segments and their influence and impact in the Republic of North Macedonia. With the "top-down" approach, the focus is narrowed to

[6]David T. A. Wesley**,** Gloria Barczak, “Innovation and Marketing in the Video Game Industry: Avoiding the Performance Trap”, 2010

the smallest organizational units that operate as video gaming development studios of individuals.The narrowing down aims to collect observations to address the hypothesis. This enables the testing of the hypotheses with specific data - a confirmation (or not) to the original theories.

Research and discussions

For obtaining a primary data, a survey is conducted via email, telephone and personal interviews with relevant people involved actively in this area such as: game developers, game educators, gaming organizations, faculties, projects for business ideas, accelerators. The adequate data are compared to the general survey conducted on game developers on the Game Developers Conference, survey with 4,000 game developers, as part of the seventh annual State of the Industry Survey, which provides a snapshot of the game industry and highlights industry trends ahead of GDC 2019 in March.

The secondary data are gathered from official institutions that measure this area as: the State Statistical Office of Republic of North Macedonia, World Cyber Games Organization and other relevant institutions.

The thesis used a strengths, weaknesses, opportunities, and threats (SWOT) analysis.Video development studious are mapped and invited to undertake a detailed SWOT analysis which provided a clear outline of the structure (problems and advantages) of the video gaming sector.

Approximately half of the surveyed video gaming companies are micro-enterprises, employing fewer than 10 people and exist for less than three years. All of the surveyed companies are start-ups, and all of the owners are entrepreneurs.

The research examines if the entrepreneurial mindset is a crucial factor for the gaming sector, how the sector needs are regulated and what kind of support is dedicated.

Pre-incubation process is a powerful tool for developing the gaming industry.In pre - incubation centers, young entrepreneurs who lack industrial experience, with financial and managerial support are establishing their startup companies. Those centers provide supportthrough initiatives such as training, networking, and mentorship.[7]

Although there is no formal database on the number of gaming companies in the Republic of North Macedonia,the survey used a snowball sampling method to identify the

[7]https://www.degruyter.com/view/j/erj.2018.8.issue-2/erj-2016-0095/erj-2016-0095.xml

respondents. Snowball sampling is a non-probability sampling technique where existing subjects recruit further subjects from their acquaintances. As the sample builds up, enough data are gathered to be useful for research. This sampling technique is often used in hidden populations that are difficult for researchers to access.

The field study used a semi-structured survey method. This method allows the deepinvestigation of a subject through face-to-face interaction.[8]The semi-structured interview is valuable because it makes the respondent comfortable during the interview,facilitating the collection of: personal information, feelings and ideas, tacit knowledge,direct feedback on the subject, and new questions for the subject.

All of the interviews were undertaken by a researcher in June-July 2019. The interviews were undertaken in Bitola and Skopjeand empirically elaborated.

Further, case studies for three studios were developed in order to assess the potential the videogaming industry in the Republic of North Macedonia.

Hypothesis and Variables

Hypothesis

H0: The process of creating a video game is progressive.

The general hypothesis proves and confirms that the trend of creation and application of video games is developing and progressive. Namely, this industry rapidly grows and makes revenues higher than other industries. Therefore, this hypothesis aims to confirm that the gaming industry is important and take a place for serious consideration by the investors.

The general hypothesis is verified by two assisting hypothesis, which are:

H1: The situation in Macedonia in relation to video games is in a developing stage.

This hypothesis proves that the beginning of the gaming industry in the Republic of North Macedonia is marginal with several start-up companies established. The evolution of these companies is in developing stage and their efforts show their presence globally. The number of gamers rapidly grows and enlarges the gaming community, so it has a potential to become more attractive.

[8]https://worldbusinessincubation.wordpress.com/2013/09/27/review-of-20-business-incubation-models-bergek-norrman-model_2008-part-14-of-20/

H2: The SWOT analysis of various tools for making video games aims to success.

This hypothesis provides evidence that the gaming industry SWOT matrix and mood barometer presents the real situation and the future trends. SWOT matrix means base for attracting investors in this industry, which implies new employment opportunities for gaming engineers and educators with knowledge-based games.

Dependent variable

Trends and applications of video games. This variable measures the application and production of the video games that depends mainly from the types(genre) of video games that the gamers are producing and their demand on the market. Moreover, the trend of the video games in general, depends from the development and availability of the various software tools, human resources and financial support for making video games that Macedonian gaming engineers are using within the production of the video games.

Independent Variables

Different types of video games. This variable measures the types of video games produced and promoted on the market, focusing on: entertainment based video games and knowledge based video games.

The type of video games are determined from the demand on the market and the needs of its customers. The knowledgebased games are required generally from the educational institutions and training centres. Universities uses this kind of games in order to make easier the learning and teaching process.

Methodological Approach

Throughout the whole thesis, the focus has been on investments in the gaming industry from different streams as well as financial benefits of video games. In addition, special attention in the research is given to the opportunities to develop educational systems for game developers – formal and informal providers with practical example for game creation.

The unequal, unavailable documented facts and statistical figures for the Republic of North Macedonia are supported with detailed data from the interviews, further statisticalprocessing and tools such as the SWOT analyses and mood barometar as an instrumentsto define the profile of the game industry. To back up the various

figures and statistics, top-ranking experts within the game sector were asked for their well-informed opinion on the different areas of interest for the project goals. The survey was conducted amongst the highest-ranking experts (such as national game associations and game development studios).

The primary method of data collection are the interviewswith a semi-structured questionnairedesigned for managers and employees of the companies in the Republic of N. Macedonia. For this purpose, questionnaires with more than 20 questions were created and distributed electronically to mapped companies and then a personal interview were conducted with 10 employees and managers of the companies.

1.2 Definition of the Video Game

The video gaming industry is blooming into global industry of enormous proportions. This industry is growing faster compared to the other entertainment industries. The video games are essential in contemporary day-to-day living. According to Newman, there are three reasons why video games demand serious approach: the size of the video games industry; the popularity of videogames and videogames as an example of human-computer interaction.[9]

Videogames as a topic for academic research are attractive in the recent years. There are different approaches for defining the video game, starting from the play, interactivity or narrative. The simplest definition is that **video game is a story played with an audio-visual device**. A video game is any game that is played with the use of computer equipment and video display. It can be played on a computer, a cell phone or a console (a terminal with a keyboard and a video display). Other definitions focus on the understanding such a complex medium.

Crawford in *The art of computer game* explains that the video game is **a closed formal system** that subjectively represents a subset of reality. In details, "closed" means that the game is complete and self-sufficient as a structure. The world created by the game is internally complete. By "formal"means that the game has explicit rules. There are informal games in which the rules are loosely stated or deliberately vague. The term "system" refers that a game is a collection of parts that interact with each other in complex ways. The game is subjective; it may be a very real metaphor for the player's

[9]Newman, J , "Game-Enhanced Second Language Vocabulary Acquisition Strategies: A Systematic Review", 2004

perception of his world. Thus, a game represents something from subjective reality, not objective. Fantasy plays a vital role in any game situation.[10]

The focus is on the rising question: What is behind a good video game? Why some games are successful and popular as the top-ranked films, and the other games fail in this end? What makes video games so appealing and soattractive to the eye?[11] To answer these questions, one must consider the features of the best digital games, which are:

Conflict, goals and rules: In order to attract the attention of the players, the games usually introduce a conflict element, which is well described and defined and requires intervention by the player. The storyline and storytelling background are built on this conflict, setting the ultimate goal and goals of the levels that a player must achieve to complete the game. In order to achieve the proposed goals, the player must play in accordance with the rules of the game, which define what can and cannot be done in the universe of the game.

Rapid feedback cycles: The games usually implement cycles of rapid feedback. In this way, players quickly experience the impact and consequences of their actions in the game world (for example, in an action game, if you do not manage to solve a puzzle - a jigsaw puzzle, etc., they will kill you). This mechanism informs the players how good their performance is.

Immersion in the game and engaging the player: This feature stems from the fact that games are designed to provide fun for the player. This is achieved through the application of various techniques: attractive stories, incredible three-dimensional virtual worlds, increasing the difficulty of challenges, etc.

Challenge: An appropriate and balanced level of challenge is one of the reasons why games attract attention. Good video games are neither too easy nor too difficult for the players.

Adjustment: This is almost a unique feature of the games - the fact that they are played using a computer system, allowing the experience of the game to vary from one player to another and from one party to another. Adjustment is commonly used in commercial games for variability of the challenge, depending on the capabilities and knowledge of the player for the game, as well as to provide a balanced experience of games played on the Internet.

[10]Crawford, C, "The Art of Computer Game Design", 1997

[11]Garris,R., Ahlers,R., and Driskell, J.E"Games, motivation, and learning: A research and practice model",2002

An interesting example of customization is the Left4Dead ™ game, where the camera is in fact the shooter. In this game, an artificial intelligent system, called "Director", controls the passing of the levels and the location of objects, creating dynamic experience and increased repetition value.

Repeatability: Good games can be played more than once. But this feature is not present in all games. It is the result of a good design and proper balance of features, such as customization (presenting different challenges each time) and matching (a good game can be replayed as many times as a good story can be re-read).

The video games are intermingling **innovation and player comfort**. Video games are **played on an assortment of media: digital TV, devoted consoles, handheld gadgets and cell phones**, through informal communication locales or through an ISP, through an amusement engineer's site, and online through a diversion support as well as home or office PC. The facts is supported with the statistics that 12% of U.S. families make standard utilization of diversion comforts for getting to video content given by online administrations like Hulu and Netflix. In 2012, stimulation utilization passed multiplayer diversion use on Xbox, implying that clients invested more energy with online video and music administrations and applications than playing multiplayer amusements. This fast kind of industry intermingling has caused the refinement between computer game reassure and PCs to vanish. A diversion comfort with fast microchips appended to a TV is, in every practical sense, a PC and monitor.

Beside the concept of amusement, it is important to note the contributions from **the innovations** and computer games testing. There is still no bound together definition or hypothesis about the meaning of diversion in this way a portion of the definitions or qualities that the primary scholars in this field have considered essential are broken down, such as:[12]

Interactive enlivened pictures joined by an ecological sound and an interface.
All electronic recreations with a basically lively **goal** played with the utilization of a PC, through different media.
Some authors proposed an increasingly total and closer definition, portraying the amusement as: **wrapping action** with a particular objective, in a small scale world constrained by moderately basic and clear standards.

[12]Clais and Dubois, “Redefining the value chain of the video games industry”, 2017

Video games are **imaginative portrayals of a marvel**. The fashioner improves this wonder intentionally to concentrate the player's consideration on those imperative components. The amusements make an awesome portrayal, not a logical model.

Crawford has twothoughts for computer games: the first is **the control of the player's** consideration by the designer of the computer games and the negligence for the **authenticity** of the circumstance.

Actually, definition of a video games as a product is challenging. Part of the problem arises from the enormous amount of different game types that exists under this label.

The wide variety of video game is in the Table 1, the types and subgenre of video games.

Types of video games	**Subgenre**
Action games the player is in contro at the center of the action, mainly comprised of physical challenges	**Platformer** games - the game's character interacts with platforms (usually running, jumping, or falling) throughout the gameplay like Super Mario
	Shooters - players use weapons to engage in the action, with the goal usually being to take out enemies or opposing players.**First-person shooters (FPS)** are played from the main character's viewpoint; Call of Duty, Half-Life, and Halo are good examples; **Third-person shooters** like Fortnite and Splatoon, the player can see the main character, usually from slightly above and behind.
	Fighting games like *Mortal Kombat* and *Street Fighter II* focus the action on combat, and in most cases, hand-to-hand combat.
	Beat-em up games, or brawlers, also focus on combat, but instead of facing a single opponent, players face wave after wave of enemies. *Double Dragon*
	Stealth games stress cunning and precision to resolve game challenges and other action or combat may help players accomplish the goal, like in *Dishonored*
	The survival horror game - modern survival games like *Fortnite* take give players access to resources to craft tools, weapons, and shelter to survive.
	Rhythm games like *Dance Dance Revolution* and *Guitar Hero* are music-based games that challenge players to keep in step with the rhythm of a song or soundtrack in the game

Action-adventure games incorporate two game mechanics—game-long quests or obstacles that must be conquered using a tool or item collected	**Survival horror** games like *Resident Evil* use mature themes and subject matter to portray grisly and gruesome settings
	Metroidvania-type games are like basic action-adventure games, nonlinear, the player backtrack is kept from progressing to find a specific item or special tool.
Adventure games, players usually interact with their environment and other characters to solve puzzles with clues to progress the story or gameplay.	**Text adventures** - the gameplay is text-based, meaning players use their keyboard to input commands in response to the game-programmed story arch or situation, such as "get shovel," "grab sword," or "go North."
	Graphic games started to replace written text commands, and players began to "point-and-click" to interact with an on-screen object.
	Visual novels require players to build up character traits or statistics to advance the gameplay. Nearly 70% of the PC games released in Japan are visual novels.
	Interactive movie-Laserdisc and CD-ROM technology allowed for the introduction of the interactive movie. Interactive movies contain pre-filmed live-action or animation sequences.
	Real-time 3D. Instead of pre-rendered scenes, players interact in a real-time 3D video game world. *Shenmue* and *Heavy Rain*
Role-playing games feature medieval or fantasy settings. The origin of the genre can be traced back to *Dungeons & Dragons*	**Action role-playing games** take game elements of both action games and action-adventure games. A defining characteristic of action RPGs is that the combat takes place in real-time
	Massive multiplayer online role-playing games MMORPGs involve hundreds of players actively interacting with each other in the same world, and typically, all players share the same or a similar objective.
	Rouguelikes - Players overcame enemies and obstacles to increase their player stats.
	Tactical RPG Players use almost chess-like strategy and a finite numbers of resources (armies, weapons, etc.) to conquer battles and enemies.

	Sandbox, or open-world, role-playing games allow players to freely roam their game environments in search of adventure.
	First-person party-based RPG-"Blobbers" are dungeon role-playing games (dungeon RPGs) where a player leads a party of adventurers in first-person perspective. Might and Magic and Bard's Tale
Similation games are designed to emulate real or fictional reality, to simulate a real situation or event.	**Construction and management simulation** *SimCity* is the most popular game that simulates the building and management of a city
	Life simulation - *The Sims* is the most popular life simulation game and one of the best-selling video games of all time. Like *SimCity* (which was also created by Will Wright), in *The Sims*, players control the individual aspects of artificial life.
	Vehicle simulations aim to recreate the experience of flying an airplane, driving a race car, and in some cases, driving a tractor on a farm.
Strategy games give players a godlike access to the world and its resources. These games require players to use carefully developed strategy and tactics to overcome challenges	**4x** is any genre of strategy video game whose four primary goals check these boxes: explore, expand, exploit, and exterminate. Sid Meier's *Civilization* series is probably the best-known strategy game in this category.
-	**Artilery** are two- or three-player turn-based games featuring tanks or other soldiers engaged in combat.
	Real-time strategy games require the player to collect and maintain resources, like bases, while advancing and developing both resources and combat units. *Starcraft*
	Real-time tactics games focus on battlefield tactics and operational warfare versus the micromanagement of resources or individual units.
	Multiplayer online battle arena (MOBA) combines action games, role-playing games, and real-time strategy games.
	Tower defense games, players must fend off computer-controlled enemies (often referred to as "creeps") to win.
	Turn-based tactics (TBT) Based on and mostly using realistic military tactics, turn-based tactics games pit combat forces against each other in volley-like gameplay.
	Wargame focuses gameplay on map-based tactical or strategic warfare. *Real War*

	Grand strategy wargame focuses on a grand strategy, typically involves placing a nation or empire's army and resources into action
Sports games simulate sports like golf, football, basketball, baseball, and soccer.	**Racing simulator series** like *Forza* and *Gran Turismo* are some of the most popular games in this category, players race against another opponent or the time.
	Team sports games simulate playing a sport.
	Competitive games or eSport games like *Overwatch* and *Team Fortress*
	Sport based fighting game include boxing games like *Fight Night* and wrestling video games.
Puzzle or logic games usually take place on a single screen or playfield and require the player to solve a problem to advance the action.	**Logic game** requires players to solve a logic puzzle or navigate a challenge like a maze.
	Trivia game players must answer a question before a timer runs out (or before another player answers) to score points.
Idle games are simplified games that involve minimal player involvement, such as clicking on an icon over and over. Idle games keep players engaged by rewarding those who complete simple objectives.	**Casual games** exhibit basic game mechanics and are perfect for short, casual sessions. This genre has exploded in popularity in the last few years thanks to mobile gaming.
	Party games like *Mario Party* usually feature mini game competitions with participants competing against each other
	Programming game has players using code to complete a challenge or overcome an obstacle. *Codehunt* for example, is a game played using either Java or C# where players write code to learn computer languages and programming elements like loops, strings, and ciphers.
	Board game/card game like chess, checkers, and backgammon are still popular also digitaly like the Card games *Magic: The Gathering* and the *Pokémon Card Game*
	Advergames are typically created to help sell a product or brand, with the brand or advertiser directing the game developer to create an interactive experience

	Educational games are used to teach subjects like math or typing using basic game mechanics, and thus stand out on most lists of best video games for kids. Technically non-educational games like *Minecraft* can be educational as well.
	Exergames are specifically designed to work with a peripheral or controller that allows the player to simulate an exercise or activity.

Table 1 GENRE AND SUBGENRE OF VIDEO GAMES

Source: https://www.idtech.com/blog/different-types-of-video-game-genres

Different gaming platforms offer different features for different tastes, with the developersexploiting the possibilities offered by new technology. Several main platforms haveemerged.[13]

Expansion of players to play video games is provoked with an assortment of **easy-going media, cell phones, tablets.** The facts are that globally 92% of all cell phone and tablet users play amusements once every week, 45% play day by day. Apple's App Store alone has in excess of 90,000 amusement applications since the start of the web. Moreover, diversion incomes for iOS and Android cell phones currently surpass those of both Nintendo and Sony handheld gaming frameworks joined.

Games are entertainment, allowing escape from daily stresses, to search for new challenges, or to find new sources of joy and excitement. Video games in particular are a powerful tool that offer different opportunities for people because of technological and innovative advancements.

The profile of a video gamer is like 174 million Americans who have grown up with PlayStations, Xboxes, and GameCubes from their initial youth and young years and now are more established with playing intelligent diversions, increasingly complex and separating about the recreations they play.[14]

What **is the inspiration of a player to pay** in an allowed to-play computer game?

1. **Time:** There are players who have more cash than time and are eager to pay to accelerate the gaming background.
2. **Personalization:** The visual separation is extremely normal and utilized for Asian gatherings. They have no effect on the ongoing interaction yet might be a motivation behind why a player draws in with the allowed to-play.
3. **Content:** They pay for additional substance that adds hours to the gaming

[13]http://www.ecchigames.com/video- game-platforms.html; Wolf, 2012
[14]Eskelinen, M.,"the gaming situation." Game Studies, 2001

background- additional sections, missions, levels or any extra enhancement to the first amusement.

4. **Game play alternatives:** Pay-to-play gives a chance to expand gaming choices, the scope of decision and offer distinctive diversion encounters. Alternatives can be distinctive amusement modes, diverse characters, dimensions of trouble and any choice that will upgrade replayability by giving new encounters and inspiration content.

5. **Grants and benefits**: Pay to get additional assistance to coordinate the dimension of a player. For example, when player purchase a power-up to encourage the accomplishment of a dimension in Candy Crush Saga, gets excellent articles or access to critical points of interest.

To best understanding for the video games is the pragmatic approach trough the numbers they are generating.Different gaming platforms offer different types of content and services; but why? The answer is simple: a game is not just a game, it is now **a commodity. Developing a video game is a business.**[15]The definition that video game is a serious business is proven with the revenues reached by a single video game.These are the top ten premium games by revenue for 2018, according to SuperData:

1. PlayerUnknown's Battlegrounds, Bluehole - $1.028 billion
2. FIFA 18, Electronic Arts - $790 million
3. Grand Theft Auto V, Take-Two Interactive - $628 million
4. Call of Duty: Black Ops IIII, Activision Blizzard - $612 million
5. Red Dead Redemption 2, Take-Two Interactive - $516 million
6. Call of Duty: WWII, Activision Blizzard - $506 million
7. FIFA 19, Electronic Arts - $482 million
8. Monster Hunter: World, Capcom - $467 million
9. Tom Clancy's Rainbow Six Siege, Ubisoft - $440 million
10. Overwatch, Activision Blizzard - $429 million

The dynamic nature of the industry is given trough the biggest movement in free-to-play models.

These are the top ten free-to-play games by revenue for 2018, according to SuperData:

1. Fortnite, Epic Games - $2.4 billion
2. Dungeon Fighter Online, Nexon - $1.5 billion
3. League of Legends, Riot Games, Tencent - $1.4 billion

[15]Edery and Mollick, “Changing the Game: How Video Games Are Transforming the Future of Business”, (paperback) Paperback – October 17, 2008

4. Pokemon GO, Niantic - $1.3 billion
5. Crossfire, Neowiz Games - $1.3 billion
6. Honour of Kings, Tencent - $1.3 billion
7. Fate/Grand Order, Aniplex - $1.2 billion
8. Candy Crush Saga, King, Activision Blizzard - $1.1 billion
9. Monster Strike, Mixi - $1.0 billion
10. Clash Royale, Supercell, Tencent - $0.9 billion

The digital premium games market is much smaller than free-to-play, but at $17.8 billion in annual revenue it remains a significant sector.A potential growth area for 2019 is the emergence of subscription services, similar to Netflix.

1.3 Definition of the gaming industry

The video game industry has many**economic aspects, including the development process, employment, the release period, advertising, marketing, and intellectual property (IP) rights.**[16]

The Video Games industry **develops, publishes, manufactures, distributes, and sells**software, electronic gaming devices and accessories. Traditionally, the video games industry referred to gaming on "raster" display devices where resolution was determined based on the number of pixels the image contained. More recent and broader perspective definition is that the videogame industry is made up of a building blocks – the consumer platforms, both hardware (the devices, consoles) and software. Content development and production, which includes publishers providing capital and intellectual property rights (IPR) management, marketing, networks of developers, animation studios and other creative teams, middleware and software tools production; Distribution, both "digital" (online/mobile), including the servers and network technologies, and physical distribution. There is also an active enduser developer movement.[17]

The video game industry combines**software sector** that constitutes the games themselves; the infrastructure and **technology sector** that encompasses the support necessary to distribute and provide technology offerings needed to play the games.

The videogame industry is significant contributor to the economy in terms of **the value of direct sales, in innovation, technology spill-over, building the infrastructure for**

[16]Edery and Mollick, "Changing the Game: How Video Games Are Transforming the Future of Business", (paperback) Paperback – October 17, 2008

[17] Stewart & Misuraca, "The Potential of Digital Games for Empowerment and Social Inclusion of Groups at Risk of Social and Economic Exclusion: Evidence and Opportunity for Policy",2013

advanced online services, stimulating complementary sectors including the broader media sector and software. This means that the video game industry is connected to the hardware market (processors, content, devices) and broadband internet access.

There is no obvious meaning of "computer game" and usually to allude to both the mechanical help gadgets (i.e., equipment, for example, reassures)and the individual amusement itself (the product, the program).

Indirectly, the industry influences the economy from technological and innovation aspeckt because entertainment games are spilling over into other sectors and non-leisure applications.

The interest for the spill-over is exchange of useful technological information, new concepts, ideas and different types of capital connected to the startups and the knowledge more precise to the education of the gaming community. The gaming industry players, with their **multidisciplinary** have strong innovation capabilities, and they act as catalysts for innovation and knowledge-based growth in various other industries, contributing to economic growth across the economy indirectly.Therefore, **the industry's total contribution is much higher than the reports with revenues.**The positive games-to-work spill-over effect can be explained by three specific behaviours that are commonly manifested in online games: **active learning, leadership and collaboration.**[18]

Business models in the video game industry are different; the digital products give the option for online delivery. This fact together with the close relation between video games computers and the Internet results in some interesting possibilities for new business models, new markets and new growth.

The new trend is less retail (CD's) and more **digital downloads**, with new on line platform as Steam, they create the movement from PC and console gaming toward downloads and mobile gaming.

Companies have discovere that revenue stream is bigger than a one-time payment for a physical commodity. The new age business model is **Games as a Service (GaaS)**. This means that customers get the product (for price or for free), and the company continue to develop the current product, adding items and in-game market to increase customers' in-game transaction activity. Instead of being a developer-centric product, games have become player-centric; the list of changes to the business model presents:

[18] Derks & Bakker, "The impact of job crafting on job demands, job resources, and well-being", 2013

App Monetization have 3 shifts historically and they are as follows:

– 2007 – 2012: **Paid apps** (face value price)

– 2013 – 2016: **Free apps with a high amount of in-app purchases and a small amount of ads**

– 2017 – present: **Free apps with a small amount of in-app purchases, high amount of ads**

The graphical islustration of the video game industry is presented trough the comparison in the FIGURE2, from hit driven business to reccuring revenue one, from low to high user engagement, from console to multi platform business, focused on the player with platform experience and lifetime value instead of number of sold units.

Figure 1VIDEO GAME INDUSTRY PAST V.S TODAY

Source (https://appsamurai.com/the-new-age-gaming-business-model/)

Free to play or freemium depends on the presence of a huge client base that play free or pay small rate occasionally for virtual products. For on-line distribution the most profitable resource is the gathering of people and the greatest crowds were attract by free administrations. Furthermore, for the organizations there is a test: expanding the level of players they can transform into payers spending genuine cash in the amusement. The adaptation procedure advertising is with various patterns, for example, around amusement promoting, advergaming and indiversion publicizing. F2P are famous by the unstable take-up of the interpersonal organizations and cell phones that put recreations into the lives of over a billion people of different backgrounds, ages and sexual orientations. In addition, the receptiveness of these stages permitted engineers recently

bolted out of the computer games industry by stage and retail guards a course to the market.

In-application buys is a type of monetization that has turned out to be broadly utilized in social recreations, comprising in trading genuine cash for money that can be utilized in-amusement for purchasing background focuses or different articles. The idea of this model depends on the presence of an expansive client base that play for free. A little rate paying little sums occasionally for virtual merchandise is sufficient for guaranteeing the benefit of the diversion - this rate shifts between 5% or 7% of F2P players.

The 5 % level of individuals moving from non-paying to paying, implies that 95 percent of players do not spend anything. The non-payers have zero contribution monetarily but they do increase the value of the amusement. The key is to achieve a minimum amount of clients to acquire an ideal number of paying clients. The Monetization Report 2016 by Swrve, an organization that oversees clients of a few effective allowed to-play diversions, demonstrates that under 1.5% of players are really paying cash. They have a gigantic base of 98.5% of the none players. The reality is that half of portable diversions cash originates from 0.15% of players. Those spenders have earned the epithet of whales (a term repurposed from the gambling club industry).

A typical suggestion for maintaining **a strategy "pay-to-win" (P2W)** is the instalments to utilize and widen the experience without influencing ongoing interaction. Players are paying to pick up favourable position in diversion. For example, World of Tanks and the fWorld of Warplanes and World of Warships (all by War gaming) have unequivocally dedicated to not giving paying players any points of interest over their non-paying companions. The system "sans classified to-win" is introduced in 2012. The premise "allowed to-win" is to evacuate every payable alternative that could be seen as giving a player favourable position in fight. This allowed to-win methodology has been connected to all the past, current and future War gaming titles and this move is to a limited extent intended to make War gaming a greater player in the expanding eSports field such a Wargaming.net League.

In single player diversions "pay-to-win"always demand that the player purchase additional substance. Instalment might be required so to proceed in the diversion, irritating or diverting the player from the experience.

With the literature review of different interested aspects to define the video gaming industry, the purpose of the research is to provide close up to the complexity of the

industry and in such mannerto create a base for in-depth focused research of the industry in the Republic of North Macedonia.

1.4 Evolution of the video gaming

Although very youngfrom the 1970s to the present, the video game industry experiences visible changes in technological and social terms and ongoing. It was consider as a hobby of a few developers. Nowadaysvideo game industry is an important economic factor where the creation and distribution of such a product involves a budget of tens of millions of dollars. Breaking into every layer of society, it continues to shift technical barriers in the world of information technology and changes the lifestyle of public.

Although the popularity of video games and industry began in the 1970s and 1980s, the origins of video games have been dated since 1947 when Thomas T. Goldsmith, Jr, and Estle Ray Mann patented their invention of "The device for entertainment using a cathode ray tube "(Cathode ray tube amusement device). It is based on the use of levers and buttons to control the cathode ray tube and simulate firing on air targets. This system used to set a particular scheme over the screen, due to the inability to display graphics. Through the evolution, it has gone different stages. One of the view on the evolution process is through the devices and most popular games:[19]

The **first generation of video games (1972–1977**) includes the Magnavox Odyssey, Coleco Telstar, and other consoles.

The **second generation of video games (1976–1984)** includes the Atari 2600, Intellivision, Odyssey 2, and ColecoVision.

The **third generation of video games (1983–1993)** includes the Nintendo Entertainment System, Sega SG-1000 series (including the Sega Master System) and Atari 7800.

The **fourth-generation (1987–1997)** of video games includes the Super Nintendo Entertainment System, Sega Mega Drive/Genesis, PC Engine/TurboGrafx-16, and others.

The **fifth-generation era** includes Nintendo 64, Playstation, Sega Saturn, Game Boy Color The sixth-generation era includes Sega Dreamcast, Playstation 2, Xbox, and Nintendo GameCube. Game Boy Advance was the lone successful handheld. This era began in November, **1998 and ended in November 2006** as the next-generation of consoles launched.

[19]https://www.did.ie/content/blog/history-of-video-game-consoles

The **seventh generation began on November 2005** with the release of Microsoft's Xbox 360 and continued with the release of Sony's PlayStation 3 in**November 2006** and Nintendo's Wii in November 2006. Each new console introduced a new type of breakthrough technology. For example, the Xbox 360 and PlayStation 3 offered high-definition graphics, while the Wii focused on integrating controllers with movement sensors instead of joysticks and appealing to non-traditional gamers.

The Eighth generation of video games is the current generation of video games. It consists of Microsoft's Xbox One, Sony's Playstation 4 and Playstation Vita and Nintendo's Nintendo 3DS and Wii U. Due to the nature of the hardware as well as the failure of the Wii U, each company also produced hardware in the middle of the generation; The Playstation 4 Pro, the Xbox One X and the Nintendo Switch. The hallmarks of this generation include the fastest selling console with the Playstation 4, the decline of the handheld consoles, the first mid-generation upgrade hardware in addition to budget models and the first hybrid gaming device as a major player. Numerous startups also have attempted Android-based and Linux-based gaming hardware with limited success.

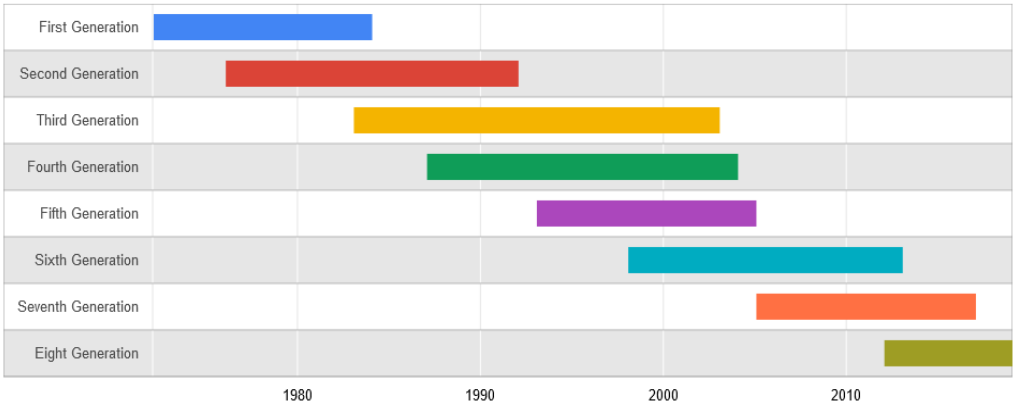

Figure 2EVOLUTION OF THE VIDEO GAME INDUSTRY

Source: **(**https://vgsales.fandom.com/wiki/Eighth_generation_video_games)

Other perspective of the evolution starts with:

The arcade games were the first video gaming platforms, generally coin-operated, and located in arcades, bars, hotels, and similar business establishments. (*Street Fighter, Pacman*, and *Pinball*)The **console platform** have a separate gaming unit (console) and the console's output is on an external monitor (television screen)(Microsoft Xbox, Sony PlayStation, and Nintendo Wii).

Handheld video games have portable devise and the screen is an integrated part of the

device. Sony had stopped producing PSP devices by 2014.[20]

Massively Multiplayer Online Games (MMOGs) platform for on-line role-playing game played with many other players simultaneously in an online game world, owned and operated by a company; for example, Blizzard Entertainment's *World of Warcraft.*

Mobile games have arisen with 'smart' phones that have a features to play games. These games are very low in price or free to play.

The current trends are amazing, changing all the time and becoming more difficult to be defined.

Pricing competitionamong Platform, the digital distribution is a bonus to consumer and IP owner. For example, Steam is well-established platform and continues to provide a great service compared to larger publishers. The competition is evident, with the success of *Fortnite*;Epic Games announced a challenge to the PC digital distribution platform, Steam (90% market share). Epic Games proposes 12% of revenue from titles hosted on its platform, leaving 88% for the publisher, down from the established norm of a 30/70 split (Apple, Google and the console platform holders remain at 30%). In response, Steam reduced its revenue share to 25% (from 30%) for revenues in excess of $10m, and 20% for revenues above $50m – annoying small, independent developers. More appealing is a US-based messaging app developer for gamers, is looking to go further, offering developers a 90/10 revenue split.

Game as aService is the ongoing relationship with a game's community post-launch, where the game developer manages the community and provides additional content or events (whether for free or for a charge) to extend the life of the game and increase its lifetime value (LTV).

eSports is the driver of future growth, especialyfrom an investor's perspective, although eSports is a technology with an evolving impact on the industry, the main beneficiaries are Google and Amazon.

eSports is another revolution in the games industry, they are organised, multiplayer video game competitions, with sponsored professional players and teams,playing online collaborative games growing into eSports (eg *League of Legends, Counter-Strike, Overwatch* etc). The necessary ingredients to success appear to be multiplayer titles with a strong community of sufficient size and players with a competitive edge. Today, eSports provides a further way to build a community around successful titles, extending the life of the game, growing its audience and providing ancillary revenue streams from

[20](http://www.theguardian.com/technology/2014/jun/04/sony-psp-handheld-nintendo).

advertising, sponsorship and merchandising. These events draw huge live-streaming audiences on Twitch/YouTube (as well as highlights for download) wanting to watch leading players show their mastery of the game.eSports is a core part of Game Digital's strategy.

Virtual reality(VR)/augmented reality(AR) is the major drivers behind the evolution of gaming.VR is where the user is offered total immersion in a virtual world via goggles or a headset, whileAR is where a digital user interface is laid across the real world through a pair of glasses or other eyewear (think of a fighter-pilot's heads-up display), allowing a mix of real and virtual objects. These technologies are the future of gaming, offering a more compelling and immersive experience than current screen-based technology. This new sector is still waiting for mass-market where hardware and content have an attractive price point.

1.5 Evolution of the video game industry in Republic of North Macedonia

The video game and multimedia industry is an important part of the creative audiovisual industry, and this sector can be said to belong to the so-called "audio-visual" industry, "cross media" or "transmedia".[21]

These terms, cross-media or trans-media, combine the two areas and are recently used as synonyms, and they explain a whole process that involves the distribution of different content (music, text, images, video, etc.) through different media, commonly used as a combination of media such as television, newspapers / magazines, mobile devices and the Internet.Multimedia are applications, computer software, edited content, adapted for the simultaneous processing and presentation of multimedia data, including video games.This part of the creative industry, although young is booming worldwide and as well has impact in the Republic od North Macedonia.

The video game industry is a complex combination of many different spheres from the creative and IT industries. By nature, it is dual, IT sector and creative industry. There are no limits to the products and services of this industry, and this is also confirmed companies are predominantly export-oriented, ie, global industry with high competition.An analysis by the UNESCO Department, 2012 has found that there are around 20 studies in Republic od North Macedonia that develop video game. Some of them work and have already created their own products, the others work (outsourcing) to

[21] Nicoletta Iacobacci, http://www.lunchoverip.com/2008/08/from-crossmedia.html

companies from abroad. A second important finding is that Republic od North Macedonia has potential in the field of video game development[22].

Since the year 2006, the interest in playing video gamesin the Republic od North Macedonia has been rising due to the availability of Internet, equipment such as PS, console or mobile and is reflection of the trend of the world population for social entertainment.Most of the players are very young still there are players among the adult population up 40 years old, they used to play games on Commodore 64 or Nintendo console and now PlayStation 3 of Xbox 360 console. The above mentioned youngster's passionat gamers interested in IT and have continue their educationon the faculties of computer science and informatics, or have taken IT courses are the base of the gaming industry in Republic od North Macedonia. (MAGDA, Macedonian Association for Game development).

The evolution stage is presented chronologically with the studious and games that had significant impact on the video game industry in Republic od North Macedonia.

The first steps of developing video game studios are since 2006 (the eighth era of computer game consoles) so the industry begins within the Eight generation. From the available data, the history starts with the third party developer **IST Games**, founded in 2006 by Mr. Adriaan van der Flier as Taurus MediaLab, Dutch citizen with Macedoian roots. The purpose of the company was to utlise the potential of the IT business for the casual video games for personal computers, for the market in that time was growing with over 600% per year and decided to get involved by opening the first Macedonian video games development studio.Since the beginning studio have been creating downloadable time management casual games for personal computers targeting the female audience at the age 35 to 60. Their first game "Kindergarten" released in 2006 and made for only €25.000, become a big hit and have kept on selling well for few years. The company had 30 permanent employees organized in production team, development team and graphics team for PS games and games for mobile. The process of production was in the Republic of Republic od North Macedonia, with exception of the music. The publisher supporting the studio is the Dutch company Youda Games, while the investor partners are from Israel and the United Kingdom. Althrough the Internet the games were sold all around the world and their biggest market is the United States.

Seavus, a software development and consulting company founded in 1999 in Malmoe, Sweden. One of the most knownICT Company with sales representatives in New York

[22]https://www.britishcouncil.mk/sites/default/files/creative_industries_mapping_in_macedonia.pdf

(United States), Zurich (Switzerland), and Dusseldorf (Germany), development and resourcing centres in Minsk (Republic of Belarus), Nis and Belgrade (Republic of Serbia), as well as large development hubs in the Republic od North Macedonialocated in Skopje and Bitola. In 2011, they had opened “Tesko Gaming”, an in-house mobile games development studio, consisted of 9 employees, some of them newly employed and some coming from the other departments of the company. Their first game “Cynedom” released in August 2011 is a role-playing mobile game for iPhone, followed by “Yatzy Ultimate” released in October 2011 for iOS and Windows Phone devices, created according the traditional table game. In February 2012 the company released “Check-ers” and “Reversi” games, also for iOS and Windows Phone devices and created according the traditional table games. “Yatzy Ultimate” is the most succesfull Seavus’ game by reaching over 1,1 million downloads in September 2012.

Wootra Games, independent studio from Skopje, formed in 2010 by two developers.The team was developing free-to-play flash online games and generating income by placing sponsors logo and advertisements inside the game. The studio released 10 games, the most popular among their games is “Codename Ballistic” released in 2011, it has been played around 12 million times and “Carveola Insident”, also released in 2011, in February 2012 was chosen for the game of the month by **www.pumpkingamesarcade.co.uk.**

The first serious gaming studio for AAA games with Macedonian capital, **KAMAi MEDIA** is founded in Bitola, started working in the first half of the 2011, supported by the Business Start-up Centre Bitola, taking part in their “Business Without Borders” project. In March 2012, the company won the first prize of €10.000 on “Business Ideas Factory” competition for best business idea organized by the Government of the Republic of North Macedonia as a part of their campaign for promoting entrepreneurship. Although this help was only a small part has contributed about recognizing a business potential in a new industry. KAMAi MEDIA starts with 3 employees and 3 external associates working on demo version of an AAA action-adventure title. The owner Petar Kotevski transfer the experience from his career as a programmer for Unique development Studios in Sweden, Lead Programmer in Crytek in Germany, Genuine Games in LA and Bungie in Seattle, working on a top selling titles such as “Far Cry”, "Halo 3", "Halo 3: ODST" and "Halo: Reach". In 2019, they have 12 employees.

TabTale was founded in 2010, the company's headquarters are in Israel with global offices in China, the Republic of North Macedonia and Bulgaria. The division is in Skopje. The company's dynamic team of experts have focused on new games, new genres and new territories.TabTale, through its Crazy Labs brand, is leading in mobile games such as Hyper Casual Games, Lifestyle Games and Licensing (AKA Casual IP) Games.As a top 5 mobile games publisher (according to AppAnnie and Sensor Tower) and with over 2.5 billion downloads to date, TabTale is now a worldwide leader in casual games development, distribution and innovation.Crazy Labs, TabTale's successful publishing brand, focuses on 3 hugely popular lines of mobile games:Hyper Casual Games, Lifestyle Games, Licensing Games (Casual IP).

Tesseract Gamesis studio located in Skopje. The team is consisted of 6 developers.They statrted working 2012 as an independent game development studio with a unified goal to breathe new life in the old shootem up formula, to make it more accessible to the modern gamer by introducing current technologies and gameplay mechanics. The company was founded by 6 (six) developers, 25 and 27 years old, with the same passion for gaming and game development. They are learning the tools of the trade, what it takes to build a fully fledged game from the ground up. Their game Excubitor is a fusion of multiple well-established game mechanics and genres. An action game at it's core, it harks back to the days of the Strike Series and Raptor: Call of The Shadows. While those games served as the initial inspiration, in the later stages of development they shifted the focus to provide the player with a loot system and different upgrades, as well as the core mechanics of the tower defense genre. By fusing all of these pieces in addition and gameplay innovations Excubitor has developed it's own identity.

ITgma Skopje is a software company that started creating games in 2010 as an outsourcing activity for Dutch companies. Although ITgma does not plan game development to become companies' primary activity, its has proven that it is worth working in that industry.

G6 Solutions an indie studio in the sphere of mobile applications. The team, 4 developers based in Ohrid, have started their freelancer business in 2011 by releasing mobile applications for Android devices. Their first game, a mobile version of the traditional "Tic-Tac-Toe" released at end of 2011 was downloaded 1 million times. The games and the other applications are free-to-play while the revenue is generated from the advertising. In 2012, G6 have also re-leased "Minesweeper Marathon" game.

4Virtus is a company established in 2010 as a tenant in the YES Incubator Skopje. The main activity of the company is web design and mobile applications outsourcing for Dutch companies. In November 2011, they started developing series of educational games named “beeClever”, aimed to be played on Android devices for pre-school children. The games are sold on App Store. In June 2012, the company presented the “beeClever” project at the “ICT Spring!” event in Luxemburg.

“Grandma’s Games” from2011 is developed a school project about implementation of traditional Macedonian games in the educational process. The main goal of the project was preserving the traditional Macedonian games as a cultural heritage by using digital technologies, and teaching school subjects through playing the games. In 2011, the school applied at the Microsoft Macedonia competition “Microsoft Forum for innovative educator”, which is part of the Microsoft global program “Partners in Learning” and is also supported by USAID program for primary schools. The “Grandma’s Games” project won the first prize and was spread in 5 schools from different parts of the Republic of North Macedonia in order to involve children and games from all nationalities. The project was presented at the European Innovative Teachers’ Forum in Moscow, Russia, organized by Microsoft and won the European Grand Prix in the Educators Choice category. Further it took part at the Microsoft Partners in Learning 2011 Global Forum in Washington, DC, the United States and was chosen for 1st runner-up in the Educator’s Choice category. The first game “Zavor” was developed in collaboration with the Faculty of Computer Science and Engineering (FINKI) at the “Ss. Cyril and Methodius” University in Skopje and NI TEKNA - Intelligent Technologies company. The “Grandma’s games” project was a part of Games for Change Europe organization and together with associates from Switzerland, Montenegro, Bulgaria and other countries are working towards finding investors for pursuing collaborative project.

Linux animation-Lynx Studios, Skopje is a high-end 2D animation and video games production company, with special care to create memorable and true characters. They produce illustration forbooks, assets for video games and applications.Their portfolio has different games such as "Duo Spheres" a brain training game, designed to help to improve player focus, multitasking and resistance to stress. Hero in training is a training adventure of the super lynx hero, this game puts the players in the paws of the central character as he jumps his way from one platform to another in order to prepare himself for future challenges as a superhero. Thumb Thump -Master the art of the thumping in

the world's first mobile split-screen fighting game. “Potion Motion” gives control over alchemy as the players try to collect as many energy potions.

Workbench Entertainment is an indie studio situated in Skopje from 2014. The team of 10 passionate gamers turned game developerss. The team has grown a lot during a 5 year span and they all started out of passion for games and game development. Wounded is a nerve racking first person horror game that is one step closer to the world of fear, unforgiveness, anxiety and all round terror. As player progress through the old and abandoned world of “Wounded”, searching for the daughter, he uncovers the deep dark secrets that the place has buried in its wall and ground. Every clue and every secret that player uncovers helps him to guide the way through the game and not to fall into nightmares. Swift moves, reflexes, and stealth are weapons of choice to insure survival and to maximize the chances of finding the daughter alive.

BoxBloy is a small puzzle game that challenges players brain with quick decisions and tactical thinking. Player needs to complete the levels in the shortest time possible. The challenge is to “collect” or run on every platform and reach the end. Just make sure that the player doesn’t slip and fall off the edge while tracking the time.

NapNok Gamesare since 2017,investment from foreign capital with around 27 employees in the offices in Skopje. Originally, they are formed in 2010 and growing into multi award-winning independent game studio located in Copenhagen, Denmark. They create groundbreaking local/ social multiplayer games driven by novel interfaces and new technologies, players interact directly with each other, not just a TV screen.They use new technologies to discover unique design spaces, not just reproduce old habits, creating games that leak out and becomes part of the player’s reality, not just games to forge time and space.Chimparty is a hilarious party game for up to four players with pick-up-and-play one button mini games, easily controlled through a smartphone. Play as one of four mischievous chimps, doing what chimps do best, monkeying around. Travelling across time and space, these gullible gibbons find themselves encountering everyone from pirates to aliens in their wacky travels across the universe. Part of the PlayLink for PS4 range, Chimparty lets players monkey around both on and off screen, bringing the play to the couch. Using a smartphone or tablet as a controller, players can sling, swing, jump and launch their way to victory, customizing their chimp along the way. Macedonian team was directly involve in production of the game.

Frantics is a PlayLink party-game, developed by NapNok Games in partnership with Sony XDev. The game is a mini-games collection with genres ranging from frenetic action arena brawls to equally frenetic strategic turn based games. The challenges are hosted by a scheming, manipulative and charmingly unfair Fox. All players fight for crowns throughout the game, but the Fox has introduced a secondary currency, coins, that can be used for bribery, backstabbing, sabotaging and all kind of obstruction.

Spin the Bottle: Bumpie's Party is a party game for Wii U™ supporting up to 8 players. The game pushes the players' attention away from the screen and onto each other with a series of collaborative micro challenges where players have to look at each other in order to win. The players sit in a circle around the Wii U™ GamePad and spin a virtual bottle in order to pair up two random players to take a challenge. The challenges are carried out with Wii Remotes and might involve tight coordination, daring trust, body contact or extreme flexibility.

Snowball Games is an indie gaming studio that creates, develops, and publishes fun mobile games for entertaining users. The games are currently available on iOS and Android.The games are designed to create an unforgettable social gaming experience for everyone.

Dark-1is registered in 2017, it is a team composed of 3 developers who share a common passion for making games. Their first game is Odium to the coreaction-packed music-fuelled levels designed to play together with original soundtrack.

Wavebois is game developed for the GGJ 2017. It's a three player asymmetrical game where two players are trying to survive the attacks of the third player, who has the power to wave and distort the playfield.

Dream Island is a game created during the 26th ludum dare game jam.

Copper crown – is another game were the king of all copper decides he needs to gather all his minions and spread his kingdom to new planets. Using his powers he controls all that is cold and copper machinery. Plan the resources, destroy all enemies, build and grow copper town so the player can take off to new planets in space.

In the Republic of North Macedonia there are not publishing companies or big development studios, but there are variaty of video game studious and individuals that produce video games for different platform.The video game industry in Republic of North Macedonia, (evaluated only through the original games produced for PS) is still consider infant and it is continuing to survive based on the organization culture in the

companies and human capital that keep on working and creating products.The fouders of the gaming industry are educated and experienced, young passionate IT graduates or students and artist – professionals and entrepreneurs that are taking high risk especially when video games were not considerate as commercial product by the Universities and investors. They have transfer the knowledge and experience to develop studios in the country and create video games for global market.

These developers have bachelor degree in IT, technical, art or other field and than, just like many game designers around the world, they gain the necessary knowledge and skills through formal and unformal education such as local providers of training, online tutorial, cooperation and work experience from outsourcing for international companies.

The one characteristic uniting all the game developers from beginnings and today is the extreme passion for video games. In this industry, the game studios drive parallel streams: one is for the profit, successand the other is the active contributionto the gaming society. That is whyvideo game industry so attractive and unique. High technology and arts that are used in the production are not just demanded from the audience, but also driven by community culture among all people developing games.

There is no culture for paying for the video games, in Republic of North Macedonia, players use pirated consumption goods (for example out of 10000 sold pieces on the global market only 100 are paid from MK, interview, July 2019,Maximus Ludos Studios).

In accordance with the above, the most important is macedonian video game sector to grow into an accelerator that will be link among all the stakeholders in gaming industry including the government and education and increase awareness for vdeo game industry.

Since 2010,most of the businesses that work on video games production are located as a part of Information and Communication Technologies (ICT) sector and theCreative Industries sector. The ICT sector is under supervision of the Ministry of Information Society and Administration while the creative industries are supported by the Ministry of Culture.Video game industry modestly is a part in the agendas and strategies of non–government organizations such as business accelerators and chambers of commerce.

	Company Name	Place and Year of Foundation	Number of employees	Type of game and platform	Type of Company	Number of games	Method of selling	Sales and other achievements	Current status

1	Seavus	Malmo, 1999	20	Mobile games	Software development and	6		"Yatzy Ultimate" 1,1 million downloads	no data
2	IST GAMES	Skopje, 2006	30	Casual games PC and mobile	Third party developers	18	Online sales	"Kindergarten" 2006	no data
3	Anima	Skopje ,2009		Educational games on CD					no data
4	4Virtus	Skopje, 2010	3	Mobile games	Outsourcing	1 series of games	Online sales	"beeClever" games "ICT Spring" event in Luxembourg	ICT soft-wer
5	TabTale	Israel, 2010	71	Mobile games			Free to play games in game advertisements		Operating
6	ITigma	Skopje, 2010	10		Outsourcing				ICT soft-wer
7	G6 Solutions	Ohrid, 2011	5	Mobile games	Team of freelancers	2	Free to play game in game advertisements	"Tic-Tac-Toe" 2011 download1 milion times	no data
8	KAMAi MEDIA	Bitola, 2011	12	console and PC		1	Online sales		Operating
9	Tesseract games	Skopje, 2012	6	PC games		1	Online sales		ICT softwer
10	Solaris Production	Skopje, 2013	3	PS games		1	Online sales		no data
11	Workbench Entertainment	Skopje, 2014	10	console and PC.		2	Online sales		operating
12	Koma design	Skopje, 2015	1	Mobile app	Main activitty is design	1			operating

13	Lynx Animation-Lynx Studios	Skopje, 2015	28	Mobile games			Free to play games in game advertisements		operating
14	Endy Milojkovski	Skopje, 2015	1	PS games		1	Online sales		Free lancer
15	NapNok Games	Skopje, 2017	27	Next-gen consoles	Outsourcing		Online sales		Operating
16	Koloss colective	Skopje, 2017	3	PS games		2	Online sales		Operating
17	Dark-1	Skopje, 2017	4	Mobile and PC games		2	Online sales		Operating
18	Maximus Ludos Studious	Amsterdam, 2018	3	PS games		1	Online sales		Operating
19	Snowball Games	Skopje, 2018	5	Mobile games	Indie gaming mobile games		Free to play games in game advertisements		Operating
20	Vestel	Skopje, 2018		educational games	Outsourcing	1			Operating
	Total		**242**						

Table 2EVOLUTION OF THE VIDEO GAMES IN RNM

Source: Authors mapping of the video game studious

Contribution to the chapter

The definitions of the video game are reflecting the complexity of the product/commodity/service.The review of different approaches in definitions for video games and video gaming industry, includes the general awareness that video games and the industry have turned into a mass marvel.

The definition bring the specifics according the period of the game development and each is bringing different angle to the general picture. From basic and simple to more complex one.

The definitions prove that to create video game in a variety of genres for the global market, the abnormal state of inventiveness and creativity is needed, to follow the trend of competing on the global market. The environment is complex and widen by the dissemination of mechanical developments (e.g., cell phones) that provoke new players to enter the market and expand the focus group.

The simplified model is generated on the base of the definitions, it includes the key elements form the aspect of the developer, publisher and gamer.

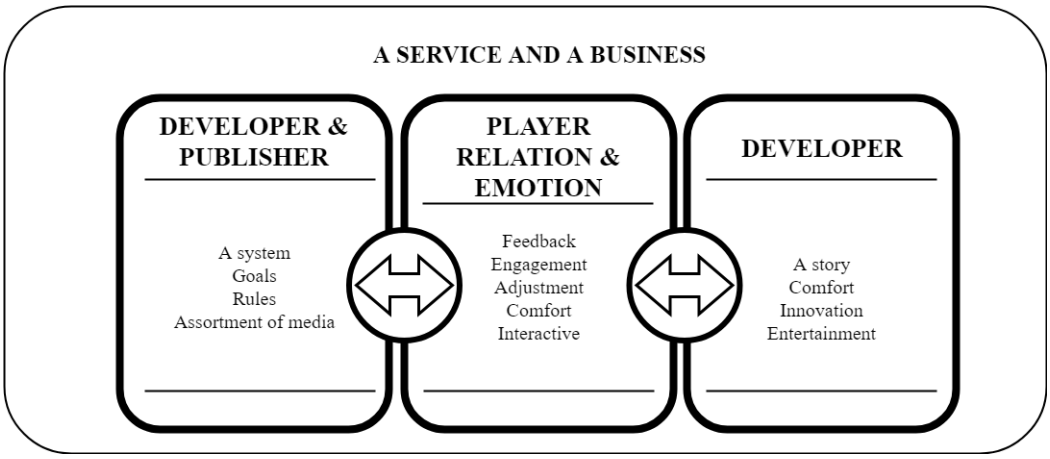

Table 3MODEL –DEFINITION OF VIDEO GAME

Source: Autors contribution to the definition of the video game

The video game industry is beyond a "hazardous" profession. The industry creates $10.5 billion income every year and the employees such as developer or artist earn approximately $74,000 yearly, while software engineers get $93,000. The extra benefit is the opportunity of being paid to "play" computer games at work.

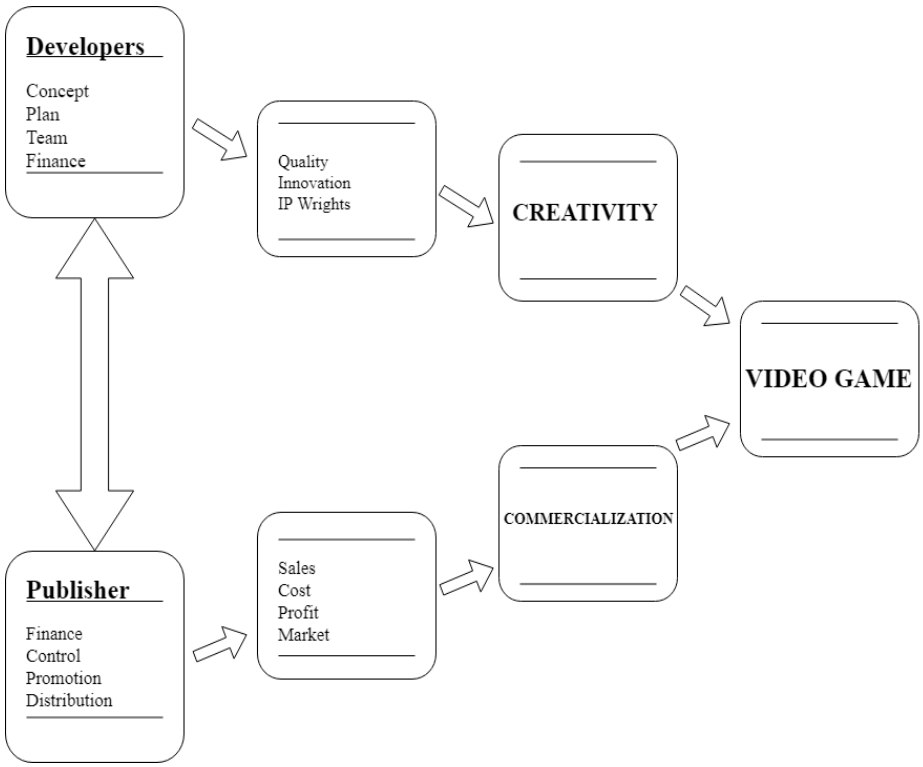

Table 4MODEL –DEFINITION OF VIDEO GAME industry

Source: Autors contribution to the definition of the video game industry

The evolution of the gaming industry in the Republic of North Macedonia actually starts with the research of the key gaming studious, more precisely chronologically mapping of the direct players with several indicators, legal structure, starting position, type of products, number of employees, qualifications, global markets, domestic and foreign investments. This is the base for further in-depth analysis, regarding the investments and the financial benefits.

Chapter 2. Conceptual framework and hypothesis

2.1 Investment in the video gaming industry

The gaming industry has experienced high growth in a relatively short period and theforecast is to grow higher, so it makes the gaming market an attractive one for investors.Back in 2012, the global gaming market had revenues of $70.6 billion USD, since then in 2018 it generated $137.9 billion USD in revenues, and for 2021 it is forecasted to generate **$180.1 billion USD in revenues.**

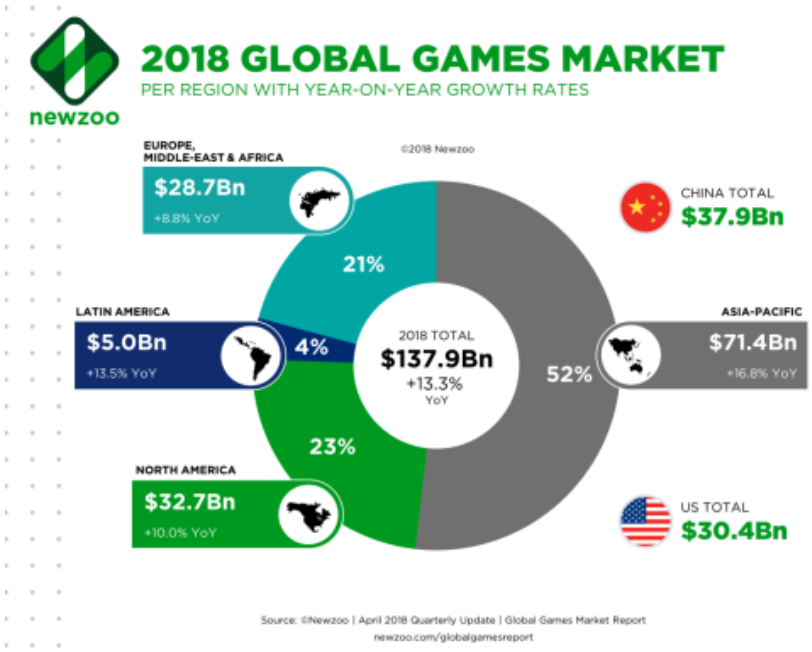

Figure 3GLOBAL GAMES MARKET

Source Newzoo,newzoo.com/globalgamesreport, 2018

The attractive revenue streams come with high investments. The Figure 4 belowgives an overview of the cost of production for some video gamesfrom $100 million for “Red Dead Redemption” to $500 million for video game “Destiny”. Major share in this numbers are the production and distribution of video games. Video game is the product of highly competitive industry, but they also have beneficial effects on players and society as a whole.[23]

[23]Wesley, Barczak “Innovation and Marketing in the Video Game Industry: Avoiding the Performance Trap”, 2010

Figure 4INVESTMENTS IN VIDEO GAMES

Source: Business Insider.http//goo.gl/HTmhta

Regardless of the platform, all video games follow a similar process; from the development to marketing stages. The gaming sector has **a complex value chain**. Constant innovation in the video game industry are changing the value chain. An engineering approach is used, allowing new games to be created quickly. Figure 5 shows the basic video gaming value chain.Thevideo game industry includes developers, publishers, distributors, retailers, customers, consumers, IP-owners, platform owners, and hardware owners. Game development is a creative and collaborative process involving numerous disciplines; it is rooted in a particular culture producing creative, artistic, and culturally important works.[24]

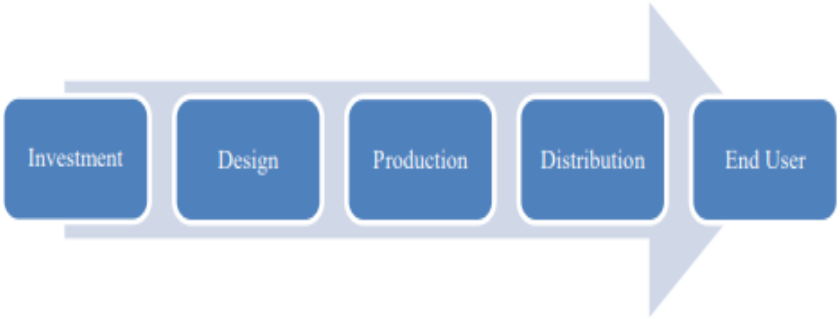

Figure 5THE BASIC VIDEO GAMES INDUSTRY VALUE CHAIN INVESTMENT

[24]Zackarisson and Wilson,"Global Games: Production, Circulation and Policy in the Networked Era"

Most of the game studios are focusing on investment, production and design, the first three stages of the value chain.

Investment is providing infrastructure for the studio, human resources and comprises the first stage in the value chain of the video games industry. The size of the investment depends on the aspirations for game development and the available financial sources.

The design is the creative stage that includes teams of designers, developers, and artists in the pre-production stage of design and adoption. **Production** includes the game engine and the middleware put in a planning matrix with timing, the testing and improvements of the product. A variety of skills are needed to produce a single product, meaning that developing a game is not easy. A single game requires the involvement people from different disciplines including: game design, visual design, programming, modelling, game-level design, testing, and marketing. The developer is the main actor in the process and different actors work together as one, to present a coherent and an immersive gaming experience for the consumer.[25]

Distribution through marketing channels is the key to sell the product. The bigger studios are covering the whole process because of the high distribution cost. The biggest challenge for game developers is the lack of financial capabilities to fund and promote their games; that role is for the publishers to bring games to the market. The publishers'business models differ, they can work with different developers (third party, in-house, and independent) to build portfolios of games. The publishers adapt the game development to the current market trends and attempt to establish promotion strategies. Publishers are the industry actors who tend to take the financial risks in video game development. The budget for an AAA game (a high quality game, with an expected high sales volume) is estimated at $15–$20 million for most games. Microsoft spends an estimated $30US million developing each game. The budgets for AAA titles seem to be on the increase, depending on the technical platform and the genre. In addition to the development costs, there are also marketing and sales costs. Microsoft reportedly spent approximately $40US million on the marketing and sales of *Halo 3.*[26]

The gamers are the key factor to determine the sales of certain game. Video games are closely related with the economy and the media. Games are influenced by "culture", and

[25]Zackarisson and Wilson,"Global Games: Production, Circulation and Policy in the Networked Era",2012
[26]Zackarisson and Wilson,"Global Games: Production, Circulation and Policy in the Networked Era",2012

are the products of cultural industries. National culture, geek culture, gamer culture and numerous other cultural aspects impact on game development and on gaming studios alike. In other words, cultural aspects infuse the design of a game.

Further,**the innovation** has been the driving force behind the growth of the gaming industry but it is a double-edged sword dependent of the consumer appetite for games, that is changing extremely fast and unexpectedly.This is evident from the moment, when Epic Games released Fortnite in 2017, in less than a year; the game drew in 125 million players and brought in $2.4US billion in revenues– more than any other free to play game in the market. On the other side, at Activision Blizzard's stock price, has fallen from ~$84US per share,down to about ~$42US per share, due to the incredible growth of Fortnite**.**

The key industry players, public companies, worldwide in the gaming industryare corporationsowned by general public shareholders via the free trade of shares of stock on exchanges or over-the-counter markets. AAA games are particularly economically valuable. For example, the sales revenue of *Grand Theft Auto V,* developed by Rockstar North, exceeded $1billion in the first three days of its launch. While it cost approximately $265 million to develop the game, over 32.5 million copies were sold.

The cumulative investments in video games firms in 2018 was around $6 billion according to Digi-Capital's Games Report Q1 2019. The top five biggest investments account $3 billion are with the largest - Epic Games' .Three of the top five -- Douyu, Shanda Games and Huya were Chinese gaming firms.Digi-Capital reports that was either an investor or a major shareholder in four of the companies listed, invested in:Epic Games ($1.25bn) Douyu ($630m), Shanda Games ($474m) ,Huya ($462m) ,Voodoo ($200m).

The key gaming companies with highest investment

Activision Blizzard (ATVI) is one the largest game company in Europe and the Americas by revenue and market capitalisation. It has three units Activision, Blizzard Entertainment and King Digital Entertainment. They have sold more than 500 million copies of their titles, including Call of Duty, Destiny, Skylanders, World of Warcraft, Hearthstone, Diablo, Heroes of the Storm, StarCraft, Overwatch, Candy Crush, Farm Heroes, Pet Rescue and Bubble Witch.

Electronic Arts (EA) gaming giant from USA that delivers games under several labels, including FIFA , NHL, Madden NFL, etc., and well-established franchises as Battlefield, The Sims, Medal of Honor, and more, and new labels – Crysis, Mass Effect, Dragon Age, Dead Space, Army of Two, etc.

Take-Two Interactive is the third largest US publicly traded game producer popular with the Grand Theft Auto V, Civilization and BioShock, Rockstar Games, Private Division and 2K Gamesvideo game publishers.

Gamestop Corporation (GME) is global gaming titan that provides video games, hardware, consumer electronics, wireless services and accessories, it owns and manages a monthly magazine Game Informer (GI) aND is the largest Apple's partner in the USA.

NetEase (NTES) is a Chinese large provider of e-commerce, advertising and e-mail services, it develops some of the most popular PC-client and mobile games, including New Westward Journey Online II, Fantasy Westward Journey II, Ghost II, Tianxia III, and Heroes of Tang Dynasty Zero.In collaboration with Blizzard Entertainment, a Microsoft subsidiary Mojang AB, and other gaming companies, NetEase delivers some of the most popular global online games in China, including Hearthstone: Heroes of Warcraft, World of Warcraft, StarCraft II and Diablo III: Reaper of Souls.

Microsoft (MSFT)provides the gaming industry with both games and consoles. The company's video game production division – Microsoft Studios– develops and publishes games for Xbox, Xbox 360, Xbox One, Steam, Games for Windows, Windows Phone and Windows Store.

Sony (SNE)is the Japanese company where the gaming is presented the Sony Interactive Entertainment division. They have given global players PlayStation consoles 1-4, as well as classic games such as God of War, and Heavy Rain.

For example the investment in Blizzard that developed World of Warcraft is more than a good decision, because since release and still remains one of the most profitable businesses. When a game is this successful, there is an opportunity to leverage its intellectual property further and increase the chances of success in future games, similar

to how Blizzard have continuously utilized its Warcraft IP into building successive games afterwards.

The issue is that in the gaming industry, it is difficult to explain the higher valuation of the stock because**innovation** in the gaming market exposes the investors to incredibly higher risks. Innovation is not a reliable and sustainable competitive advantage.Innovation is the driver that will attract players, that is the best competitive advantage that any gaming company can have.

The **main factor** for investors to consider besides the companies **are the players/markets and their customer satisfaction,** they actually define whether the game will be a hit or it will fail.They play a particular game because is interesting, fun, amusing, adrenaline driven to play. They are not loyal because certain company like Blizzard developed the game or EA sports copied the game. The company in some cases can leverage off previously successful intellectual property for a new game (similar to Nintendo), but the chances of their next game taking the same path of success can be different. The investor cannot be sure if the next game is going to be as successful as the last one.

Other important issue is the **timing of release**, **monetisation strategy** because if any other game developer releases a hit developed game, there is a big risk of instantly losing market share to that new game.

Investors, besides the model of buying shares, can be **serial entrepreneurs – business angels.** On an online platform, the angel list is available. The company can reach and invite them to become investors in this industry, taking in consideration that they are acting on their national eventually regional territories.[27]

Characteristics of the investing in the EU video games sector

Video games are a global industry from the point of sales and revenue, but the scenario of investors in EU is different from the global tendency. The top 10 shareholders of most companies in EU (beneath the largest few, ie Ubisoft, THQ Nordic, etc) are dominately domestic or regional investors. This fact opens opportunity to create a new source for active investors to provide them industry expertise and insight, to look for companies with preferred business models at attractive valuations on a pan-European

[27]https://angel.co/video-games/investors

basis.EU is a fragmented market, with niche market leaders and few specialist investors.

The games industry grows and the focus is on the world's largest companies. Digitalisation has reduced the financial resources and capital required to launch a new title and offers the opportunity to manage a game's community with downloadable content to maximise recurring revenues. The characteristics of the video game studious are:

Professional management teams run the games businesses companies

Governments support promotes the video games with the launch of Video Games Tax Relief (VGTR).It recognizes video games same as film and TV as a core creative industry, allowing the domestic industry to compete on an equal footing with, e.g. Canada, France, the US and Ireland and other regions with significant industry tax breaks.

The games industry is risky, hit-based business. The formula for success is hard,only few companies achieve serial 'hits'; larger companies prefer to acquire proven IP and franchise successful titles rather than develop new hits themselves. The dynamic nature of the sector, where technology and creativity are joined and the shift to build community-orientated titles, serviced by downloadable content and expansion packs, to offer recurring revenue models helps reduce the risk.[28]

Specific type of investor are the EU funds. Creative Europe is the European Commission's framework programme for support to the culture and audio-visual sectors. Following on from the previous Culture Programme and MEDIA programme, Creative Europe, with a budget of €1.46 billion (9% higher than its predecessors), will support Europe's cultural and creative sectors.[29]This is a specific EU **program for Support for Development of EU video games**.

The specific objective is reinforcing the audio-visual sector's capacity to operate transnationally and internationally. The priority of the MEDIA sub-Programme is to increase the capacity of audio-visual operators to develop European audio-visual works with a potential to circulate in the Union and beyond and to facilitate European and international co-production.

[28] https://capital.com/is-it-time-for-investors-to-play-with-video-game-stocks
[29]https://ec.europa.eu/programmes/creative-europe/about_en

The MEDIA Sub-programme provides support for the development of European audio-visual works in particular films and television works such as fiction, documentaries, children's and animated films, as well as interactive works such as **video games and multimedia** with enhanced cross-border circulation potential. Under this support scheme, applicants may submit a proposal to develop a concept and project (activities to the point that the concept leads to a playable prototype or trial version) of highly innovative and creative narrative storytelling video games designed for commercial exploitation for PCs, consoles, mobile devices, tablets, smart phones and other technologies.

This program is aimed for European companies whose activities contribute to the attainment of the above objectives, and in particular to European video game production companies which have been legally constituted for at least 12 months prior to the submission date and that can demonstrate a recent success. The applicant must also own the majority of the rights related to the submitted project. Republic of North Macedonia is eligible to participate on this call.

An additional points can be awarded for projects specifically targeted at children up to the age of 12 years old as evidenced by the content being suitable for and the strategies being specifically targeted at this age group. The total budget available is 3.78 M €. The financial contribution awarded is a subsidy. The financial contribution is between EUR 10.000 and EUR 150.000 provided the amount does not exceed 50% of the total eligible costs of the action.**Most of the EU countries have additional national and regional funds.**

Current Global Market Demographics

This map evaluates where growth markets exist, by analyses of the demographics of the video games market and keeping in mind that shifts in key demographics allow companies to prepare for shifts in industry.

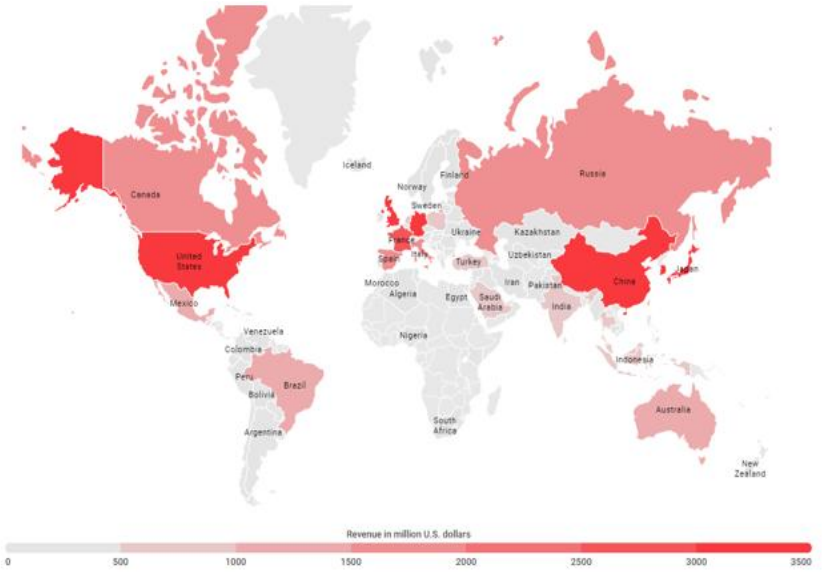

Figure 6MAP OF THE WORLD INVESTORS IN VIDEO GAMES

Source: https://eacea.ec.europa.eu/sites/eacea-site/files/call_notice_dev_vg_2019_en.pdf

The biggest locales in 2018 were (The Nielson Company, 2017):

- Asia-Pacific ($43.1B),
- North America ($23.8B), and
- Western Europe ($15.6B)

2.2 Models of investment

The current theory and practice recognize different categories of models of investment:

- Equity investments (company ownership),
- Bootstrap investments,
- Debt investments (loans)

Equity investments (company ownership)

One of the basic dilemmas for entrepreneurs is the investment in their own idea, to maintain 100% control over the business. Frequently, entrepreneurs exhaust their own funds and assets before the business becomes self-sustainable. In the initial phase is premature to request a loan. Therefore, the entrepreneur approach external sources of equity. Almost all loans require payment of the installment plan where interest is chargedon a monthly basis. Failure to meet these obligations can lead the business to bankruptcy.

The advantage of equity is agreed options of return the investors' funds. Investors buy equity shares at their own risk. Later, if they want to sell the shares, they cannot force the entrepreneurs to buy them. Investors are in high risk of a return on investment, unless the company generates profits and dividends. The high-risk exposure is attractive for investors because of the expected high returns. For these reasons, equity financing is more expensive for entrepreneurs. The unavailability of loans and risk dilution force the entrepreneurs to ask for equity. Equity comes from various sources: venture capital firms, angels, large companies, platforms, public equity capital markets through the issue of shares.Business gives up a certain percentage of ownership for the money received. In return, the investor receives a percentage of future business profits based on the percentage of ownership.

Possible forms of equity sources are:

- Entrepreneur (own sources and/or investment from the team members)
- Non-refundable funds
- Relatives and friends
- Business partners
- Venture capital firms
- Business – angels
- Issuance of shares
- Reinvestment of profits

The entrepreneur start a business with his personal savings in the form of bank deposits, current accounts and credit cards.

Non-refundable funds are from the Government or institutions to finance the best businesses. In many countries, government incentives to start businesses in certain industries provide irreversible financial support for starting a business through business startup centers, or universities.

Relatives and friends/ business partners. They can borrow the money needed to finance the business. This type of financing does not affect the ownership structure unless the loan is a special agreement for partnership.

Venture capital firms raise funds from various financial institutions (pension funds, donation funds, banks, etc.), then establishe a venture capital fund, which is a further source of financing for small businesses. The agreement for financing gives venture capital firms a share of the ownership, usually these firms sell their stake back to the individual business after 5 to 10 years. Venture capital firms provide mechanisms for

monitoring the business through a representative in the board of directors, but also by providing expert and managerial expertise for more successful business operation and growth.

Business angels are wealthy individuals who invest in small startups. They are entrepreneurs who have achieved success, and now want to help maintain the system that has enabled them to become successful. Former senior managers in large successful companies, or successful individuals in certain professions. In addition to financial capital, they provide expert knowledge of the market and production technology for small startups.

Issuance of shares is applicable when the business reaches a certain sizeand has need to provide new equity. With the issue of shares, the business can provide a significant amount of capital relatively quickly; investors in the firm's shares will become co-owners/ shareholders adequately represented in the management of the firm.

Reinvestment of profits made from the business and the entrepreneur decides to reinvest it again in the firm to finance its future growth.

Bootstrapinvestments

Bootstrap investment is when businesses finance their own start-ups or growth through their own earnings, savings or current assets. In order to succeed in own financing, the management of finances is crucial to enable optimal business operation. The instruments are:

Quick payment customer reward for faster discount payment. Client who pays the invoice in advance gets a special discount, to improve cash flow. Further, "penalty" for irregular payers will also improve the cash flow of the business and have more finances available for business ventures.

Payment of equipment to the vendors in 3, 6 or 12 monthly installments. Multiple installments can be obtained by purchasing from the same supplier.

Free software as a wide selection of open source software for both operating systems and basic office software packages free of license. More recently, projects have been initiated to use open source government institutions to reduce budget spending.

Initial investments in a new business idea are usually in the form of equity capital. Financing new firms carries the greatest risk. Investors trust in the team, especially at this riskier level of business performance, entrepreneurs will be more committed to business if they have invested a significant amount of equity.

There are specialized funds that provide "seed capital", most investment funds require firms to bridge the idea phase and begin to achieve results before considering funding. Bootstrapinvestment is a set of methods used to reduce the amount of external debt and equity financing from banks and investors.

Debt investments (loans)

Sources of debt capital are:

- commercial banks,
- insurance companies,
- other financial institutions,
- private individuals,
- relatives and friends,
- suppliers, as well as
- Government and local institutions.

Investmentassets are a liability (debt) of the company in installments according repayment plan (depreciation plan). According to maturity, loans can be short or long-term loans. Short-term loans are approved for one year to cover current working needs. Investment in equipment, buildings are long-term loans generally repaid from the profits. The assets that can be used as collateral for securing loans.

Bank lending. Banks are a major source of loans for small business financing. In this case, without changing the ownership structure, the entrepreneur takes out a loan and repays it after a certain period of time together with the amount of interest for that period.

Leasing. In leasing, the small business actually leases the equipment during the lease term - the contract, during which it pays a certain monthly rent as a rent, which contains some interest, the firm pays a monthly rent for a period of 36 to 60 months.

2.3 Investment models inthe video game industry in the Republic of North Macedonia investment in

This chapter explains existing models of investment in the Republic of North Macedoniaand links them to the investment in the actual studios for video games. It is a challenge to reveal investments reports from the studios due to the lack of precise data

(cost, working hours) dedicated to the video game development as one of the projects they work on.

The classic models of equity investmens such as own capital, borrowing from friends, grant sheme from the government, credits are used regulary.

In a beginning prhase are the business angel investments in the Republic of North Macedonia. In 2018, business angels from the **BusinessAngels Association**have invested infive startup companies from idea and mentoring to development. This concept starts to develop and the awareness of the support is growing.The association has 15 business owners who have businesses and are powerful enough to fund other projects. Five projects have been funded, all in the area of Information Communication Technologies (ICT) - software and applications. There is no rule how a business angel invests and in practice that means investing capital and/or strategy and mentoring. The amount of capital invested depends on what companies need, is it a proof of concept or the company is already at a higher level of development, i.e. it is already earning, and then the evaluation is higher. Usually the investment is 10 percent or 30 percent for startup companies. In thesefive ideas 300,000 euros are invested over a period of 5 years. An example of a successful investment by business Angels is Novobox as a competitor to Dropbox which is a fully macedonian product made here with cooperation of US company, but the investment is from business Angels from Republic of North Macedonia. The government through different measures can stimulate these sources of financing that will encourage the business Angels to invest. A proposition is given for tax exemption on the amount that is invested.

Funderbeam for funding, operates through the principle of crowdfunding and the possibility of providing an alternative source of fundraising. The Macedonian Stock Exchange has signed an exclusive cooperation agreement with Funderbeam SEE, registered in the Republic of Croatia. Funderbeam SEE is part of the Funderbeam Market Limited group, that offers a global scheme for collective financing. Through the established cooperation between Funderbeam SEE and the Macedonian Stock Exchange, this crowdfunding platform, linking companies is seeking to raise funds and looking for early stage investment companies. The role of the Stock Exchange includesan educational and promotional activities, primarily aimed at presenting the Funderbeam platform to small and medium-sized enterprises and start-up companies as an alternative way of raising additional capital in order to grow their businesses and a potential transformation into companies suitable for future listing on theStock Exchange. Potential

users of this platform are exclusively legal entities that are not established as joint stock companies. Considering the great importance of SME development, the Exchange's activities in this domain have received official support from USAID Macedonia as part of the Business Ecosystem Development Project activities.The Funderbeam platform is designed in a way that offers a wide range of benefits to its users:

- Early stage companies and growing companies gain access to new capital from domestic and foreign investors through the implementation of special campaigns inwhich they will present key information about their operations;
- Investors are informed about this type of investment and get the opportunity to invest in early stage and growing companies, within the investment structure offered bythe platform;
- Investors gain access to the secondary market through the platform for further trading with their investments.

The Stock Exchangeindependently or jointly with other stakeholders of the Macedonian startup ecosystem,organizesa series of promotional events for a more detailed introduction to all interested in the opportunities offered by this crowdfunding platform.[30]

Investment in video game studious in Republic of North Macedonia

Kamai Media has applied combination of the models of investment,***own capital mixed with the 2012 Award for Best Business Idea Competition from the Business Ideas Factory project*** and additional grants.The competition had 104 business ideas applicants from 23 cities, most of the service, food industry, information technology and tourism and the winner was the founder of Kamai Media, Peter Koteski, with a project to develop and sell video games on the world market.The award was 10,000 euros.

In 2015 for the development of the first episode of the video game Sounder, this studio was awarded with grant of 30,000 EUR by the national Investment and technology development fund.

They develop their own engine for game development and a video game adventure genre that has been presented at a number of foreign fairs so far and has had many talks with potential partners from the US, Britain and Sweden. Since the topic and the faaschion of

[30]https://www.mse.mk/en/news/22/5/2019/macedonian-stock-exchange-has-signed-an-exclusive-cooperation-agreement-with-funderbeam-see

plaing the game is an exclusively innovative idea, that is new on the market and since their studio is a startup operating in Republic of North Macedonia - they have failed to agree on a large multi-year project. Though the years they switched the strategy of game production to an episode-based game format, in 6 episodes of 20 minutes. The grant from the Innovation Fund helped them bring the first episode to the global digital marketplace, to cover the operating costs of the studio, visiting fairs and promoting the product. Their startup plan is to grow the company to a team for development of high quality computer games. The team is about 12 developters and artists. They hope that the popularization of their game through episodes will allow them to partner with a distributor who will distribute their game on the world market and grow into a sustainable business.

The ***Workbench Entertainment developed*** thegame "Wounded", it has the model of investment - equity capital by the 10 team members and they are acting as indie studio.

The studio developed game's demo video, that have over 10 million views on Youtube. The game trailer released in December, 2018, has attracted a lot of interest from the worldwide gaming public, especially horror fans. Since the release of the trailer, world media relevant to the gaming industry, as well as experts in the field, have not spared the positive comments, especially emphasizing the fact that the game is made by an indie studio, with almost no budget, but with the skills, enthusiasm and ***individual investment*** of a young team. The team at Workbench Entertainment, won the sympathy through an extremely complex project delivered at a high professional level, which meets the world-wide criteria in the most attractive and exciting gaming industry - horror games.

The game "Wounded" has already made its way to the world's famous Steam gaming platform and has joined thousands of other games at an extremely competitive price of €12.99 and in April is promoted with price of €6.99.

NapNok Games is a foreign investor in RNM in branch office in Skopje. The game Frantics from 2018 partially is developed by the team in Skopje. Behind Frantics stands video company NapNok Games with headquarters in Copenhagen, Denmark. In the game, 70 artists, designers, developers and testers worked for two years, 27 of them from The Republic of North Macedonia. Definitely, Frantics involves **innovation**, it isone of the first games that is exclusive to the PlayPlay platform, which involves combining smartphones, TV and PlayStation 4. Gamers can play on the PlayStation over the phone, which opens opportunities that guarantee fun and new experience. Frantics is actually a social game that reveals new technologies and ways of communication.

2.3.1.Phases of investment for development of the start-up studio for production of video games in “Kamai Media”

The **general strategy** for investment at Kamai Maedia follows the value chain investment in **production** were the team of developers (developers, designers, artist) produces the game in the form of a data packet digitally transmitted for downloading or to some kind of media (such as a DVD). At the beginning they were searching investor for the production phase, latter a distribution agreement with the publisher. The publishershould pay to the developer the necessary budget for the game production, and then it performs reproduction, marketing and distribution. Once the game starts on the market and makes a profit, the publisher will regain the funds that he has previously given to the developer and pay the developer a percentage of the profit, regulated by the publishing contract.

Kamai has beta version of the video game Sonder realised **on Steam**, as option to sell directly through the platform and is still interested for the above option. It is an AAA game, which are developed for PS and/or consoles, made for playing on XBOX360 or PS3. The primary feature of these games is the technological and creative ambition of the game, but also the budget for making. Their principle offer to publishing partners is that they can create such a quality game for lower cost than other producers. Games like this are reaching production budgets of several millions of dollars. The concept of the game includes the marketability, becausethe nature of the product. Such types of new game costs up to $US29, and the markets that can afford that price are known - North America, Europe, Asia, Australia. These markets have a mechanism for distribution, marketing and demand for such products.

The strategy includes also the **innovative part** - creating their own engine that will support game developers to develop their own video games.

The public awareness for the video game industry in the Republic of North Macedonia is perceived as **a hits-driven business, enthusiasm of young developers and high projections of revenues**. Starting such a business in theRepublic of NorthMacedonia is attractive from the point of **a low development costs and a very high creative potential** in the form of people with artistic and technical abilitiesas as well as infrastructure to help entrepreneurs. The strategy to place the product is digital package without logistical complications, nothing to be physically transported in the regulated industry,the location of the business is not important whether is the Republic of

NorthMacedonia, the EU or other country with adequate infrastacture and resources. The industry thought the platforms has mechanisms to bring the game to the final consumer.

2.4 Grant/credit institutional form of investments and projects for game development

2.4.1 The Self Employment program in Republic of North Macedonia

The Ministry of Labour and Social Policy (MLSP) implement the Self Employment Programme and the Employment Service Agency of the Republic of Macedonia (ESA), in cooperation with the United Nations Development Programme (UNDP). It is devoted to the unemployed active job seeker, as an opportunity to realize their business idea.

The Self-employment Programme is an essential part of the country's employment strategy and the national active labor market measures which have been designed to promote smart, sustainable and socially inclusive growth. The main objective of this project is to reduce unemployment by encouraging the creation of small businesses though the following:

- Entrepreneurship training for developing of business skills,
- Support in the development of a business plan,
- Registration of the company,
- Start-up grants in the form of equipment and/or materials,
- Coaching and mentorship support.

The results from the selfemployment program for the past 12 years, are:

- 33,000 unemployed people have applied for the programme;
- 14,000 candidates have attended trainings in entrepreneurship and business plan development.
- 11,000 people to open their own businesses
- 35% of these businesses are open by women entrepreneurs and
- 30% by young people
- 70% of the companies created through the project are still active
- 13,000 persons have been employed on full-time basis
- special component are 198 persons with disabilities that have completed the entrepreneurship training while 146 businesses have been registered.
- 32,19% are women with disabilities entrepreneurs who opened their own business.

This project has helped to reduce the national unemployment rate by 3%.Significant number of businesses created by the Self-employment Programme have grown and the biggest 120 companies that employ around 1.000 persons.[31]
Donors of the programme are theUnited Nations Development Programme with **$671.34K**and theGovernment of the Republic of North Macedonia with **$18.27M**

Grant program

Entrepreneurs can apply for the Self-Employment Support Program (Entrepreneurship). All interested unemployed, unemployed young people up to 29 years old, unemployed disabled persons can be selfemployed with financial support through the Self-Employment Support Program (Entrepreneurship).The program covers the provision of:

- Expert support in the form of entrepreneurship training and doing business, a business plan voucher system and business registration support amounting to MKD 17,940;
- Grant in the amount of MKD 246,000 to MKD 307,500 per beneficiary or up to MKD 615,000 if a legal entity is established by two affiliates as LLC - a two-person limited liability company, with each of the affiliates having an equal share (50%) in the company.Opportunity for additional employment of one person for newly opened companies which will receive additional grant in the form of equipment and / or materials in the amount of 92,000 MKD for a person over 29 years and 153,750 MKD for a person up to 29 years;
- Legal entities established by persons with disabilities are entitled to an additional employment grant of up to 2 (two) persons in the amount of 92,000 denars for employment of a person over 29 years of age or 153,750 denars for employment of a person under 29 years;
- Legal entities established by two affiliates will not be supported by a grant of (one) additional employment;
- Advisory / Mentoring support within 12 months of starting a business (120 hours total mentoring) only for the following target groups: young people up to 29 years; disabled persons; members of the Roma community, legal entities founded by two partners (LLC) and women from vulnerable categories.

[31]http://rabotaimoznosti.mk/

Persons who have received a Self-Employment Grant for the past 5 years are not eligible to apply for the Program.

The grant scheme is attractive, 2 gaming studious Dark 1 and Tesseract in Skopje have received grants with support of 615,000MKD in equipment.

Credit program

The unemployed persons registered in the Employment Agency of the Republic of Northern Macedonia with idea to start their own business can apply for the Self-Employment Credit Project. The loan can be at least EUR 5,000 up to a maximum of EUR 10,000. Additional EUR 5,000 can be borrowed for each newly created job, financing projects with up to 5 jobs (including the borrower) or up to EUR 30,000. The repayment period is 7 years including a grace period of 1.5 years regardless of the amount of the credit; 1% interest rate annually. Own contributin by the borrower is at least 25% of the loan amount (in the form of equipment, objects and/or money).[32]

2.4.2 The Fund for Innovation and Technology Development

The Fund for Innovation and Technology Development was established in December, 2013**,** to encourage innovation by providing additional financial resources and to build a competitive knowledge based economy.

The Fund for Innovation and Technological Development supports the innovation activities in micro, small and medium-size enterprises (MSMEs).The purpose is to achieve dynamic technological development based on knowledge transfer. Research and innovations that will contribute to job creation, economic growth and development. Simultaneously improving the business environment for the development of competitive capabilities of companies.

(1) Co-financing micro, small and medium-size enterprises (MSMEs) registered in the Republic of North Macedonia focused on encouraging innovation activities, implementation of innovative solutions and processes, introducing innovation and transfer of technology among companies and support companies with high growth potential.

[32]https://av.gov.mk/announcements-for-active-measures.nspx

(2) Financing newly established micro and small enterprises registered in the Republic of North Macedonia, foundations and accelerators for encouraging innovation among companies and transfer of results from scientific research into applicable, commercial activities by establishing “spin- off “companies.

(3) Achieving long-term positive contribution to the development of the national economy, improving competitiveness through technological and operational improvements and the provision of new jobs; supporting the formation of business and technology accelerators, entities providing infrastructural support for innovation activities in order to promote entrepreneurship by supporting individuals who want to establish an enterprise, as well as already established companies in their initial stage (not older than 6 years) by providing educational, logistical and financial support.

The grant instrument for newly established enterprises startup and spin off supports projects that are in the phase of proof-of-concept, up to the close-to market phase.Micro, small and medium-size enterprises (MSMEs) from all business sectors are eligible to apply for funds. The eligibility criteria are:

- To be an enterprise established in accordance with the Law for Trade Companies and registered in the Central Registry of the Republic of North Macedonia,
- The period from the establishment of the company to the date of submission of the project proposal to the Fund shouldn’t exceed 6 (six) years,
- To be a micro, small or medium sized enterprise (up to 250 employees),
- To be with Macedonian ownership structure (of 50,1% or more) ,
- To be owned by individual/s and/or micro, small or medium sized enterprises (with a Macedonian ownership structure of 50,1% or more), and/or a higher education, i.e. scientific-research institution (of up to 20% ownership in the applicant),
- With the annual revenues up to of 1,000,000.00 (one million) EUR, according to the financial reports for the previous two fiscal years,
- To be without capital connection (according to the Law for Trade Company) to another enterprise where the total annual revenues of both enterprises exceeds 1,000,000.00 (one million) euros in the previous two fiscal years, except in case of a capital connection with a higher education, i.e. scientific-research institution,

- To have less accumulated support, lower than 200,000.00 (two hundred thousand) EUR in the last three fiscal years, including the amount requested from the Fund in accordance with the Law on State Aid and the Regulation on the Conditions and Procedures for Granting Aid,

The instrument encourages the innovation level in newly-established enterprises by providing the necessary support for research and development activities. The grant is expected to encourage a culture of risk taking and innovation, to provide support for the enterprises that develop new or improved products, processes, and/or services, as well as to encourage the commercialization of research results obtained in higher education institutions, i.e. scientific-research institutions.

Projects that can fulfil this instrument have a **12 month duration** with the possibility of extension for **up to 6 months**.

- Level of innovativeness
- Project quality
- Capacity of the project team
- Market potential
- Impact

Following successful commercialization, the revenue (not only the profits) from the sales of the product/service and any subsequent products/services based on the technology developed within the project financed by the Fund, will become the basis for the royalty payments towards the Fund. All royalty payments shall be made at a rate of 5% (five percent) of the annual revenue generated from the sales of the product or the service derived from the project, up to a return of 120% (hundred and twenty percent) of the amount of financing received from the Fund or for a period of up to 5 (five) years after project completion, whichever condition is achieved first.

The innovation fund invested in 2 video games:

- KAMAJ MEDIA DOOEL BITOLA's

"Sonder" game an episodic nonlinear narrative game consisting of 6 episodes, each episode being a separate game. The game is based on new technology inspired by previous 14 years of experience of the owner in the video game industry. For the first episode in 2015, they received financing of 30000 EUR for a period of one year.

- STUDIO DARK 1

The gaming **studio Dark 1** is one of the winners of this fund for the call at the end of 2018, with the for video game “Skopje”. Theawarded grant is 29.815 EUR, the studio

has cost share of 5.310 EUR, or in total 35.122 EUR. "Skopje" is a 3D first person game where the player is placed in a huge area of research and survival. It will be fully modeled and visualized in the style of classic comics. The game will have multiple segments through which the player can interact with the world in which they will be located. "Skopje" will have an original and unique story. The story is set in an alternate history where the city of Skopje becomes a world-renowned metropolis known for cutting-edge scientific achievements and brutalist architecture, retaining the culture and aesthetics of true Skopje in the 1970s.[33]

Investment in accelerator for video games development – Project HIVE

The GAUSS INSTITUTE Bitola, Foundation for New Technologies, Innovations and Knowledge Transfer and MAGDA (Macedonian association for game development) have created an accelerator for video game development. The non govermental organization and the community of game developers with a membership of over 250 game developers and organizer of the international Global Game Jam events, formed partnership for project application implemented a project HIVE – accelerator for video games, supported by the USA embassy in RN Macedonia in 2015-2016 in Bitola.

The synergy of two organizations has provided motivational, supporting environment for young IT population to realize their ideas into commercial products – 2 video games published on Steam.

The grant has supported the realization of the idea - teams in the Republic of NorthMacedonia to be a part of the big scene in the creative industry, especially in game development and to the enabled development of adequate support for excellent ideas and creativity for the young generation, to enjoy the game development as a professional orientation and earn income. The circle was open, by selecting the teams from the last three international events Global Game Jam and putting them in a working mode environment with professional support .

Gauss and Magda were suporting functional space for the accelerator of 60 m^2, equipped with 3 licensed desk computers adequate for game development, 1 laptop for the onsite presentation, projector for training and other gaming equipment (2 drawing tablets, joysticks) for daily activities and training in commutable conditions. The volunteers of the project (6) have fully supported the maintenance and logistics during opening hours

[33]http://www.fitr.mk

from 9-21 hour according to the team's requirements including Saturday as a meeting day for all teams with mentors, testing the games, cooperation, support and professional help.

The implementation of all project activities, the meetings, coordination with teams, trainers and mentors were carried out by the project manager, towards providing sustainability and applying to other donors and sponsors.

The focus was on 1) Game design, 2) Game building, and 3) Game business.

Game design addressed the actual design issues such as control mechanism, gameplay, story, artistic style and graphics as well as the social dimension of the game. That is, the Game design perspective focuses on the gameplay experience.

The game building included the software and audio-visual engineering viewpoint of game production. For example, this perspective includes such issues as the handling of hardware and platform, skills and formation of the team, company's organization and project's schedule.

The Game business is focused on the economic side of games. It included issues as customer and partner identification, monetization plan, the organization of the game launch as well as discovery and growth plans.

The three perspectives help to be identified different issues that need to be thought through during the actual game development with the mentors. When a new, inexperienced, team starts to develop a new game, they face several relevant questions. We can easily highlight questions such as “Where to start?, What influences on what?', and What do we know and what we should know?”

The practical experience has open discussions for the future directions to maintain the balance of the Hive, how to work with teams, motivational drivers, available professionals, testing the skills, team roles, leadership, and responsibilities of the teams. In that direction, the strategy is focused on two levels organizing commercial and on the other site project and educational activities.

Upon successful completion of the program, the HIVE graduates (2 teams) have a thorough understanding of the context and range of indie games technologies such as:

- a detailed knowledge of ludology,
- game design theory and the game design processes;
- an understanding of the techniques, issues and
- decisions involved in designing developing and testing game prototypes;

- the processes of the commercialization of indie games including coming up with innovative gaming concepts,
- preparing a portfolio and the use of disruptive distribution models such as Steam.

Regarding the know-how and skill the HIVE graduates are able to:

- comprehend and articulate the range of gaming technologies and techniques available to create game content;
- create and/or justify game designs to satisfy given requirements, deliverables, techniques and rules;
- develop games using different tools, software and methodologies;
- distribute and promote their games through the channels such as Steam;
- transfer the software development skills they learn to a variety of problem domains in computing and information technology.

HIVE graduates have gained competencies to engage in:

- the successful specification and completion of game design prototype in technical and, design roles;
- to work effectively as an individual and as a member of a team;
- to take significant responsibility for the work of individuals and groups;
- take partial responsibility for leading and initiating game design activities;
- to be aware of the resources available,
- to keep up with new developments in the games industry;
- to comprehend multiple perspectives;
- demonstrate an awareness of the resources available to keep up to date with new developments in the field;
- take responsibility for their own learning.

The goal of the HIVE is creating ecosystem for IT creative industry (video games), by accelerating teams to create video games and selling them on the global market; jobs and employment opportunities for the young, unemployed and women in creative IT industry; and opening dialog for the topic of IT creative industry in public, private, civil society and academic sectors.

The project from Game to Business supported the fulfilment of the goal, by accelerating 3 senior teams (target group 17-25 years pupils, students, employed and unemployed) and one junior team (12 years old participants of Global Game Jam event 2016); they fully developed 2 video games and currently one of them is published on Steam

platform; the third game was postponed by the team members and the junior one is still under construction.

Team Karton games has 3 members: programming (artist designer 20 years old, a student at FIKT), (20 years old, programmer, a student at FIKT); (20 years old, musician and programmer, unemployed). They have developed the indie video game BOB RG 42, green-lighted by Steam.

Team Return Zero has 4 members: (21 years old, programmer, and student at Fikt); (18 years, programmer, and pupil at Gymnasium Josip Bros Tito); (17 years old, 3D modeling, pupil at Gymnasium Josip Bros Tito); (17 years old, 3D modeling, pupil at Gymnasium in Bitola).

Team Duo-trio has 3 members:(24 years, 3D modeling, graduated at FIKT); (20 years old, 3D modeling, employed); (22 years old, programmer, and student at Fikt). This team tried to develop one of the winners game from Global Game Jam 2014, part of the team were employed and postponed the development of the game due to the time limitations.

Junior team is represented by boy and a girl 12 years old, they are developing a game from the Global Game Jam 2015. The purpose of including this team to the Hive is to feel the atmosphere of working in an accelerator with different teams, follow mentoring sessions and gain experience in team development; attract younger members to create and develop video games by promoting their example.

In total 10 members of the Hive were creating video games, out of them 4 are actually graduated with developed products and the remaining members are participants of the program, that have been part of the 5 trainings and mentorship program - game development cycle, that increased their knowledge, skills and competencies for future career development.

The teams and Hive staff, mentors and members tried to invite female members to join the teams, the reality has shown that for this topic - a game development is not attractive among young females. They only joined the teams for the training and some activities (testing the games) as visitors, not as team members.

In the frame time of the project, 5 training were developed according to the team demand and game development concept:

- Practical Game design by Petar Kotevski, owner of the gaming studio Kamai Media
- Project management - Debrief for video games; intellectual right by Prof. Igor Nedelkovski

- D Modeling – Vasko Lazarevich, 3D artist at Kamai Media Bitola
- Programming – Todor Panovski, programmer at Kamai Media
- Business plan Canvas; Development concept for business idea – Risto Ivanov, a consultant at Kreacija Skopje.

The training for Game design was presented as a kick start of the educational aspect to the chosen 3 teams of the Hive, intent to transfer the knowledge to game developers about the fundamentals of game mechanics: interface design, player control, managing player expectations, designing an appropriate player challenge and developing a story that works together with the game mechanics. As an opener for the future activities of mentorship, it used the actual case studies of proven games compared with the ideas provided by the teams themselves, specifically the games proposals that they are already developing. The training was tailored specifically to the demands of the teams to be used for next steps in their game development. The group consisted of 10 members all actively involved in the training, with suggestions between the teams and questions towards the trainer, comments, and feedback, creative atmosphere with excellent motivational reactions. Some of the outcomes of the training are the increased awareness of the possibilities for game design, decision making, time limitation, resources variables, selecting game design style, following the contemporary trends in the gaming industry, how to stand out through the creativity of the game.

The Project management training was perceived as the framework for the activities defined in the Game design, in technical resources, timing, and HR. All the ambitious activities for the game design were operationally spread among team members. A practical approach, evaluation of the preferences and team skills, forecasting possible risk. Special attention provokes the topic for the legal arrangement for the author's rights among team members, as well as towards supports (financial venture capital) and joined activities with the Hive. The training was practical and the outcome was the actual management of the game development. The content was based on real examples for MK as well as the region, based on the lesson learned from success and failures of gaming studios. The training provoked discussion and possible solution according to current situations of the team members that in the next 2 month showed the change in the structure of the teams as well as their roles.

The training sessions continued with 3D modeling that has been conducted in the period of 2 months and provoked the highest interest for participation by the external members not involved in creating games (in total 10-15 per class). Learning started from

basic models to the most sophisticated one (from objects to faces, the most common patterns used), with the instructions, tips, and tricks. The sessions were dynamic and followed by assignments for each model. The mentorship was focused on actual models in the game and their incorporation in the design, the forms, color and lights, the general impression, the style of the graphics.

Business plan canvas and development of the business idea, it gave the new aspect to the game development. The group (10 team members) that are mainly design and technical oriented more towards production were exposed to create Business plan canvas as a tool for financial evaluation of the projects, prospects and obstacles, venture capital search, for values offered to the customers–gamers and ways to create and maintain the relationship. How to use the resources and chose key partners for the project, to boost income and plan the costs. From the canvas to the business idea development as an open opportunity to apply to other donor programs such as self-employment. The training offered practical examples that were further applied to the teams during the mentoring sessions.

Parallel sessions for Programing (training) were held starting from the basics towards more advanced topics and the actual needs for game programming and improved usage of the available engines for game development. This training was attractive mainly for programming oriented members, due to the complexity and affinity for problem-solving.

Mentoring sessions were held, scheduled activities with each team - individual and joined meetings, with defined targets and problem-solving issues that pop up during the game development. Joined meetings were held every Saturday for an update of the team development, in which stage is the product, testing the product, feedback from the mentors and suggestions from the teams. The time schedule and the human resources were adjusted according to the development curve with a minimum of 80 hours per mentor or more according the Hive teams demand.

Outcomes of the mentors work depends of the nature of mentoring, it was consisted of an explanation of the question and possible solutions to be chosen, all designed to provoke proactivity of the teams for problem solution and decision making.

The actual results from mentoring are: concept and story of the game, debrief and contacts, Business plan canvas for each team and business idea concept, models and graphic of the game, mechanics and level design, steam profile of the games and team, promotion tools – articles issued on the relevant portals, trailers, social network profiles.

Both mentors and team members had an excellent understanding, challenging, demanding all in a direction to complete the product and applaud the game on Steam platform. The team members of Hive were participators on all training, joined by additional participants that were invited trough MAGDA network, so we have outdone the goal with 55 participants on training. The groups were created in max 10-15 people due to the fact that part of the excises were customized according to games in progress and certain characteristics of the teams.

Associate partner of the project has been FIKT – The faculty that provided the premises for organizing two events the opening of the project and Global Game Jam 2015. The cooperation is ongoing on a higher level since the students from the faculty can perform practice in the Hive and get on hands experience with projects, software, and hardware. Hive had 2 practices sessions from students from Fikt, separately from the game development program.

On a regional level, Gauss, Magda and Hive had cooperation with Greek partners Noesis and Technopolis from Thessaloniki and developed a project proposal for the Cross-border call in April 2015, to mirror the activities in Republic of North Macedonia in Greece.

The cooperation with ngo sector is established with Get innovation, Sega Prilep and it will grow in development future application for IT skills among the young population. Also cooperation has been developed with commercial partners as Seavus Skopje, Tab Tale Skopje, GG Skopje, T- mobile Skopje, Coca-Cola Bitola, Bimilk Bitola, Ortograf Bitola to support organization of events such as Global Game Jam, Game weekend and other events planned to develop the ecosystem for creative industry in Macedonia and wider.

The issue with the projects supported by donors is the sustainability after the finding. The accelerator has been active, more as an informational and networking spot but the activities are reduced to trainings for game development with full price to be financed by participants.

Structure of the investment in the gaming studious through the prism of cost for one video game developed

The process of video game development is complicated and the cost depends of several factors.The most important is the complexity of the game.The AAA level and MMO

games have different cost, for example, Flappy Birds game development cost $0–500, and GTA 5 costs $265 mln. The main cost structure is:

- Salary for a development team.
- Software licenses
- Intellectual property. Purchase of rights to the brand, a popular character, a series of games
- Purchasing the right equipment for development.
- Time frame for game development

The human resources with the data for yearly salaries for the following positions, example from USA, are:

Game Designers developthe game rules and the content.

Programmers of the game that use popular engines like Unity3D or Unreal need to have background in C# or C++ programmers. If the game is for to several platforms,they need to have background for android, iOS, PS4 or web development.

Animators to creategraphics and animation 2D, 3D, interface graphics. For smaller games, one specialist executes a combination of these roles. In a bigger game development scenario, 2 to 10 graphics and animation designers are usually required.

Sound designers can be outsourced or the team can use ready-made sounds from a sound bank free or for a charge. Following are free resources for game developers:Freesound.org, 99Sounds.org, NoiseForFun.com, Incompetech.comor can be developed original sound.

QA engineers for testing is a part of the game development lifecycle for functional, regression, security and performance testing. They ensure that user requirements are met and bugs are fixed before the game deployment.

Software developers use free alternatives or paid software from 3D Max, Maya, Adobe Photoshop and plugins. For example, Unity3D Pro costs $125 per month. The platform and stores (AppStore, Play Market and PC Windows Store) also requires a license.

Services are third-party services, such as Google maps, storage or multiplayer services (PlayFab, Photon, and Firebase).

Templates, libraries, and plugins. There are libraries that make game development faster, cheaper and more maintainable. They are free and even open-source.

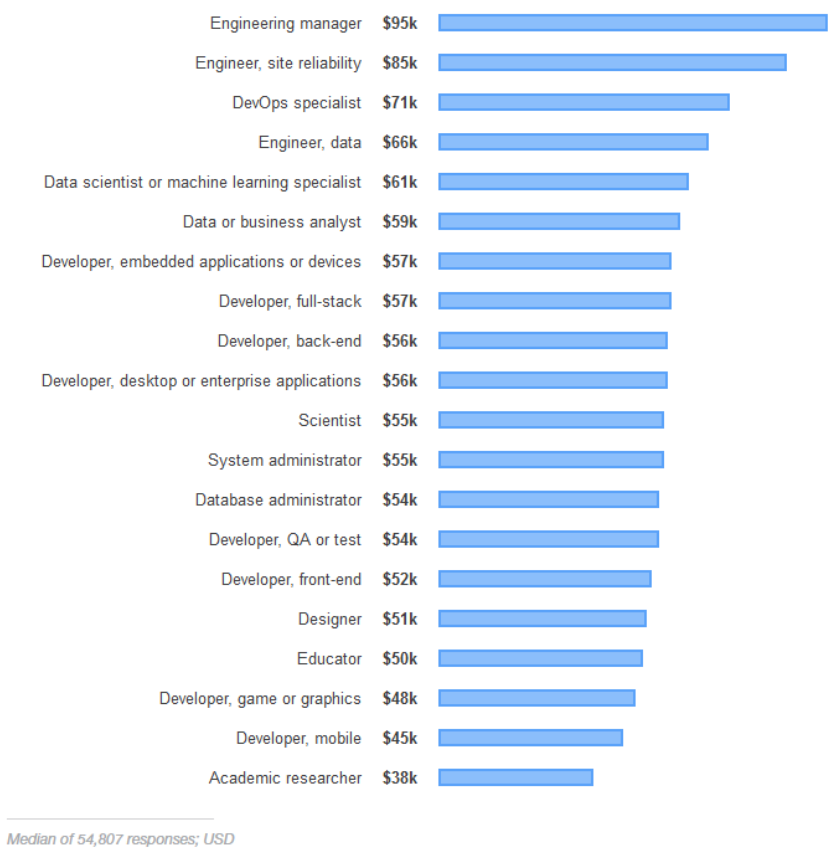

Figure 7SALARIES OF THE GAME DEVELOPERS PROFFECIONALS IN USA

Source:https://insights.stackoverflow.com/survey/2019?fbclid=IwAR0AGCsxS_DYAIWCCx2VRGf4pwqlInSTmTVVnmCuxCaIR4Hh9OClJCBUfjk#key-results

The yearly salaries for programmers and designers in USA are in range of 51-57k. This market is taken for the research as one of the most developed.

Software licensesfor game developers are based on the preferencies of the developers and the opportunities that are offered by the software. The most used software are following:

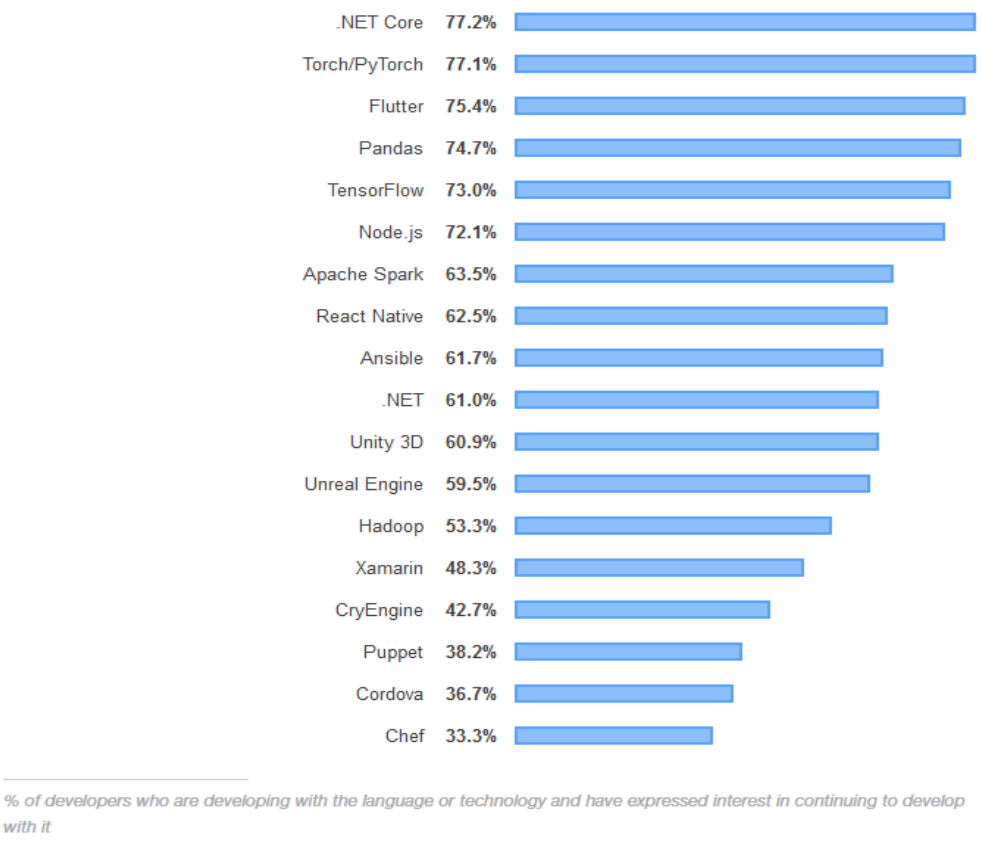

Figure 8USAGE OF SOFTWARE FOR VIDEO GAME DEVELOPMENT

Source:https://insights.stackoverflow.com/survey/2019?fbclid=IwAR0AGCsxS_DYAIWCCx2VRGf4pwqlInSTmTVVnmCuxCaIR4Hh9OClJCBUfjk#key-results

The Figure 8 shows the usage of different softwares for game development from Netcore with 77%, to .Net with 61%, Unity 3D with 60,9 and CryEngine 42.7% according the possibilities offered and preferencies of the developers.

A game development process may take from **one month to a few years**. For the smallest projects, one programmer and one designer are sufficient to combine animator and modeller functions. A simple game can be created on **a ready-made engine**, for more complex needs modification of an existing engine or **developing new engine**.[34]

The structure of the investment in Republic of North Macedonia is similar to the one that is general for the small gaming studious worldwide. In the Republic of North Macedonia case studies has been done on the studious that have already published video games on Steam platform successfully finalizing the process of game development and publishing. The interviews are done with domestic studious in Skopje, Bitola and one in Amsterdam (the owners are Macedonians but now they are living abroad) and the data

[34]https://vironit.com/how-much-does-it-cost-to-make-a-video-game

are linked to the basic investment in certain video game. The data are not exact or supported with financial reports, the answers were given in a range, for example how much was the cost for this video game and the answer were from 0-10,000$USA from 10000 to 20000$USA and more. The data from the interviews with the domestic studious are presented below.

	Workbench Entertainment	**Cost in $**	**Structure of the investment in %**	**Team member**	**Time for development**	**Total Investment per Employee**
1	Salaries	18.000	**56,78**	5	12	
2	Outsorcing	9.000	**28,39**	5	6	
3	Equipment	3.500	11,04			
4	Logistics and Marketing	1.200	3,79			
	Total cost in $	**31.700**		**10**	**18**	**3.170**
	Dark 1					
1	Salaries	16.200	51,10	3	18	
2	Outsorcing	1.800	5,68	2	6	
3	Equipment*		0,00			
4	Logistics and Marketing**		0,00			
	Total investment in $	**18.000**		**5**	**24**	**3.600**
	Maximus Ludos Studios***					
1	Salaries	6.000	60,00	3		
2	Outsorcing					
3	Equipment	3.000	30,00			
4	Logistics and Marketing	1.000	10,00			
	Total investment in $US	**10.000**		**3**	**12**	**3.333**

Table 5INVESTMENTS IN VIDEO GAME STUDIOUS IN RNM

Source: Authors calculation based on data from the interviews

The table shows that the biggest cost or investment is in the human resources, developers, programmers, 3D artist and other outsourced experts. The employees in this studious are actual the team that is connected on informal or network meetings as Global Game Jam and they are considered as owners of the studio and the game as well. The percentage vary from 60 – 80% from the total investment and points out the importance of the developers for the production of the final product.

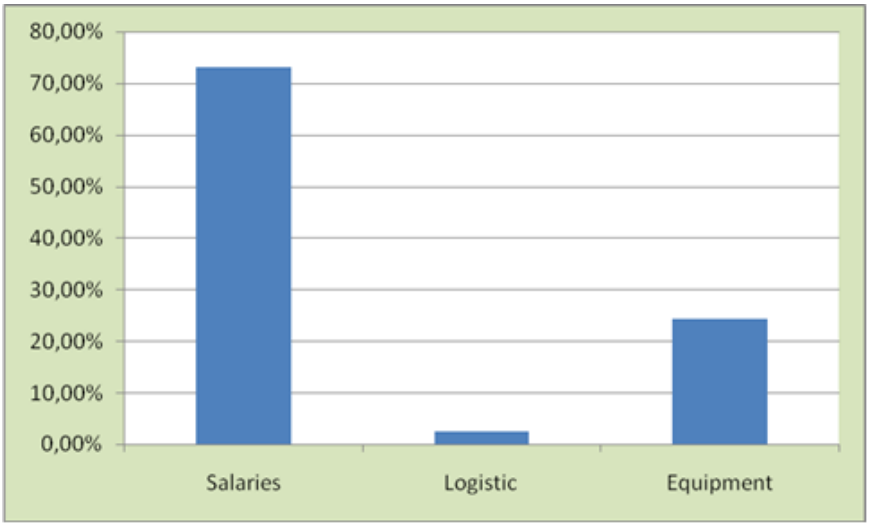

Figure 8 COST STRUCTURE OF THE STUDIOS

In the cost structure production of the video games in the studios the biggest item, or more precisely, almost three quarters occupy the cost for salaries and the smallest are the logistics cost, only 2.44%.

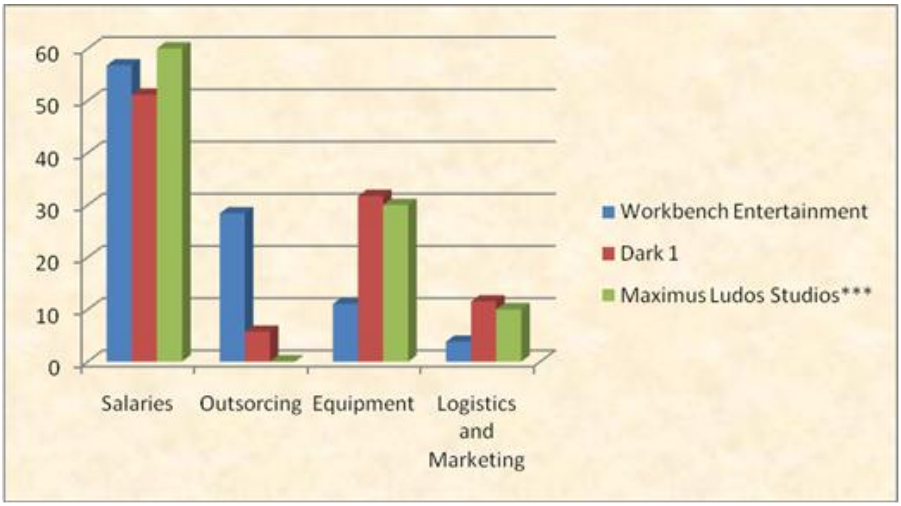

Figure 9COST STRUCTURE OF WORKBENCH ENTERTAIMENT, DARK1 AND MAXIUS LUDOS STUDIO

The upper stereogram, presents the cost structure of the three studios. The conclusions are that in the cost structure the highest item, with over 50% are the salaries. The studio Maximus Ludos Studios have no outsourcing costs, while the Dark studio spends small amount on outsourcing. The case with Workbench Entertainment's studio has a significant item cost for outsourcing 30%. Almost 30% of Dark 1 and Maximus Ludos Studios costs are for equipment and only 10% of Workbench Entertainment's studio costs are for equipment. For logistics and marketing 10% is invested by Dark 1

studio, and this percentage in logistics and marketing costs is below in Maximus Ludos Studios and Workbench Entertainment. All three stusious have identical the structure of investments in salaries, outsourcing, equipment, logistics and marketing.

Further the number of developers per studio is presented including the three studious above. The developers are essential and their salaries are highest investment. The figure below show the majority of developers are in the Kamai Media studio and the least or only one developer is Endy Milojkovski. Four of the study have up to three programmers. (based on the answers of the questionarry)

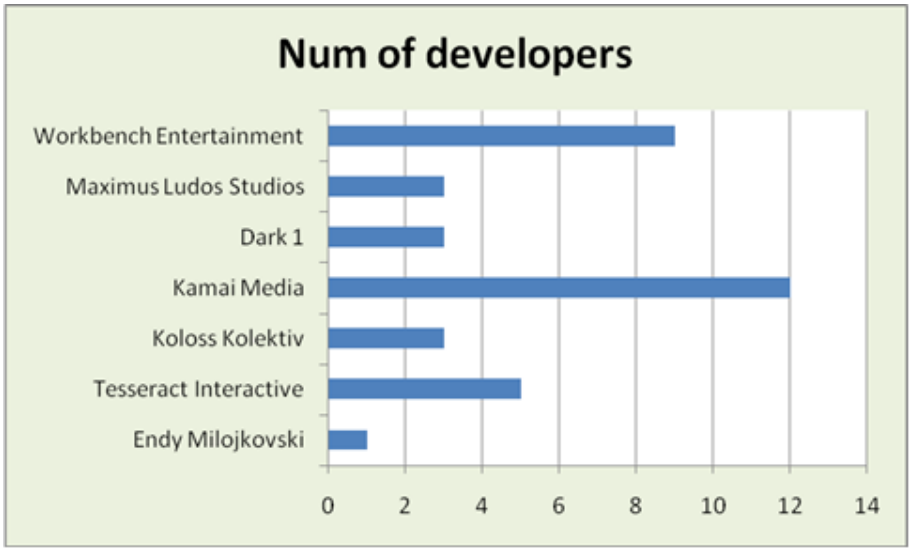

Figure 10NUMBER OF DEVELOPER IN STUDIOUS

The situation in Republic of North Macedonia with theIT professionals and their salaries is presented by processing the newest datafor IT sector conducted by it.mk.

The followingtable shows:

PROGRAMMERS

	Position	Technology	framework or library	Monthly net salaries in MKD	Age	Level of education	Additional source of education	Working experience
1	Developer	C#	Unity	37.000	18-24	Faculty	Free tutorials Google, YouTube	< 5
2	Game Developer	C#	Unity 3D	80.600	25-34	High school	Free tutorials Google, YouTube	5-10 years
3	Product manager	C#	Unity 3D	80.000	25-34	Faculty	Master studies	5-10 years

4	Student developer	C#	Unity with C#	4.000	18-24	Faculty	Free tutorials Google, YouTube	5-10 years
5	Developer	C#	Unity3D	75.000	25-34	Faculty	Free tutorials Google, YouTube	< 5
Average net salary acording autors calculation				55.320				
Average net salary from the national survey				65.365				

DESIGNERS

	Position	Main tool	Monthly net salaries in MKD	age	Level of education	Additional source of education	Working experience
1	3D Hard Surface Artist	3ds Max	50.000	25-34	Faculty	Free tutorials Google, YouTube	< 5
2	Designer	3ds Max	30.000	18-24	High school	Local providers Semos, SEDC	< 5
3	Motion Graphics designer	3ds Max	45.000	25-34	Faculty	Free tutorials Google, YouTube	5-10 years
4	3D Artist	3ds Max	42.000	25-34	Master studies	Free tutorials Google, YouTube	5-10 years
5	Graphics designer	3ds Max	42.000	35-44	High school	Free tutorials Google, YouTube	11-15 yers
6	Product designer	3ds Max	24.460	25-34	Faculty	Local providers Semos, SEDC	5-10 years
7	Graphics designer	3ds Max	21.000	35-44	Faculty	Free tutorials Google, YouTube	11-15 years
8	3d artist	3ds Max	30.000	25-34	Faculty	Local providers Semos, SEDC	5-10 years
9	Graphics designer	3ds Max	30.000	25-34	Faculty	Local providers Semos, SEDC	5-10 years
Average net salary in MKD			34.940				
Average net salary from the national survey			44.461				

Table 6AVERAGE MONTHLY NET SALARIES IN DENARS

Source: Own calculation based on the data of it.mk - mapping of the IT industry in RNMit.mk/mapiranje-na-it-industrijata-vo-mk/ 2019

Programmers

Table presents the the five listed positions for developers: developer, game developer, product manager, student-developer and developer and their usage of technology. They use is C #, and the most commonly used framework or library are: Unity, Unity 3D and Unity with C #.

Monthly net salaries vary from 4000 denars at student developer to 80 600 denars at game developer, ie 80 000 denars at product manager. The average monthly net salaries is 55 320 denars.

The programmers' age range is from 18 to 34 years, with the first group of 18 to 24 years being student developer and developer, and the second group of 25 to 34 years being game developer, product manager and developer.

The level of education is high in all positions except secondary education in the game developer position. Programmers from all positions use an additional source of education this form of Free tutorials (Google, YouTube ...) except the product manager position that uses master studies as an additional source of education.

As for work experience, the developers of the developer position have less than 5 years and the other developers of the other positions have 5 to 10 years work experience.

Designers

Out of the nine listed positions as designers: 3D Hard Surface Artist, designer, motion graphics designer, 3D Artist (2), graphics designer (3), and product designer use 3ds Max as their main tool.

Monthly net salaries are in range from 21,000 MKD for graphics designer to 50,000 MKD for 3D Hard Surface Artist. The average monthly net salaries is 34 940 denars.

Designers are from 25 to 44 years old, with the first group of 18 to 24 years being a designer, the second group being 25 to 34 years 3D hard surface artist, motion graphics designer, 3D Artist (2) and Graphics designer, and the third age structure of 35 to 44 years belongs to graphics designer (2).

The level of education is high in all positions of designers except secondary education in positions of graphic designer and designer. One designer has master studies.

Designers from all positions use additional sources of education in this form of free tutorials (Google, YouTube) and local providers (Semos, SEDC).

As for work experience two designers have work experience of less than 5 years, 5 designers have work experience of 5 to 10 years and two have work experience of 11 to 15 years.

Equipment and software usage for game development

The cost for equipment and software usage in Republic of North Macedonia is similar to global preferencies. Most of the interviewed studious use the UNITY, two of the studious use Unreal and one CryEngine, for one studio the question was not answered.

	Name of the studio	Engine for development of video games
1	KAMAi MEDIA	own engine, CryEngine, Unity and Unreal.
2	Tesseract games	Unity
3	Workbench Entertainment	Unity
4	Endy Milojkovski	Unity
5	NapNok Games	no data
6	Koloss collective	Unity
7	Dark-1	Unity
8	Maximus Ludos Studious	Unity
9	Return Zero	Unreal

Table 7USE OF ENGINE FOR DEVELOPMENT OF THE VIDEO GAMES

Source: Based on the questionnaire answers of the video game studious

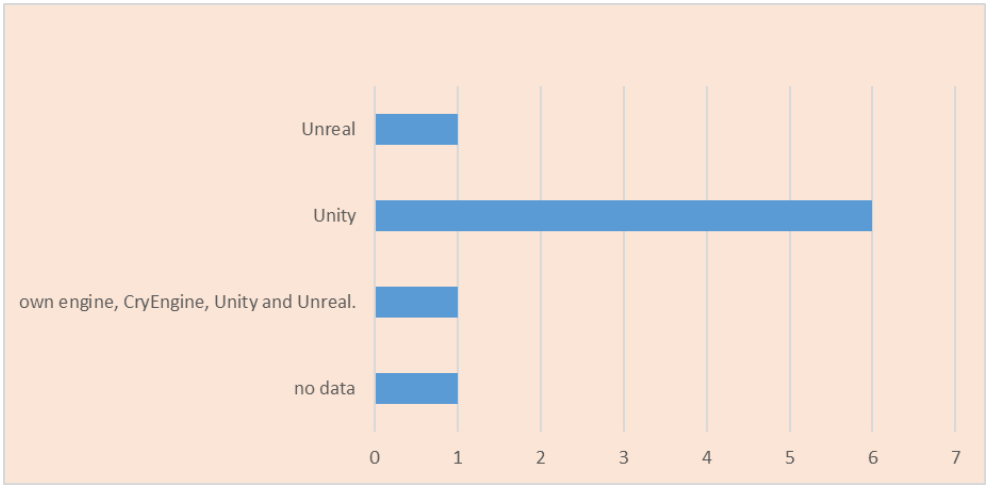

Figure 11USAGE OF THE ENGINE FOR DEVELOPMENT

Source: Based on the answers from the questionnaires

According to conclusions above, for the structure of the investment, especially the biggest share of the salaries for programmers and designers, the Republic of North Macedonia is interesting for investors to come and open studious for game development. That strategy is used by Tab Tale origin from Israel, Nap Nok, origin from Denmark that have already open their offices in Skopje. The same is valuable for the entrepreneurs – young gamers with such abilities to work for themselves and build up portfolio for the world market.

Regarding the software usage Unity ans Unreal globaly (more precisely in USA) are used with around 60% and CryEngine with around 42% (see Figure 8) and the domestic studious 80% are oriented to Unity, as most adequate for their skills and type of games.

2.5 Financial benefits of video games industry

The financial benefits of the gaming industry as revenues are observed on a global market because video games are produced for that market. To overview the financial benefits of the video game industry, data from several platforms are collected considering the methodology, they use for a sizable and complex research. Newzoo use three key metrics for every market: players, payers, and revenues. The data on players and payers is based on primary consumer research, which continues to form the basis of

our understanding of consumers and games. The data presented below are from the consumer research, conducted from February to March 2019, with more than 62,500 invite-only respondents across 30 key countries/markets were surveyed. The 30 countries/markets together represent more than 90% of global game revenues.The revenue data are generated with predictive games market model, which uses a top down approach to market sizing. In the model are incorporated macroeconomic and census data from the IMF and UN: as household income and GDP per capita, transactional and app store revenue data, primary consumer research, detailed financial information reported by more than 100 public companies and third-party research. Such comprehensive research provides valuable insides in the industry.

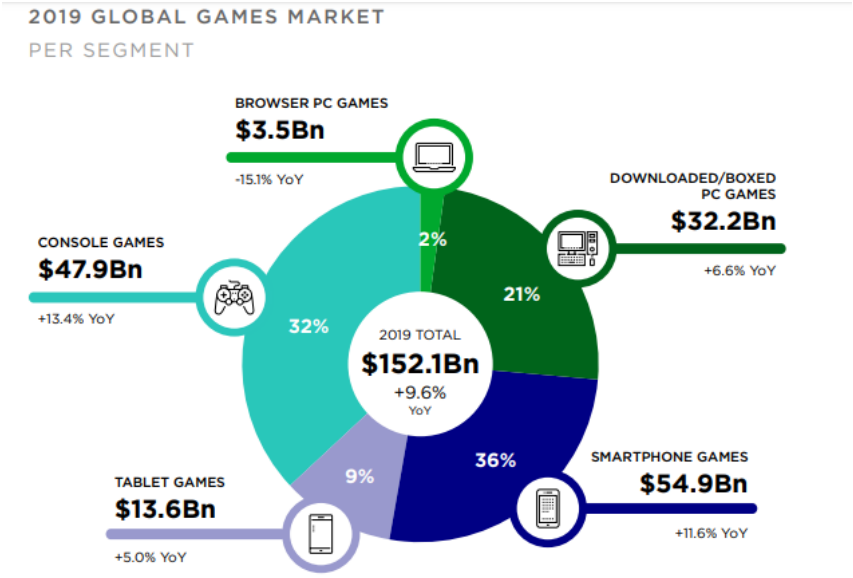

Figure 12GLOBAL GAME MARKET, 2019

Source: Global games market report, Newzoo, newzoo.com/globalgamesreport

According to Newzoo projections for 2019, the global games market will generate revenues of $152.1 billion, a +9.6% year increase. The focus of the research in this thesis arePC game revenues and the data show that for this segment in 2019, downloaded/boxed PC games will grow with a CAGR of +5.4%, generating $37.3 billion by 2022.

Mobile gaming (smartphone and tablet) are the largest segment in 2019, producing revenues of $68.5 billion—45% of the global games market.

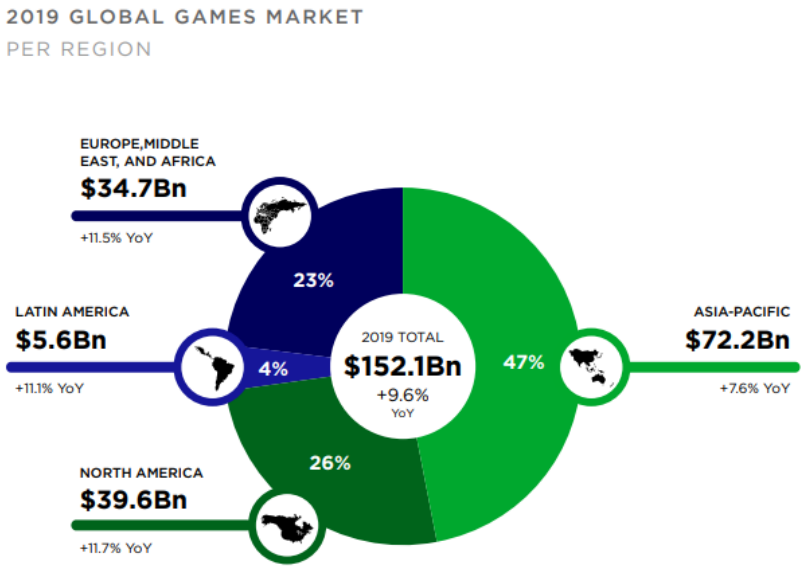

Figure 13REGIONAL BREAKDOWN, 2019

Source:Global games market report, Newzoo, newzoo.com/globalgamesreport

The Asia-Pacific (APAC) region is expected to produce game revenues of $72.2 billion, accounting for 47% of total global game revenues. This represents year-on-year growth of +7.6%. China's licensing freeze has had a huge impact on the region's revenue growth.

North America will be the second-largest region (by game revenues), taking more than a quarter (26%) of 2019's total global games market with $39.6 billion. This represents a +11.7% increase from 2018, the fastest year-on-year growth rate of any region. With a year-on-year growth of +11.5%, EMEA will generate revenues of $34.7 billion this year, representing 23% of the total global games market. Meanwhile, Latin America will make up 4% of the games market, growing +11.1% year on year to $5.6 billion.

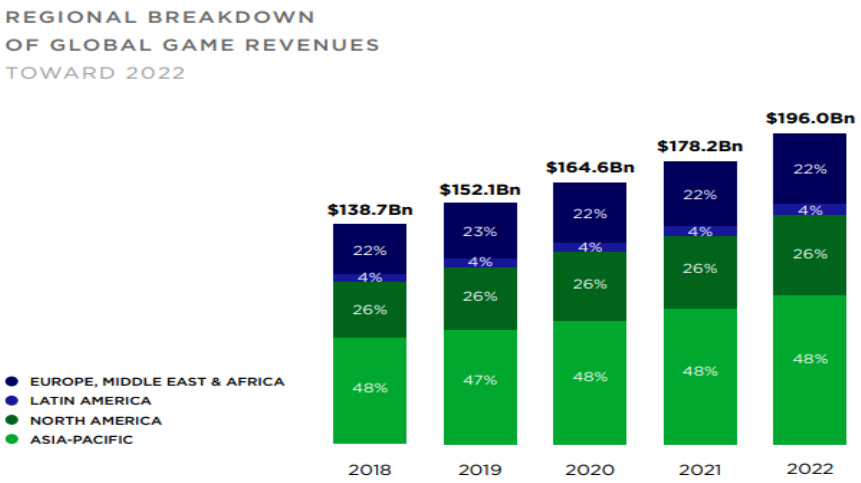

Figure 14REGIONAL BREAKDOWN TOWARDS 2020

Source:Global games market report, Newzoo, newzoo.com/globalgamesreport

In 2019, mobile are the largest segment, generating revenues of $68.5 billion and comprising 45% of the global games market. Of global mobile game revenues, 80%, or $54.9 billion, will come from smartphone games, with tablet gaming accounting for the remaining $13.6 billion. Across the board, the games market is in a healthy state, with every segment showing growth. Console is the second-largest segment, boasting revenues of $47.9 billion. It will grow to $61.1 billion by 2022 with a CAGR (2018-2022) of +9.7%. **In total, PC games will generate $35.7 billion in 2019, making it the third-largest segment. Growth in downloaded/boxed PC games is partially offset by declining browser PC revenues,** as browser gamers have mostly transitioned to mobile. Browser PC revenues will continue to decline from $3.5 billion this year to $2.2 billion in 2022, a CAGR (2018-2022) of -14.7%.

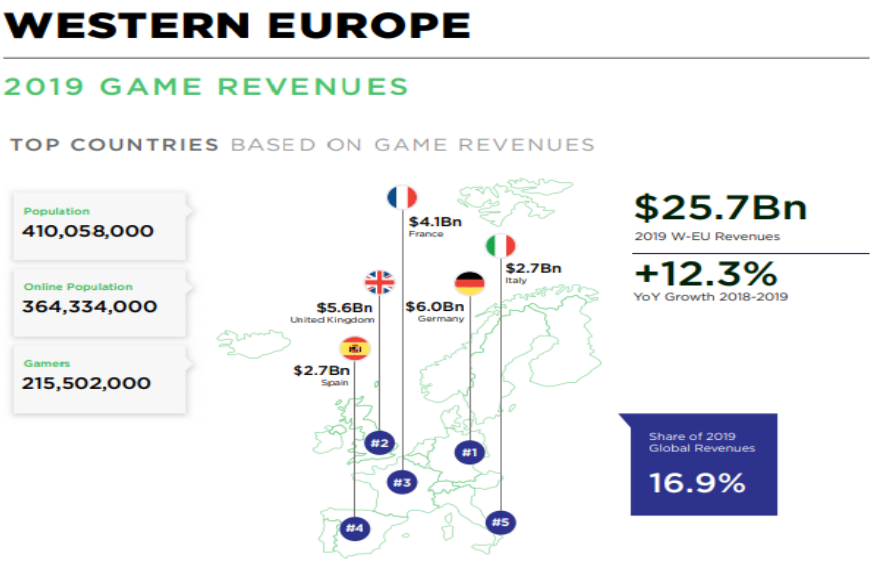

Figure 15WESTERN EUROPE TOP COUNTRIES BY REVENUE

Source:Global games market report, Newzoo, newzoo.com/globalgamesreport

The data for Western EU are significant with 16,6% share in the global revenues the revenues are $25,7Bn and the growth is 12.3% in 2019. The major companies are from Germany $5,86, UK with 5,6; France 4,18 and Italy and Spain with 2,7 Bn. The new emerging markets are Eastern Europe with 2,8 % share in the global revenues and 4,2 Bn and growt of +7,4%. The leader in this group is Rusia, Poland, Ukraine and Romania.

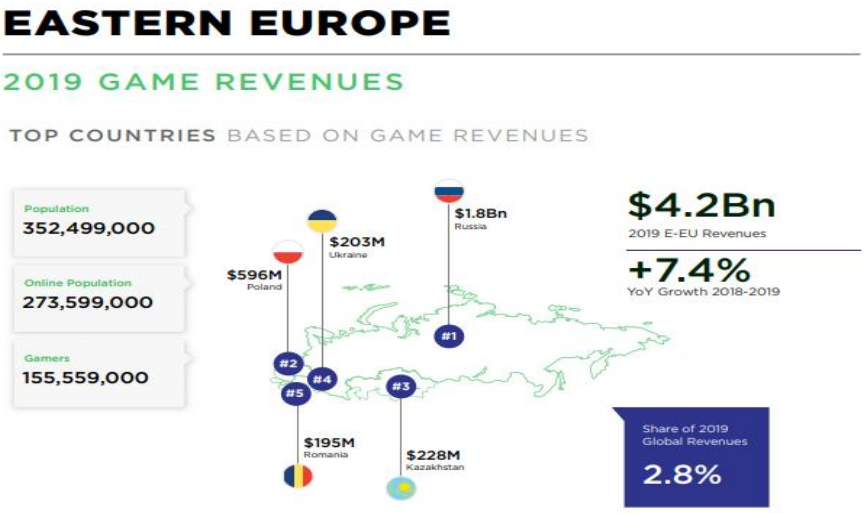

Figure 16EASTERN EUROPE TOP COUNTRIES BY REVENUE

Source:Global games market report, Newzoo, newzoo.com/globalgamesreport

General comments on the global video game market and the demographics

The biggest countries by evaluated computer game incomes in 2018 are:

- China ($24.4B),
- the United States ($23.5B) and
- Japan ($12.4B).

China is the biggest nation by amusement revenue, and has a gaming open that surpasses the number of inhabitants in the whole United States. It is home to Asia Game Show, the biggest diversion tradition on the planet by attendance. In 2014, the Xbox One turned into the principal new amusement comfort sold since China's restriction on consoles in 2000.

The U.S. is home to real amusement improvement organizations, for example, Activision Blizzard (Call of Duty, World of Warcraft), Electronic Arts (FIFA, Battlefield, Mass Effect), and Take-Two Interactive (Civilization, NBA 2K arrangement, Grand Theft Auto). What's more, ZeniMax Media (Doom, Fallout, The Elder Scrolls) is the world's biggest secretly held computer game company. Niantic (Ingress, Pokémon Go) is a striking versatile amusement designer.[35]

Valve Corporation works Steam, the biggest PC gaming stage, with a functioning client base (≈125 million) that matches the joined client bases of the current support age (≈150 million). While not explicitly centered around amusements, the biggest portable gaming stages are worked by (Google Play), and Apple Inc. (Application Store), with most of the portable income originating from Asia. Microsoft works Xbox, the main real diversion support equipment establishment not constrained by a Japanese organization (Coursera, 2017). Sony built up Sony Interactive Entertainment in Silicon Valley to run PlayStation, the world's biggest and longest-running computer game comfort franchise.

Intel and Nvidia are the biggest creators of PC designs chips. Progressed Micro Devices has turned into the most critical support processor seller, with each of the three of the eighth era home consoles utilizing AMD GPUs, and two of them use AMD CPUs. Microsoft, Nintendo, and Sony did not know that they were all utilizing AMD processors until every one of their consoles were announced, underscoring the mystery found inside the diversion business. Outstanding diversion motor designers incorporate Epic Games (Unreal Engine) and Unity Technologies (Unity).

[35]Hamilton K. "The Daily Show gleefully Rips Into free-To-Play gaming", Kotaku 2011, September 12th

The West Coast is home to imperative computer game traditions, for example, Electronic Entertainment Expo (E3), one of the biggest computer game industry-just occasions on the planet, and Penny Arcade Expo (PAX West), the biggest open computer game tradition in North America. The West Coast is additionally home to a considerable number of the significant American computer game industry organizations, especially the districts of Los Angeles, San Francisco Bay Area, and Seattle. Significant amusement advancement districts outside of the West Coast include the Northeast and Texas.[36]

More than 150 million Americans play video games, normally aged 35 and according to gender, 59 percent male and 41 percent female. American gamers are bound to cast a ballot than non-gamers, knowing that the economy is the most essential political issue, and lean conservative.

A few essential diversion improvement identities were brought into the world in or moved to the United States. Eminent engineers linking Ralph H. Baer (Magnavox Odyssey, the "Father of Video Games"), Jonathan Blow (Braid), John D. Carmack (Doom, Quake), and Alexey Pajitnov (Tetris). Mario is named after Mario Segale, a previous proprietor of Nintendo of America. Some conservative and left-wing activists, including Jack Thompson and Anita Sarkeesian, have met outrageous opposition from the gaming open in light of the apparent politicizing of their specialty form.

The United States perceives eSports players as expert athletes. Major League Gaming has eSports fields and studios over the nation. Robert Morris University has a League of Legends varsity group, whose individuals are qualified for scholarships. Players turn out to be fourth-party engineers, taking into consideration progressively open source models of diversion structure, improvement and building. Players additionally make alterations (mods), which now and again turned out to be similarly as prevalent as the first diversion for which they were made. A case of this is the amusement Counter-Strike, which started as a mod of the computer game Half-Life and in the end turned into an extremely effective, distributed diversion in its own right.

The Japanese video game industry is extraordinarily not the same as the business in North America, Europe and Australia. Japanese organizations have made probably the biggest and most worthwhile titles at any point made, for example, the Mario, Final Fantasy, Metal Gear, Pokémon and Resident Evil arrangement of amusements.

[36]Callois, R. “Man, Play and Games. translated by meyer Barash. urbana, il: university of illinois press”, 2017

Lately, consoles and arcade recreations have both been surpassed by downloadable allowed to-play diversions on the PC and portable platforms.[37]

The UK business is the third biggest in the World regarding designer achievement and offers of equipment and programming by nation alone, however, it is fourth behind Canada as far as individuals employed are concerned. The extent of the UK diversion industry is similar to its film or music industries. Recently, a portion of the studios have turned out to be ancient or been acquired by bigger organizations, for example, LittleBigPlanet engineer, Media Molecule and Codemasters. The nation is home to a portion of the world's best computer game establishments, for example, Tomb Raider, Grand Theft Auto, Fable, Colin McRae Dirt and Total War.[38]

The nation assessment help until March, 2012 when the British government changed its psyche on expense for UK engineers, which without, implied the majority of the skilled advancement inside the UK may move abroad for more benefit, alongside guardians of certain computer game designers which would pay for having recreations created in the UK. The business exchange body TIGA gauges that it will expand the video game commitment to UK GDP by £283 million, produce £172 million in new and ensured expense receipts to HM Treasury, and could cost just £96 million more than five years.[39]

Before the assessment alleviation was presented, there was a treat that the UK diversions industry could fall behind other amusement ventures globaly, for example, France and Canada, of which Canada overwhelmed the UK regarding work numbers in the business in 2010.

Canada has the third biggest computer game industry as far as business numbers are calculated. The computer game industry has additionally been blasting in Montreal since 1997, matching with the opening of Ubisoft Montreal. Recently, the city has pulled in world driving diversion engineers and distributers studios, for example, Ubisoft, EA, Eidos Interactive, Artificial Mind and Movement, BioWare, Warner Bros. Intelligent Entertainment and Strategy First, primarily on the grounds that video games employments have been vigorously financed by the commonplace government. Consistently, this industry produces billions of dollars and a huge number of occupations in the Montreal area. Vancouver has likewise built up an especially expansive group of computer game designers, the biggest of which, Electronic Arts, utilizes more than two

[37] Newzoo, 'Top 25 Companies by Game Revenues", Oxford 2018.
[38] Chapple, C."Clash of Clans the highest grossing App Store game ever. Retrieved from Develop: NY", 2015
[39] Nievera, H."How technology is shaping the way customers engage", Harvard 2016

thousand individuals. The Assassin's Creed arrangement, alongside the Tom Clancy arrangement have all been delivered in Canada and have made overall progress. For buyers, the biggest video games tradition in Canada is the Enthusiast Gaming Live Expo (EGLX).[40]

Germany has the biggest video games showcase in Europe, with incomes of $4.1 billion figure for 2017. The yearly gamescom in Cologne is Europe's biggest gaming expo.

Video gaming is still in its early stages all through the African mainland, yet because of the landmass' young populace and expanding innovative proficiency, the division is developing quickly. African nations, for example, South Africa, Nigeria and Kenya have been making quick advances in portable amusement improvement, both inside their nation and internationally, yet because of constrained subsidizing and a market stuffed with western recreations, achievement has up to this point been minimal.

The PS market value

The video gaming scene is so complex; the brand name games are attractor for the gamers. These games have a long life circle, they still generate revenues. They are included in the chapter to emphasize the importance of the product for the public.The Figure below shows the best selling PS games of all times, data are published in 2018. The top three are Sims3 with 7, 9, The World of Warcraft 6,33 with and Diablo III with 5,23 millions units sold.

[40]2015: THE REPORT ON FINNISH GAME INDUSTRY IN 2014 IS OUT NOW

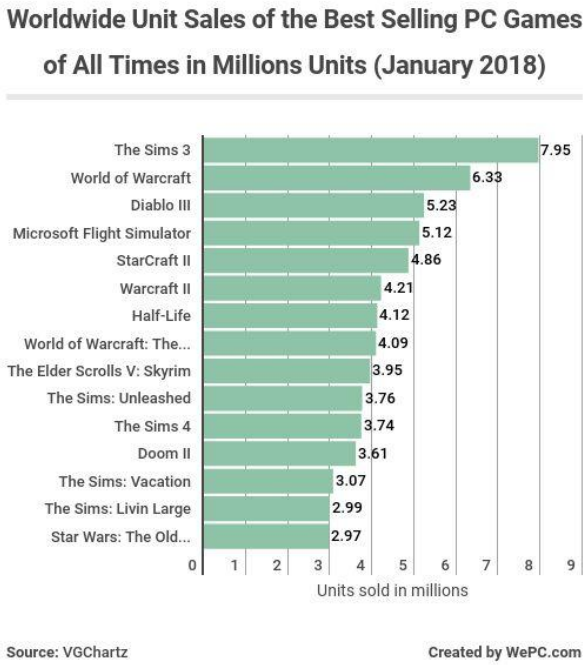

Figure 17THE BEST PS GAMES IN THE WORLD

Source:https://www.wepc.com/news/video-game-statistics/

Financial benefits from video games in the Republic of North Macedonia

Official data for the revenues from the video game industry in Republic of North Macedonia are not available.This limitation was the reason to do the research trough interviews and case studies of the game development studious that finalizedthe process of game development andpublished video games on Steam platform. The interviews are held with domestic studious in Skopje, Bitola and one in Amsterdam (the owners are Macedonians but now they are living abroad) and the data are linked to the revenues for certain video game. The data are not supported with financial reports, the answers were given in a range, for example how much was the revenues for this video game and the answers were from 0-10,000$US from 10000 to 20000$more and US. The collected data are presented below:

	Studio	Name of the video game	Time of release	STEAM estimation downloads	price $ US	$US potential
1	Endy Milojkovski	Raining Blobs	2016	20.000	9,99	**199.800**
2	Tesseract Interactive	Excubitor	2016	20.000	14,99	**299.800**
3	Koloss Kolektiv	SlimeBrawl	2017	20.000	2,99	**59.800**
4	Kamai Media	Sonder	2017	20.000	3,99	**79.800**
5	Dark 1	Odium to the Core	2018	20.000	4,99	**99.800**
6	Maximus Ludos Studios	Echoes World	2018	20.000	3,99	**79.800**
7	Workbench Entertainment	Wounded	2019	20.000	6,99	**139.800**
	Total estimated revenues in $USD					**958.600**

Table 8POTENTIAL REVENUES FROM VIDEO GAMES IN RNM

Source: Own calculation based on the projection of STEAM

The table gives overview of the studious that provided informations, the video games they produced, time of launch in the period from 2016-2019, sales estimation done by the platform Steam were they publish the games and the potential revenues in$US.

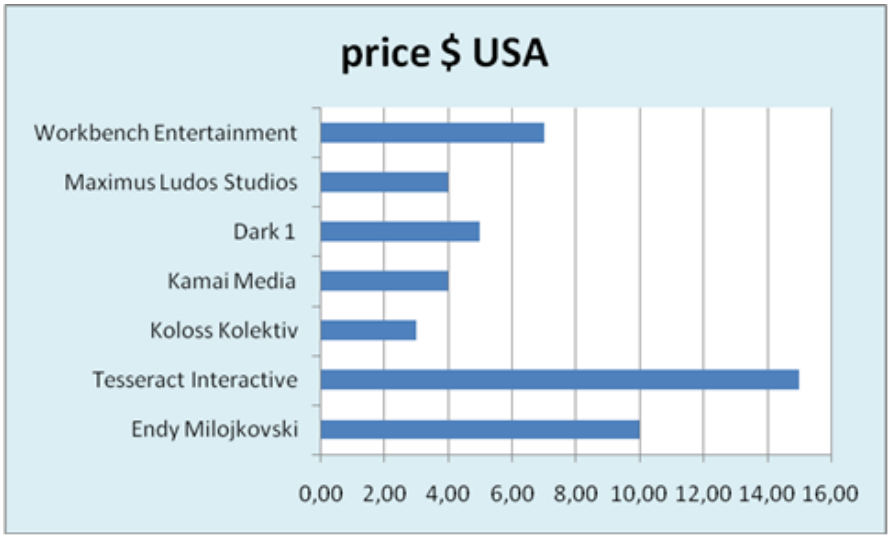

Figure 18VIDEO GAME PRICES $ USA PER STUDIO

The highest price of the video games in $ USA is for Tesseract Interactive studio and the lowest price is for Koloss Kolektiv studio.

Four of the seven studies cost less than US $ 5.

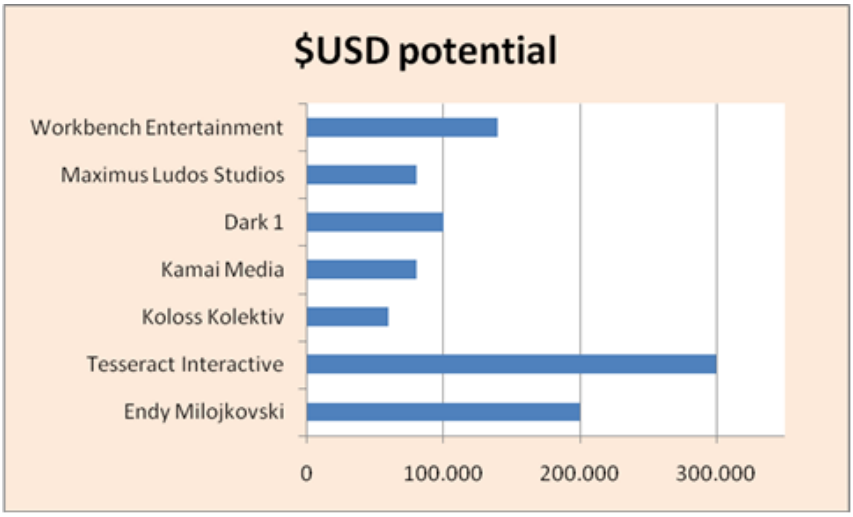

Figure 19REVENUE POTENTIAL IN $ USD

The highest revenue potential in $ USA has the Tesseract Interactive studio which represents one third of the total potential of the seven studies. Koloss Kolektiv studio has the smallest potential which represents 6.24% of the total potential of the seven studies. Four of the seven studies have a potential of less than 100,000 $USA. According the interviews, the more realistic revenue projection is the projection with 30% of the Steam projections. The realistic scenario revenues per game are:

	Studio	Name of the video game	Time of release	STEAM estimation downloads	price $ US	$USD projection with 30% of the estimation
1	Endy Milojkovski	Raining Blobs	2016	20.000	9,99	**49.950**
2	Tesseract Interactive	Excubitor	2016	20.000	14,99	**99.933**
3	Koloss Kolektiv	SlimeBrawl	2017	20.000	2,99	**19.933**
4	Kamai Media	Sonder	2017	20.000	3,99	**26.600**
5	Dark 1	Odium to the Core	2018	20.000	4,99	**33.267**
6	Maximus Ludos Studios	Echoes World	2018	20.000	3,99	**19.950**
7	Workbench Entertainment	Wounded	2019	20.000	6,99	**46.600**
	Total estimated revenues in $USA					**296.233**

Table 9PROJECTED 30% REVENUES FROM VIDEO GAMES IN RNM

Source: Own calculation based on the interview 30% of the projection of STEAM

The table gives full details of the projection wit 30% of the potential.

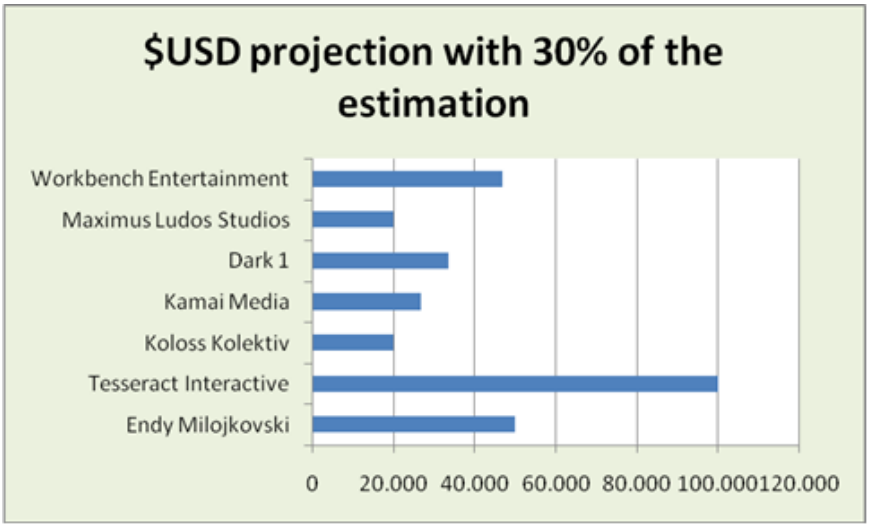

Figure 20POTENTIAL IN $ USD WITH 30% OF THE ESTIMATION

In the Figure the highest projection has the studio Tesseract Interactive or one third of the total projection of the seven studies. The smallest projection has the Koloss Kolektiv studio or 6.73% of the total projection of the seven studios. Four of the seven studies have a projection below $ 35,000 US.

Furthermore elaboration is done, regarding the revenue per employee and per year. All interviewed companies stated that the game is done parallel with other assignments that are balancing the cash flow in the companies, and there is a lack of detailed evidence for working hours on the game, for changing concepts and other technical issues.

Only Kamai media has more organised structure, but their first episode is only as trial version on Steam so these revenues are not presenting the real expectation of the game.

	Studio	**Name of the video game**	**Time of release**	**Num of developers**	**Revenue per employee in $USA**	**Period for development in months**
1	Endy Milojkovski	Raining Blobs	2016	1		
2	Tesseract Interactive	Excubitor	2016	5	19.987	48
3	Koloss Kolektiv	SlimeBrawl	2017	3	6.644	12
4	Kamai Media	Sonder	2017	12	2.217	48
5	Dark 1	Odium to the Core	2018	3	**11.089**	12
6	Maximus Ludos Studios	Echoes World	2018	3	**6.650**	12

7	Workbench Entertainment	Wounded	2019	10*(5 are regular)	**5.178**	24

Table 10REVENUES PER DEVELOPER

Source: Own calculation based on the interviews

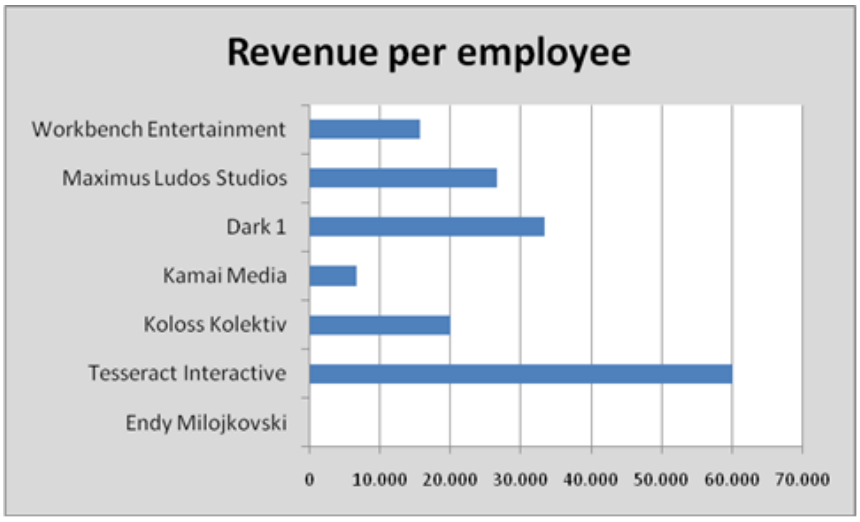

Figure 21REVENUE PER EMPLOYEE IN DIFFERENT STUDIOS

According to calculation the revenue per employee is in a range from 6000-11000 $USA, with remark that Wounded is still in demand especially for the Halloween. All the interviewed parties were satisfied with the success of their first game, and lesson learned finalization the whole process from idea to published game on Steam.

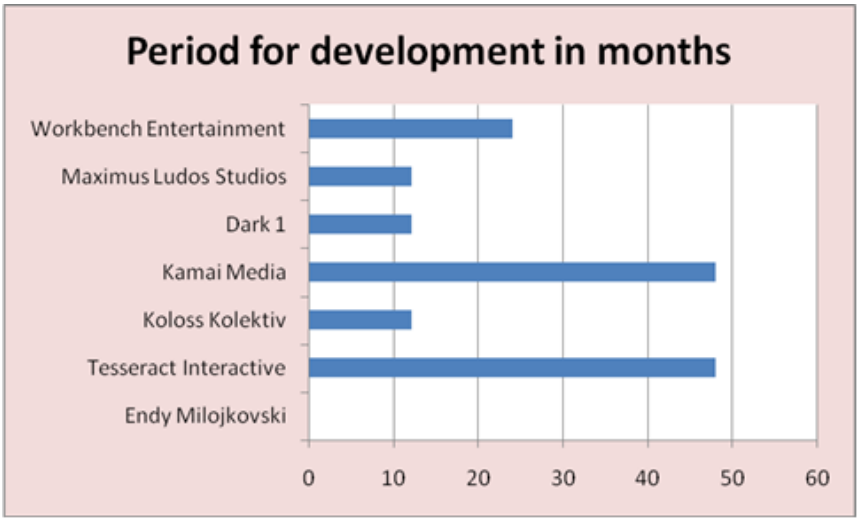

Figure 22PERIOD FOR DEVELOPMENT OF VIDEO GAMES IN MONTHS

The longest period for development of the video game in months, or more precisely 48 months, has Tesseract Interactive and Kamai Media and the shortest, or 12 months, are Koloss Kolektiv, Dark 1 and Maximus Ludos Studios.

The current state shows that they have covered the cost of the game end earned some extras. The expectation are focused on the relaunch or creating a new game, in order to build up a portfolio and become more attractive to the audience.

Other benefits of development of gaming industry

The effects of playingvideo games are visiable in other spheres of business and living. The PS hardware industry advances in parallel with the game development industry. New reciprocal items are introduced such as: **processors, substance, gadgets, and broadband web.**

There are new applications of the technology and methodology of the video game industry that are used for purposes other than entertainment and applied in various fields such as education, defense, medicine, health,job security or culture.

It additionally contributes a**to innovative work (R&D),** to create progressively imaginative recreations for the upcoming players. The games are used to evaluate certain behaviors and further to influence in order to address or improve certain conditions. Immersive experiences with devices that enable virtual and augmented reality gaming experiences, like Oculus, are near commercial release, leaving the door wide open for new game content specifically for these devices. Initiatives like Google's Project Tango are encouraging experiences similar to virtual reality by enhancing the real world surrounding the gamer.

It interacts with other fields, film and television companies make their content more interactive as AMC has The Walking Dead and HBO has Game of Thrones. Other non-traditional gaming companies like Amazon are realizing the value in original content.

The idea of **multi-channel story** telling is just beginning; pioneers like Disney and Amazon are trying media assets across comics, movies, games and a range of physical items. The future advances are open up for the possibility of a multi-platform product in which the current differences between a movie and a game will not exist.

The utilization of computerized recreations is powerful on instruction. Utilizing computer games in a non-diversion setting **asgamification.**The most commonly

accepted definition is that gamification is the use of game design elements in non-game contexts. Gamification can be differentiated from simple contests because it seeks to use elements from designed games to enhance the fun or effectiveness of a game in a work environment. A game is designed when it is purposefully created with reinforcing contexts, interactions, and mechanisms that create a more immersive feeling of play.[41]

Concerning the Republic of North Macedonia, there is no data on the level of implementation and usage of gamification by organizations. There is one research done in 2016on representatives of SMEs (small and medium enterprises) in the IT industry, because they comprise 99.7% of all active business entities. The IT industry was selected as one with more companies working with virtual teams and having online collaboration between employees with 30 companies. The concept of gamification was familiar to 73% of the respondents, while 27% were not familiar with this concept. 66% of them use gamification from the aspect of employees or clients, and 7% are in the process of its implementation, but the gamification that most managers utilize is simple gamification techniques such as achievements, badges, challenges and leader boards. The main disadvantages were the lack of understanding by managers and employees, insufficient technical knowledge, and as a potential barrier, the implementation and maintenance costs.[42]

E sports

E-sport video games will equal the greatest conventional games groups as far as future chances for publicizing, ticket deals, authorizing, sponsorships and promoting, there are enormous development territories for this early industry. This part of the industryis where gifted video gamers play and envelops rivalries on computer games. The industry is genuine, it developsinternationally. For example, more individuals viewed the 2016 world finals of well known video games amusement League of Legends (43 thousand watchers) than the NBA Finals Game 7 (31 thousand watchers). This industry incorporates NBA2K, FIFA, League of Legends, Counter-Strike, and Dota. Singular players can either stream themselves playing to win cash or join bigger associations to go after substantial money prizes. The players can draw in with their fans in an assortment of ways including online networking, live-gushing stages, and face to

[41] Mollick & Rothbard, Mandatory Fun: Consent, Gamification and the Impact of Games at Work,2014
[42] Martin Kiselicki, THE CONCEPT OF GAMIFICATION AND ITS USE IN SOFTWARE COMPANIES IN THE REPUBLIC OF MACEDONIA, 2018

face at competitions. On the opposite side, fans can watch and pursue their most loved groups contend in local and worldwide competitions. Numerous innovation stages, administrations, occasions, examination stages and generous financial specialist capital encompasses the e-sport. Video games is like novel where players prosperity is autonomous of how tall, solid or quick they are. Video games can even the odds for variables, for example, sexual orientation, culture, and area. Customary games have physical limitation, video games is the more quick paced and adaptable are the result of its dependence on advanced stages.

The most famous player from the Republic of North Macedonia with international experience is **Martin Sazdov. WithUS team he won second place and team award of $ 3.4 million on the competition "The International 2016"**. As a member of US team “Digital Chaos” , they were part of the Dota 2 International 2016 competition, event that brought together the best gamers from around the world. They reached the grand finale held in Seattle. The tournament prize pool exceeded $ 20 million - the winning team earned $ 9.1 million.He personally earned $ 700,974, while in 2015, he earned $ 18,834.[43]

The **Vip Game Fest 2018**in the Republic of Nrth Macedonia met 756 competitors from the the Republic of Norht Macedonia in Fortnite, Hearthstone and FIFA19 as major competitions. There were 260 on the field competing in Tekken 7, rFactor, Board games,The Gathering, stacking puzzles and Rubik's Cube tuning and 26 competitors competing through creatively made masks of heroes and characters - Cosplay. All matches were covered by commentators for each game separately, streamed on the GG.MK service and through Vip's state-of-the-art network. Competitors' prize pool was 4550 euros, with over 400 gifts in the form of T-shirts, pendants, action figures from games, backpacks, bags, mouse pads, mice and keyboards, power banks, slots and memory cards, books, comics and vouchers. There were 5,000 visitors who could try out games, simulators and virtual reality.

The e-sport events for macedonian watchersare on TV on the **SK Esports channel** thatis covering Esports Balkan League, EU Masters, Epicenter Major, GG, Sa1na, Guh Sayian and other tournaments.Fans of gaming and esport have this specialized TV channel sinceJune, 2019. The content of the channel is tailored to gamers of all interests and ages, so viewers will see broadcasts from the biggest European and world esport competitions, gameplay on popular homegrown shows, as well as

[43]14/martin_sazdov_so_timot_zaraboti_3_4_milioni_dolari_vo_turnir_na_igrata_dota2.aspx

entertaining and informative shows. Fans enjoy the live broadcasts of all Esports Balkan League matches, the largest regional League of Legends competition in the Balkans. Localized broadcasts of the biggest European and world tournaments in Counter Strike: Global Offensive and Dota 2. The program chart isjoined by major regional comentators such as Milos "Sa1na" Jainovic, Ivan "GUH Sayian" Ilic and Stefan "Donn" Stojiljkovic.

The slogan "More than a Game" describes the great future of this modern industry with 380 million viewers watching the matches and esports content.The Esports Balkan League, as one of the biggest regional competitions, has so far donated over 120,000 euros through the prize pool, and each season has over 200,000 spectators.[44]

The above facts confirm that the video games are changing web based gaming into an observer sport.

2.6 Educational benefits

Learning based games are a specific type of game with goal to have an educational nature, ie, so during and after the game, players can learn. Games are designed to balance between learning and playability, be interesting and appealing to the players. They have an element of fantasy that guides players through the learning process through certain scenes or stories. Educational video games can motivate children to develop awareness and responsibility skills by presenting the consequences of particular actions and actions. Children are allowed to express themselves as individuals through learning and participating in social activities.

The success of this kind of learning is due to **the active participation and interaction** that are set as the basic postulates of the game, and they imply clear signals that today's educational methods that are practiced in classical educational institutions are not challenging enough and do not succeed to keep the attention of the students.
The attraction of games as a learning tool is a universal feature. Learning through games is a fast growing category starting with simple games using paper and a pen like the game "Quick Geography" to complex multi-player and online games.

Using collaborative games based learning games offer students the opportunity to apply their **acquired knowledge and experiment and receive feedback** in the form of consecutive and/or rewarding.The built-in learning process makes the game enjoyable and attractive. The process of learning is what the human brain perceives and

[44]https://www.fakulteti.mk/news/16-08-

understands. The process of understanding is a new concept through playing and allowing the individual to feel a certain reward and pride in the results achieved. Ideal learning environments are well-designed games that motivate players to play the games and win.

The challenges are easier with a game that contains an **effective and interactive experience**. In a successful game-based learning environment, selecting stocks, experiencing consequences from them, and taking steps toward achieving goals, allows players to make mistakes by experimenting in a risk-free environment. The games have rules, structures and goals that inspire motivation. The games are interactive and produce results and returns information. Games encourage **active learning, multi-player interaction, team work**, and also provide an environment in which players' **abilities and skills** can be enhanced, such as memory, reflex, logic, etc. Learning through games offers a variety of different learning styles and directly affects the cognitive abilities of the participants in the game. While learning through games can bevery effective, but they can have negative consequences causing great focus on the game, while forgetting about learning. By presenting information in different formats (visual, textual, audio), players can not only **select the style** that suits them best, but also can practice their abilities in other areas, that are often unaware of this.

Traditionally, the technologies used in schools are at a basic level. Examples, they are typically used to direct students to specific technologies in order to prepare them for future, for difficult challenges and problems that they need to solve, which require a deeper knowledge. The technology and games are expected to be used in **simulation environments to simulate real problems**. In the professional sector, such as flight training, simulations are already used as a standard tool and practice for preparing future pilots before switching to practice with real jets.Such training sessions are used to replicate realistic stressful situations in which pilots need to make important decisions quickly without the associated risk of carrying out the same scenarios of real jets.

Video games are useful tools for **learning specific strategies and gaining knowledge**. They are also used to develop educational content that is more acceptable to the new information society. Before deciding how to use learning through games, coaches should first determine what they want the learners to learn. A trainer who fails to focus on a workout around a central idea increases the risk of using a game with which the participant will not establish a personal connection. The video games contain specificities that transfer the processing of information from traditionally verbal to visual

processing. Many popular action games that are spatial and dynamic are characterized by performing parallel actions at different locations in real time. The multiplicity of skills that children develop by playing such games is a basic tool in the teaching of computer literacy and preparing them for manipulation of different images on the screen.

Playing video games increases player's **spatial ability**, by long practice is achieved a certain maturity and routine in the performance of certain skills. After long acting action with games develop mental rotation, spatial skills, perception, orientation, etc.

Another skill that develops through gaming is **the ability to read images such as diagrams and maps.** The pictures in principle are more important in a game than the words themselves. Playing video games also changes the mindset and changes the presentation skills of players, and they express their ideas and theories through pictures, diagrams, tables, etc. different ways of graphic expression. The general difference is that players playing a video game use multiple diagrams when describing or presenting something while players playing board games use more verbal gestures.

Another skill that develops as a playback product for video games is the so-called **"increased visual attention",** that is, the ability of the player to keep an eye on and watch different things in parallel in real time. The way how much is measured and whether this skill is developed is that the individual is placed in front of a computer screen that is divided into two parts and at the same time two scenes on the same monitor are running and the individual's ability to measure how much he has noticed the details of the two scenes that were played in parallel. Players who are experts in video games have a much higher level of detection than individuals who do not play games at all or play very rarely.

From the above example, it is very easy to conclude that gaming helps students develop skills that are both important and useful in real professions **like flying with planes and helicopters, military activities (shooting, cursing), traffic control.**

Learning using digital based games is based on the two basic postulates:

- The students have changed dramatically in recent years
- New ways of motivating new students are needed

Growing with digital technology, from which computers and video games are a major part, dramatically changed the way people think and process information. These changes were so drastic and enormous that today's youth have fundamentally different minds from their parents and all their previous generations.

A growing problem facing formal education, whether it is about classroom learning, online or distance learning, is to keep motivated students motivated enough to continue the learning process by the end of the class, lesson, session, course, or semester. Motivation is important because learning requires some effort by the participants. However, the reality faced by educational institutions today is that the methods used in the past to motivate students today are no longer effective. Fortunately, today we have generations who have grown to experience a radical new form of play - computers and video games. As this new form of entertainment radically shapes their expectations and abilities, it also absorbs their time and effort in an amount that has not been previously noticed with the help of traditional games. A typical student today has played thousands of hours of video games before finishing the faculty. The power and appeal of video games if properly used and directed can be the greatest motivator for learning that has ever been used.

Today's students represent the first generation that grew up from the kindergarten to the university with the help of new technology. They spent their entire life surrounded by computers, video games, digital video players, video cameras, smartphones and various other digital toys. It is assumed that the average student is spending twice as much playing some kind of video games than reading.

Of all the stated it is clear that as a result of the overall digital environment that is formed around us as well as through the size of the data that we exchange with and through this environment, today's students think and process the information in a fundamentally different way from their ancestors. Different types of experience lead to a different brain structure.

These generations who spent their entire life with digital gadgets around them were born and brought up together with technology so we can freely call them **"digital natives"**. If they are "digital natives" then what the rest of the people are - older generations, they are just "digital immigrants". They, like all immigrants who have come to the new state, will try to adapt to the laws and customs of the new state, but there will always be a certain mark on which they will differ. This accent can still be seen today when many people print their emails received via email and carry them when they are probably stored on a cloud server and can be accessed from anywhere. Many people when they receive some text to make notes first print it and then notice the printed text with a pen and then they enter it electronically.

It is important because digital immigrants are the ones who create educational programs for digital natives. Changes in the brain or cognitive changes caused by new digital technologies and media have brought many new needs addressed to new generations.

In today's education systems, the learning process itself is very rarely a motivational factor. Although there are exceptions in which students are interested in an object (usually a course for computers or a course on how to make more money), the general conclusion is that the motivation that students have is an external ie. to satisfy their parents, to avoid some punishment or to receive a reward.

Playing games is different. The main reason people play games is that the playing process requires a certain engagement. These games carry with them a combination of motivating elements that are not in other media, such as:

- They represent a form of entertainment.
- They represent a form of play; players are intensely and passionately involved in playing.
- There are rules. The rules give a structure.
- There are goals. The goals give motivation.
- The games are interactive.
- The games are adaptive.
- Have results and feedback. It helps in learning.
- There are victories and conquests.
- There is a conflict / match / challenge / opponent. It gives adrenaline.
- Troubleshooting improves the creativity
- The games are interactive with social characters and a part of a social group.
- The games have characters and stories. It gives emotions.

Because of all these factors, it can be concluded that the combination of games and crawling has the potential to motivate students to learn things that they are not naturally motivated to learn. If there is inserted element of fun in the process of scaling, it gives us a moment of relaxation.

The Games are a formal and structured way through which is inserted an element of fun in the learning process. The games do motivate through their goals and the challenge to achieve them, through the decisions and the risks taken to achieve the goals, through the connections made with the rest of the players. These are the facts that keeps children in front of their computers or toys for hours.

Combining passion and attraction of games with interactive learning processes (which may have different shapes depending on the learning objectives) is that creates learning.The main part is managing how the two entities are placed in a common package.

Further is how this package is used as part of the learning process. In most cases, Digital Gaming Learning is not designed to replace an entire training course, but as an auxiliary tool. Although the technical ability to use game-based learning has existed for twenty years, it is slowly accepted as part of the classical education system.

Even in the business sector, managers still do not accept simulations and military games as appropriate educational tools. A major problem for knowledge-based protagonists is that people who have to decide and invest in such systems are precisely these traditionalists.

Many are criticizing today's games intended for learning. The fact is that if some of these games are not effective enough or do not achieve the desired effects, that does not mean that the problem is in the game or that the very concept of game based learning is wrong. Measuring "true learning" is not easy. The real measure of learning is changes in behavior, ie, does a particular individual when faced with an identical or similar problem in the future, do something different (mentally or physically) than before? The approximation to measure the learning is a test. The test is a series of questions, problems, and hypothetical situations that enable the student to demonstrate his behaviors and the approach he has learned.Although there have been only a few direct comparisons between learning-acquired knowledge through games and traditional methods, studies have shown that learning games can be well-designed to produce real knowledge.

3 Research methodology

3.1 Case studies of 3 video games produced in Republic of North Macedonia

The reseach of the potential of the video gaming industryis based on the video games produced by studious in Republic of North Macedonia as original product. The development of Macedonian video games is still in its infancy, it starts to be intereresting due to the games published on global platforms. Macedonian teams face scarse budgets (their own investment as is shown in the previous chapter) and emerge as the ultimate

winners, with games that offer to thousands of people on computers or phones a unique and unforgettable entertainment. Most popular Macedonianvideo games launched on Steam are:

Sonder, By KAMAJ MEDIA

KAMAI MEDIA aired the first episode as part of Steam's early approach and, although the game had some drawbacks, it still radiated immense uniqueness and was one of the most pleasant surprises in 2017. Imagined as a story without the main characters, Sonder is promising the beginning of a beautiful digital odyssey. As an unfinished adventure, the first episode offers an immersive experience of immense proportions.

Sonder is a SciFi third-person Mystery Adventure game unlike anything you have ever played before. It is an interactive nonlinear time loop where you are in total control of space, time and the lives of everyone in it. You are given a section of time to analyze - you can observe from the sidelines as the same mistakes are being made over and over again, or you can take control of any character, at any time and experience events from that character's unique perspective. Then you may guide them to the choices that will ultimately lead them to salvation - or bring them to their doom. Time marches forward mercilessly for the characters, but for you it is merely a resource. You can restart the time loop at any time, as many times as you wish. You can rewind to any past point within the loop and attempt to change what happens from that point onward. The only place where information can survive from one loop to the next - is in your head! The characters in the story have no recollection of events in previous loops. Each time you restart the loop, or rewind time - they have to re-learn what they previously knew. It will be up to you to make them find the information (that only you know is out there) quicker and do something with it. As you get more and more familiar with the story and the character's roles in it - a deeper mystery will become apparent.

Wounded, by Workbench Entertainment

Wounded guarantees a quality horror experience that aims to introduce complex forms of fear, grab and whisper crazy. Workbench Entertainment with unexpected attacks spread across the Wounded world by building tension, formulating fear of the unknown, and co-opting a wide range of phobias. Lovers of the horror genre come across a quality accomplishment that can comfortably stand side by side with Outlast, as a self-contained, deeply disturbing accomplishment.

"Wounded" is a first person, adrenaline, horror game. The player manages a character named Tim, who is primarily a very worried father. The answers are in the mission of

fulfilling the player into a nightmare world where reality dances with paranoia and fear, and anxiety and terror lurk in the dark corridors, "Wounded" evokes strong emotions and provides an unforgettable experience. The complete audiovisual experience complements the feeling of uncertainty and fear of the unknown, which accelerates the pulse with each subsequent scene. The audio effects are work of the world's best sound designers. In this mysterious game, the player's only weapons are his inner strength, wit, and will, making the game good for defeating fears, practicing reflexes, and making quick decisions as well as boosting self-confidence, all through careful thought created challenges and quality entertainment.

A small indie studio made up of students created Wounded, a brief survival horror where we must reckon with our sins as we struggle to search for Lisa, our daughter, on an island inhabited by a serial killer. We play Tim, an estranged alcoholic father with marital problems, who must hide and avoid enemies as he desperately tries to save his daughter. Beyond minor complains about the game's enemy AI system, Wounded is an impressively good release for a small studio on a low budget. Wounded is a linear, story-driven game. The game adopts a philosophy that rejects jump scares to frighten the player or to progress the story. Instead, Wounded relies more on crafting an eerie atmosphere that both scares the player and compliments the story. The more you explore your surroundings in this game the more you learn about the story through notes, cassette tapes, and other documents. One area I enjoyed in Wounded is *The Sewers*. It's a level that adopts a popular trope in horror: an animal with supernatural and/or uncanny abilities. In horror movies, it's often a dog that can sense ghosts or an evil presence. Here, we get to wander the sewers with a bird cage because the bird can smell certain gases lethal to the protagonist. In effect, you have to escape a maze of invisible deadly toxins with the help of your companion bird. It's a treat. Wounded is also visually intriguing. It features a variety of scenes, including a haunted underwater summoning, a decrepit underground mining shaft, and a nightmarish slasher imagery. It also features more gruesome imagery. There is a group of construction workers that fall prey to the serial killer. They are all skinned and jailed. Wounded is not perfect. The enemy AI could use some improvement because at times it seemed to bug out. For instance, the enemy AI would chase right behind me up until I hid in a closet, at which point it would just turn around and leave. In games like Amnesia: The Dark Descent, or Outlast, if I hid right in front of the enemy, it would almost certainly mean death. In other occasions, I would be right in front of the enemy AI and it would either not try to hit me or hit me

and miss. But, as I mentioned before, these are minor complaints as they did not drag me out of my suspension of disbelief[45].

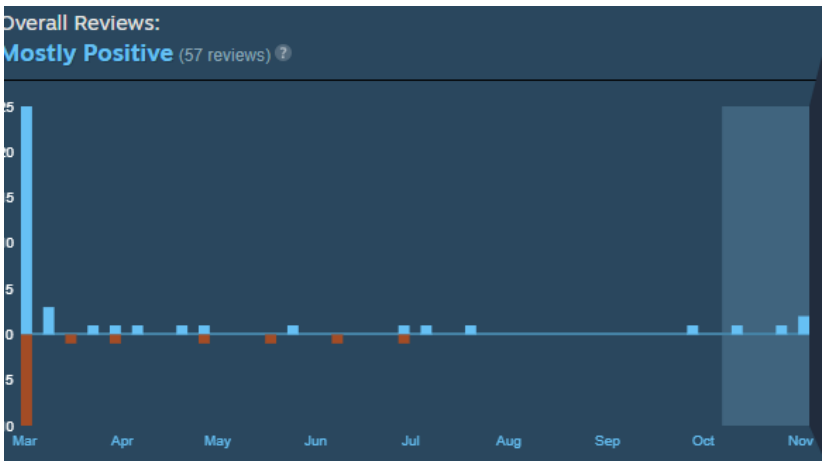

Figure 23OVERALREVIEWS ON STEAM

https://store.steampowered.com/app/1015130/WOUNDED/

Odium to the Core, by Dark-1

The Macedonian game of Dark-1 frustrates to the point of euphoric hair loss and crying not sure if it is a joy or a pain. The Odium to the Core is based on a simple concept that is difficult to master but offers tremendous fun, especially after encountering creatively crafted bosses. Odium to the Core is the epitome of simplicity, but simplicity that is painstakingly transformed into an extremely beautiful and stimulating experience, a winning formula that is capable of producing a range of complex emotions and great fun in short doses.

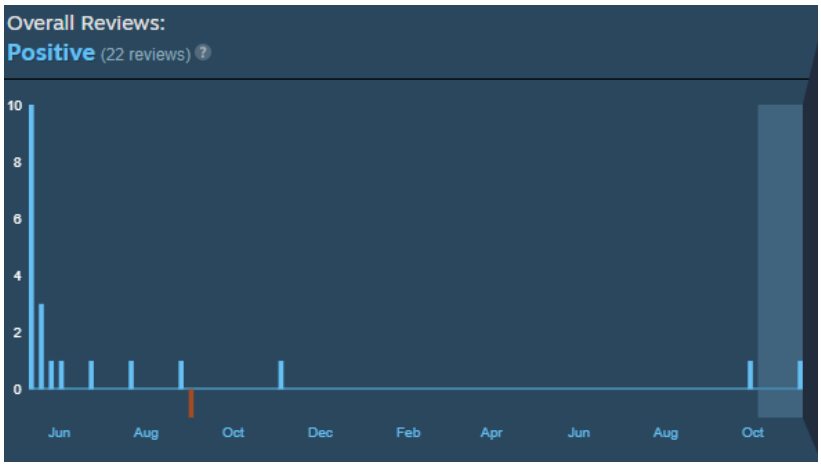

Figure 24OVERALREVIEWS ON STEAM

https://store.steampowered.com/app/1015130/WOUNDED/

[45](https://store.steampowered.com/app/1015130/WOUNDED/This review was made for Elite Giveaways by Anna from Malkavian Madness)

Wounded and Odiun to the core are made their expected sales (presented in the financial benefits) and are satisfied with the results. Kamai media has only a trial version and they plan the premiera of the game in 2020.These are successful examples that are drivers of the industry in Republic of North Macedonia, supported with all the other launched video games, especially the mobile ones.

The main focus of the studious are the players, their games are focus on USA market with 40% and raising EU market with 30%, the rest are other markets like Asia. (source, interviews)

Due to the methodology of the research, based on the deductive methods, this chapter starts with the general potential for developing video games. The global market are actually the player-gamer, that is why their on the list of priority for research.

3.2 Simulation of a model for development of gaming industry – focus on financial benefits

Gamers

The first indicator for evaluation of the potential in the video game industry are approximately

2.2 billion gamers in the world. (https://gaimin.io)

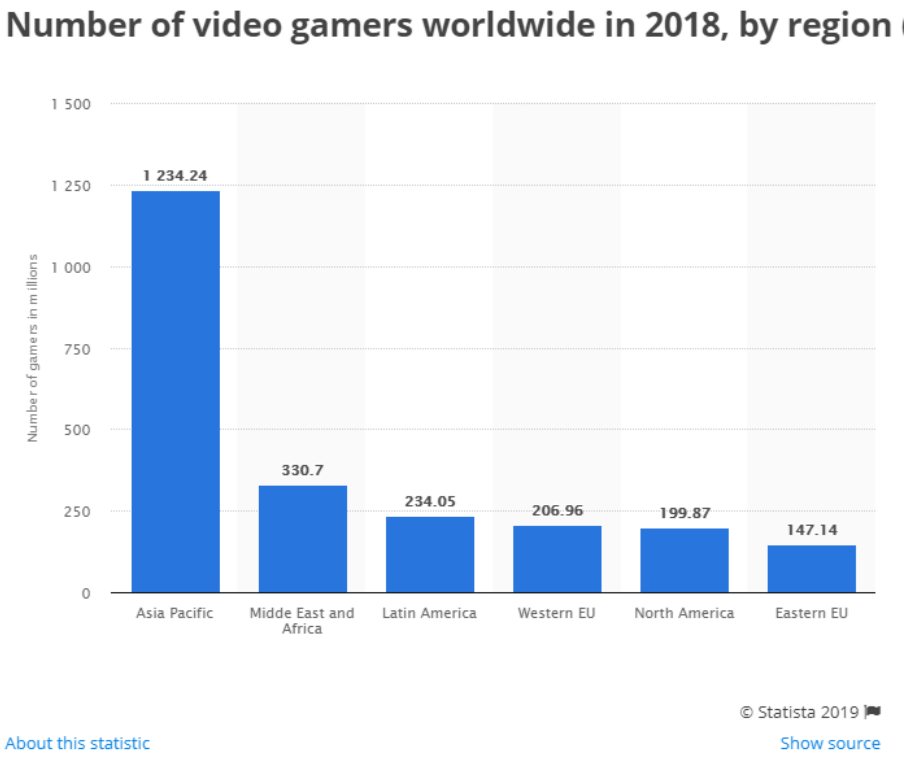

Figure 25NUMBER OF VIDEO GAMES WORLDWIDE 2018

Source: Statista, 2019https://www.statista.com/markets/

The data above shows that the highest number of video game players are in the Asia Pacific region, and the lowest in eastern Europe, or 8.4 times more. The number of video game players in the Pacific part of Asia is higher than the total number of video games in other regions of the world. The regions of Europe and North America are lagging behind in the number of gamers over other regions of the world: Latin America, the Middle East and Africa, and especially Asia Pacific.

Out of those 2.2 billion gamers, **1.2 billion of those who play games are playing games on a PC.**

League of Legends is one of the most popular PC video games in the world. Every single day there are 27 million people, on average, playing League of Legends, every month there are 67 million players. Titles like PlayerUnknown's Battlegrounds, which is a game that can be played on either a computer, the Xbox, or a mobile device, have a significantly higher daily active user number – 87 million,.

When taken into consideration that these are just single games and that on Steam there are 10,000+ games alone, it goes to show just how many gamers there are out there and how wide-reaching the audience is.

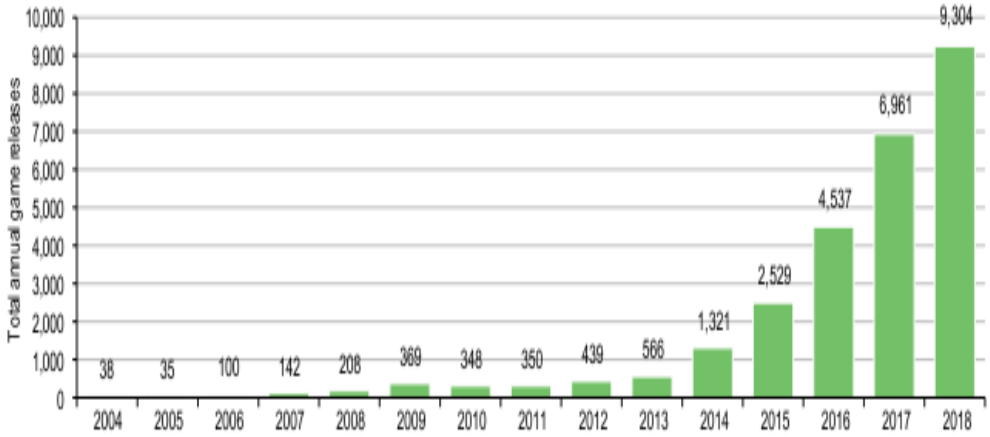

Figure 26NUMBER OF GAMES RELEASED ON STEAM

Source: Statista, 2019,https://www.statista.com/topics/4282/steam/

The Figure above shows the total annual game releases of the Steam platform games. From 2004 to 2014 continuous slight increase is noticeable, an intensive and significant increase in the total annual editions is evident from 2014 to 2018. Namely, the number of total annual releases for video games in 2018 increased by 7 times compared to that number in 2014, and by 245 times compared to 2004. If the time series analysis models are applied, it will be noticed that this trend data represented by this time series, are best presented with the curvilinear or parabolic cubic trend.The very high value of the coefficient of determination of 0.995 gives the right to use the equation square trend to forecast future periods. If the evolving tendency of total annual video game releases behaves as a cubic trend then the total number of annual video game releases is expected to be 12911 by 2019 and by 2020 that number will be 17130.

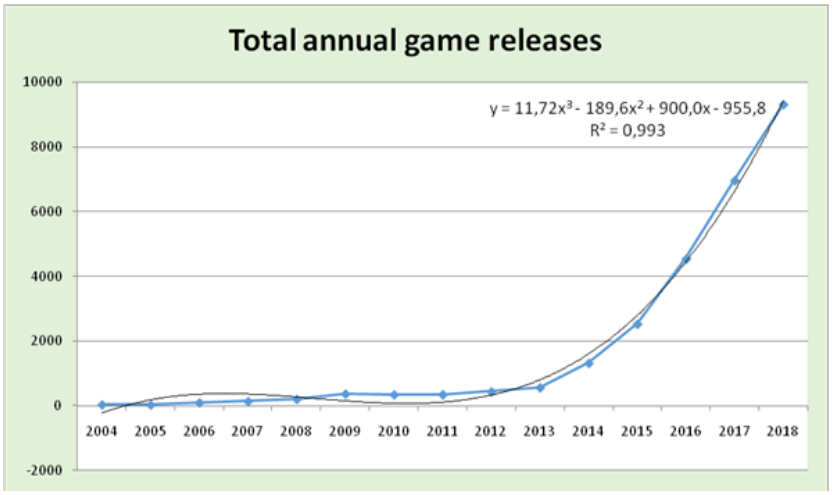

Figure 27TOTAL GAME RELEASES IN STEAM (polynominal trend, order 3)

The demand is growing and at the same pace the offer of the video games that can be easily downloaded is raising, nevertheless the download is for certain price or for free.

There is a pool of research organizations that are trying the define the behavior of the contemporary player, such report is the *State of Online Gaming 2018* market research report that highlights the latest findings in an ongoing series of consumer surveys about online activities and perceptions.[46]

This report was based on responses from 3,000 consumers age 18 and older in France, Germany, Japan, South Korea, the United Kingdom, and the United States who play video games at least once a week.Respondents were asked questions on a variety of topics to determine the types of games and how often they play, the devices they use, how they access content, and what they think is important for a successful gaming experience. Highlights of this report include:

- People who play video games spend an average of nearly six hours each week playing. Gamers 18-25 spend the most time, at **more than seven hours each week**.
- Globally, gamers spend **more time playing on mobile phones than on computers**, tablets, or gaming consoles. However, men and people older than 45 spend more time playing on desktop or laptop computers than any other device.

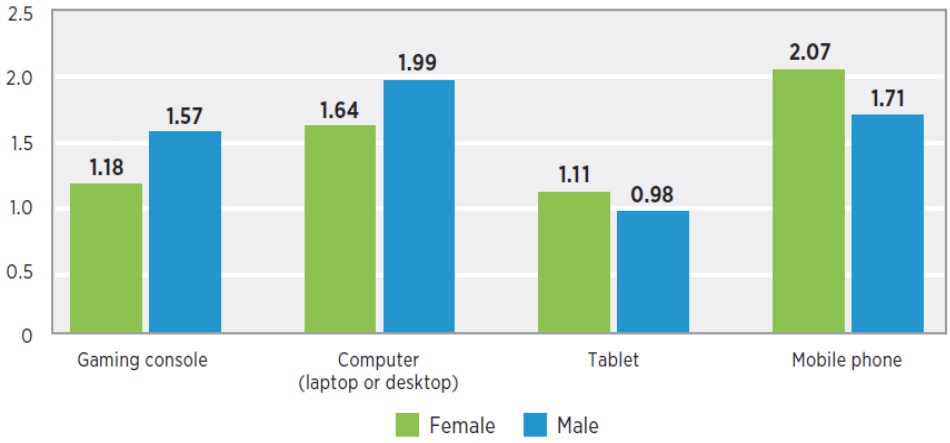

Figure 28PLAYING TIME ON DIFFERENT DEVICES

Source: The State of Online Gaming, 2018

[46]https://www.limelight.com/resources/white-paper/state-of-online-gaming-2018/

https://www.limelight.com/resources/white-paper/state-of-online-gaming-2019/

- Nearly 85 percent of gamers **download free games multiple times** each year. However, only 55 percent are willing to pay to download games.
- Gamers spend an average of one hour and 48 minutes each week **watching other gamers play online on sites such as Twitch.** This compares to two hours and 27 minutes spent watching traditional sports on broadcast television.Millennial gamers (age 18-35) spend more time watching other people play video games than they spend watching traditional sports on television, while younger gamers (age 18-25) spend almost an hour more each week watching online gaming than watching traditional sports.
- Gamers are concerned about **online security**. More than half will not continue to make purchases or play games on a website that has previously suffered a security breach.
- Fast performance is more important to gamers than a game being simple to play, having an interesting storyline, or being available offline.
- Consumers prefer downloading video games rather than purchasing physical copies
- Gamers play casual single-player games such as Candy Crush or Angry Birds more often than other types of games.

Country	Casual Single-Player games (like Candy Crush or Angry Birds)	Casual Multi-Player games (like Words With Friends)	First-Person Shooter games (like Call of Duty)	Single-Player Role-play games (like The Elder Scrolls)	Massive Multiplayer Online games (like World of Warcraft or League of Legends)
France	2.43	0.90	1.18	1.10	0.90
Germany	1.78	0.78	1.07	1.11	0.98
Japan	1.25	0.81	1.07	1.46	0.97
South Korea	1.74	1.33	1.51	1.47	1.66
U.K.	2.06	1.10	1.37	1.23	0.94
U.S.	2.39	1.28	1.20	1.05	0.90
Global	**1.94**	**1.03**	**1.23**	**1.24**	**1.06**

Figure 29PLAYING TIME WITH DIFFERENT GENRE

Source: The State of Online Gaming, 2018

https://www.limelight.com/resources/white-paper/state-of-online-gaming-2019/

The figure above shows the popularity of different game genres in 6 countries from different parts of the world, as part of a global survey of gamers and how much time they spend playing each type of game on a scale of 0-4, where 0 indicates that they never play that type of game and 4 indicates that they are playing most of the time. It can be seen that in all 6 countries the answers prevail that players mostly play regular games such as Candy Crush or Angry Birds. Those games are mostly played in France and the United States. Casual multi-player games (like Words With Friends) are mostly played in the U.S., South Korea and the U.K. First-person shooter games (like Call of Duty) are mostly played in South Korea and the UK, single-player role-playing games (like The Elder Scrolls) are mostly played in South Korea and Japan, and Massive Multiplayer Online games (like World of Warcraft or League of Legends) are mostly played in South Korea, Germany and Japan.

These facts can be guidelines for increased number of new studios or indie teams to learn the preferences of the gamers and create adequate product. The current state in RNM is that the studios are starting with their own ideas for product, creativity and abilities driven without conducting research that is needed for the global market.

Increased income

The income in the video gaming industry is growing and new streams of revenues are opening, since video games are services.

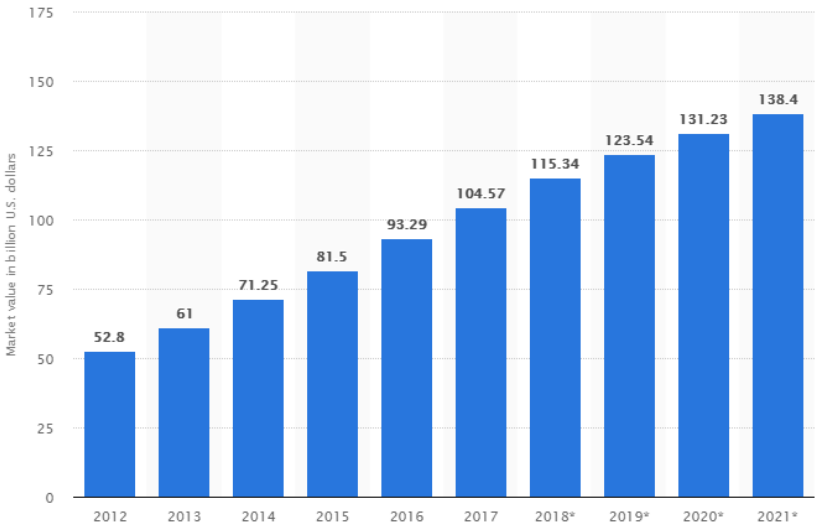

Figure 30VALUE OF THE GLOBAL VIDEO GAMES MARKET FROM 2012 TO 2021 (IN BILLION U.S. DOLLARS)

Source Statista, 2019https://www.statista.com/statistics/246888/value-of-the-global-video-game-market/

The Figure above shows a significant and continuous increase in the value of the global video game market over the time period. Namely, from 2012 to 2021 the value of the global market expressed in billions of US dollars is expected to increase by 2.6 times.
If we analyze this time series, it can be concluded that these data are best approximated by the linear trend with a high coefficient of determination of 0.995 (See Figure 21a). In addition, the value of the global video game market is growing by an average of US $ 9,922 billion each year over a defined period of time. Assuming the data for this time series will behave as the assumed trend is expected, the projected value of the global video game market in 2022 will be US $ 151,722 billion.

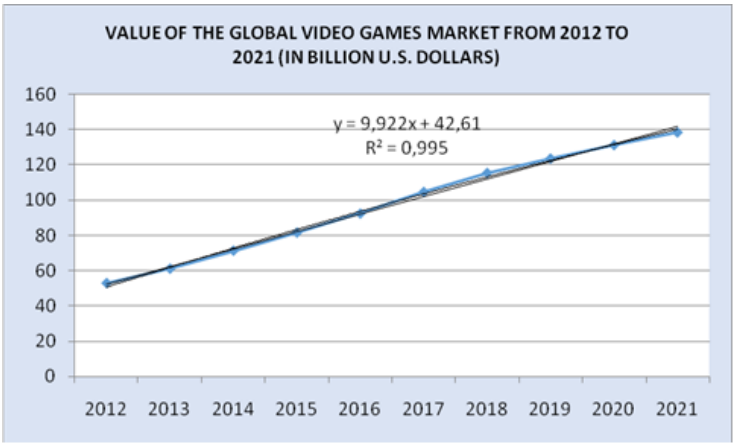

Figure 31 a VALUE OF THE GLOBAL VIDEO GAMES MARKET FROM 2012 TO 2021 (IN BILLION U.S. DOLLARS) (linear trend)

New trends in video game industry

Innovative technologies contribute to the business growth of the video games industry, a huge transformation comes from a product-oriented business to an as-a-service model. At the same time, new technologies like 5G, cloud, and virtual reality will usher in a new phase of innovation, while new business models like support for in-game micropayments are already changing the economics of gaming. Games are shifting towards the free-to-play with optional in-game purchases, in part due to the success of games like "Fortnite."

Streaming games, also called cloud gaming, will grow in the future. Sony recently shared that its game streaming subscription service, PlayStation Now has increased in popularity and led to increased revenue for the company in the past year. Other companies, including Microsoft, are already developing their own cloud gaming platforms.

Cloud gaming is evolving into a global phenomenon. Major games companies are racing to become the Netflix of games, driven by rapidly increasing viewership on existing streaming channels. Network limitations do seem to be a concern for consumers, currently, as a slow connection could hamper the gaming experience. For example, PlayStation Now began offering a download service for its games so playtime per user increased.[47]

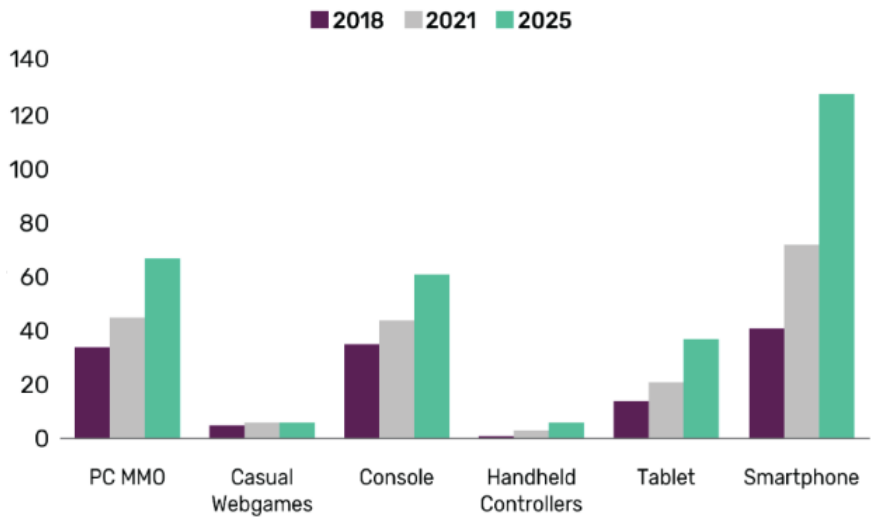

Figure 32GLOBAL VIDEO GAMES MARKET REVENUE BY GAME TYPE

Source: Global data thematic research, https://variety.com/2019/gaming/news/video-games-300-billion-industry-2025-report-1203202672/

The video games and the business interaction are an unpredictable, multidimensional procedure considering a definitive objective of the business. It must be noted that diverse organizations give different prognoses of expected income mostly identified with the distinctions in the enterprises, to which video games is connected.

Different income springs

[47]https://variety.com/2019/gaming/news/video-games-300-billion-industry-2025-report-1203202672/

The potential of the video game industry is evident also from the model of different sources of income. In the table, sources of income in video games are constrained to these sorts, while in practice their range is a lot bigger. The biggest scope of income in the video games business is creating and publishing games as well as organizing competitions. The primary profits from video games are from PC makers since they finance world-class titleswhere they support them. Customary business representatives are effectively coordinating the electronic games showcase as competition support. A lot of video games financing is provided by purchaser products makers with brands, including Coca-Cola, Red Bull, Visa, Audi, and Gillette.

Activity stage	**Actors**	**Sources of income**	**Sources of income in RNM**
Development and distribution	Computer game developers	Sale of computer games	yes
	Organizers of network computer games	Institutional fees for network access; Technical support fee	yes
Cyber-athletic training	Sportsmen	Own funds of athletes; State support	
		Private fund grants; Donation of patrons; Sponsorship	yes
	Player clubs	Membership fees	
	Player schools	State financing; Sponsorship; Sportsmen membership fees	
Video games promotion	Game developers	Sales additional components	
		Additional game content	

	Film companies	Sale and rental of movies / cartoons based on popular games	
	Gamer clubs	Festival members' fee	yes
	Internet providers	Additional services to progamers in social media	
	Conference organizers	Registration fees	yes
Conducting cyber tournament	Team owners	Sportsmen transfer	
		Reward for the right to use team symbols	
		Fee for the rights of athletes' photo and video	
	Sportsmen	Sports competition prize fund; Sportsmen transfer	Yes, since 2018
		State support; Patron donation Sponsorship	
		Deductions from the established goods sale	
	Investors	Investment projects sale; Fee for video games stadiums	
	Sponsors	Additional sale of consumer goods Tax advantages	
	Media sponsors	Means for tournament promotion and for	Yes, gg.mk Other media

		PR	
	Manufacturers	Sale of goods with sporting attributes; Souvenirs sale	
	Tournament organizers	Sponsorship	
		Proceeds from advertisement and merchandising; Patron donation	
		State support	
		Sportsmen registration fees	
		Sale of tickets and season passes; Broadcast rights sale	
		Sale of competition records; Additional services for funs; Revenue from lotteries	
	Book-makers	Income from betting and forecasts	

Table 11SOURCES OF INCOME ACCORDING TO COMMERCIAL ACTIVITY STAGES IN VIDEO GAMES

Source: Own marking based on resources from the Interactive Software Federation of Europe

The table 9 points out there are sources like development and publishing games, organizing conferences and tournament in a small range adopted in the Republic of Macedonia, while the other mentioned sources are unused sources of income.

The structure of revenue sources in games and in video games as indicated, shows a huge undiscovered potential for further development in incomes in video games from the tickets to rivalries, the acknowledgment of broadcasting rights and promoting. The most effective representatives have acknowledged such chances to acquire huge benefits and now they are building arenas for digital games.

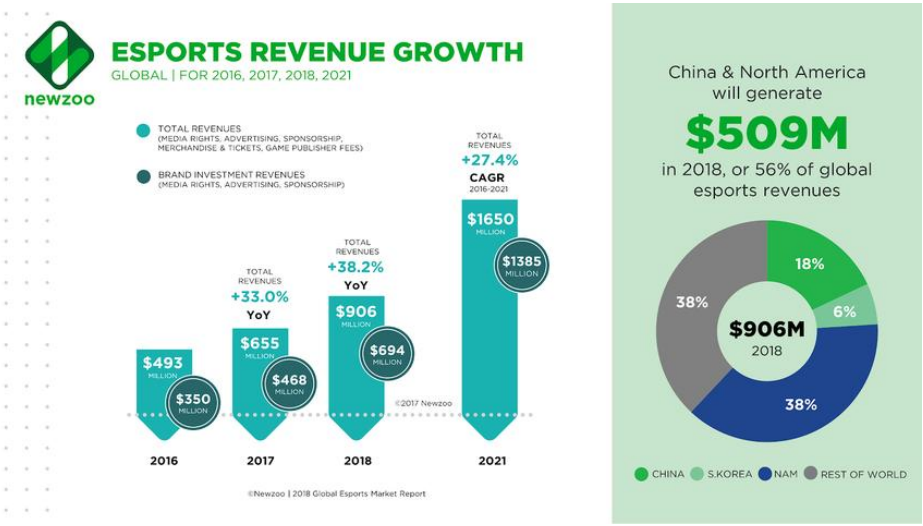

Figure 33aESPORT REVENUE

Source:https://www.weforum.org/agenda/2018/07/the-explosive-growth-of-esports/

In 2018, the eSports industryis projected to generate $905 million in revenue, China ans North America are leaders. The comparison of the e sport with the video games revenues accosding the activities is given below in the Table 10.

Activities	**Share in revenue %**	
	Sports (2018)	**video games (2018)**
Sponsored and promotional income	31	74
Sale of tickets	31	4
Realization of broadcast rights	24	*
Merchandising (use of sports symbols for goods promotion)	14	2
Prize fund	*	9
Betting (bets) and fantasy sites (fan clubs)	*	7
Amateur competitions	*	4
Total	100	100

Table 12STRUCTURE OF REVENUES IN E-SPORTS AND VIDEO GAMES

Source: The Interactive Software Federation of Europe

The video games major source of 74% are the downloading and sales activities of the games, while the e-sport have balance of the promotional income and sales of the tickets both with 31%. This is the reflection of the potential connected to the video game industry and other options that are opening for widening the business activities.

In the video game industry in Republic of North Macedonia the revenues are generated from only one source e.i downloading the game P2P, all other options are not used and are great potential for the studios. The same situation is with the e-sport, with only one individual example and in 2018 turmament for playing video games.

Game developers potential

The key factor in creating video games are the game developers, they are major cost in the investment and driver of the revenue. The comparative analises is used for evaluation of the potential for game developers in Republic of North Macedonia. The method is used due to the small base of such professionals and because video gaming industry is at begging of development, without a sufficient mass of successful examples to be followed or to be used for solving problems in the development.

Globally, the primery analyses of the game developers is used, that is performed on The Game Developers Conference with survey of 4,000 game developers. It is a part of the seventh annual State of the Industry Survey, which provides a snapshot of the game industry and highlights industry trends ahead. This survey is applied to Republic of North Macedonia studios with only several questions that are relevant for snapshot of their situation and compared to the global one.[48]

(44 percent) spend more than 40 hours a week, on average, working on games. The most common workweek proved to be 36-40 hours per week, with 24 percent of respondents saying that was their average. 21 percent of respondents said they worked on games 41-45 hours per week on average and 17 percent said they averaged 0-20 hours per week on games. Notably, 3 percent of respondents said they average over 60 hours of work per week on games, and 5 percent said they average 51-60 hours.

[48]https://artillry.co/wp-content/uploads/2019/01/GDC-State-of-the-Gaming-Industry-2019.pdf

The same question was given to the Republic of North Macedonia developers; the situation is that 2 studious (20%) work 40 hours per week, that equals to the global trend. The rest 80% of the studious work 20 hours per week on the game, and that is 62 % more than the global present. The last shows that gaming studious work on other projects to provide sustainability.

Steam is the store to publish PC games, some developerss thrive on smaller competitors given how many notable new game store fronts are published in 2018 (such as the Epic Games Store and Discord Store), the survey respondents answer on which PC/Mac game storefronts they sell their games on, and what percentage of their sales came from each. As you might expect, the most popular answer was Steam, with roughly 47 percent of those who responded saying they sell games on Valve's storefront. Selling directly to customers (via your own website, for example) was the second most popular answer with 26 percent, followed by Itch and publisher-owned storefronts (like Electronic Arts' Origin or Battle.net) with 18 percent.

Out of 6 studious in Republic of North Macedonia, 90% posted their games on Steam, and they consider this platform as most suitable market to sell their video games. Only one studio 10% had three channels of distribution. Even in their next projects, they plan to continue selling games on Steam.

Compared to the global trend macedonian studious have 43% more published on steam, regading the other Ps/Mac stores dta are uncomplite.

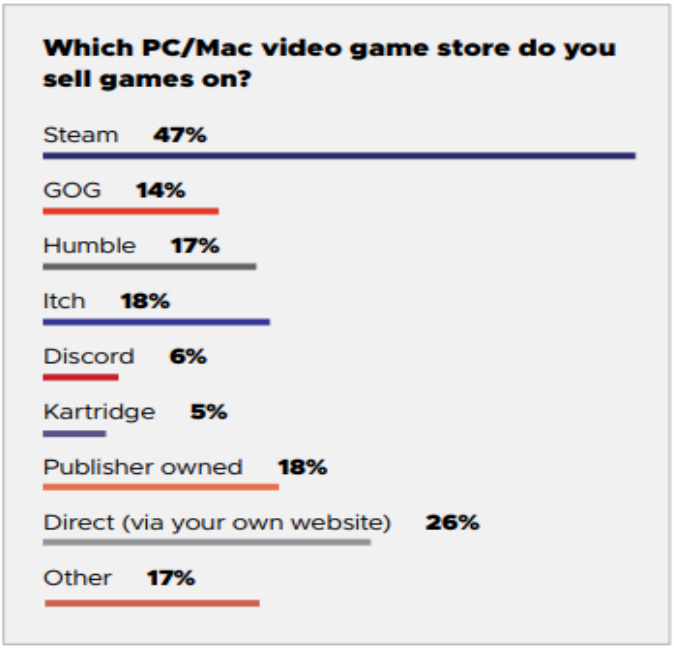

Figure 34PC/MAC VIDEO GMAE STORE

Source: The 2019 State of the Industry Survey, Informa Tech https://tech.informa.com/

Most respondents have been making games for less than a decade, how long they've been making games, and the largest share of those polled -- 33 percent -- said 3-6 years. 18 percent said they'd been making games for 7-10 years, and 13 percent said they'd only been making games for 1-2 years. By comparison, another 13 percent said they'd been making games for 11-15 years, and 8 percent said they'd been at it for 16-20 years. Most impressive of all, 7 percent of respondents said they've been making games for over 20 years!

The situation in Republic of North Macedonia can be seen from the table with the mapped studios and their year of founding, they are in a range 1-2, 3-6 and 7-10 years, because the gaming industry in Republic of North Macedonia is in the beginning stage, the first studios were open 2011, 2015, 2017 and 2018. Some of the indie studious are not formally registered yet but they produce games and publish them on Steam.

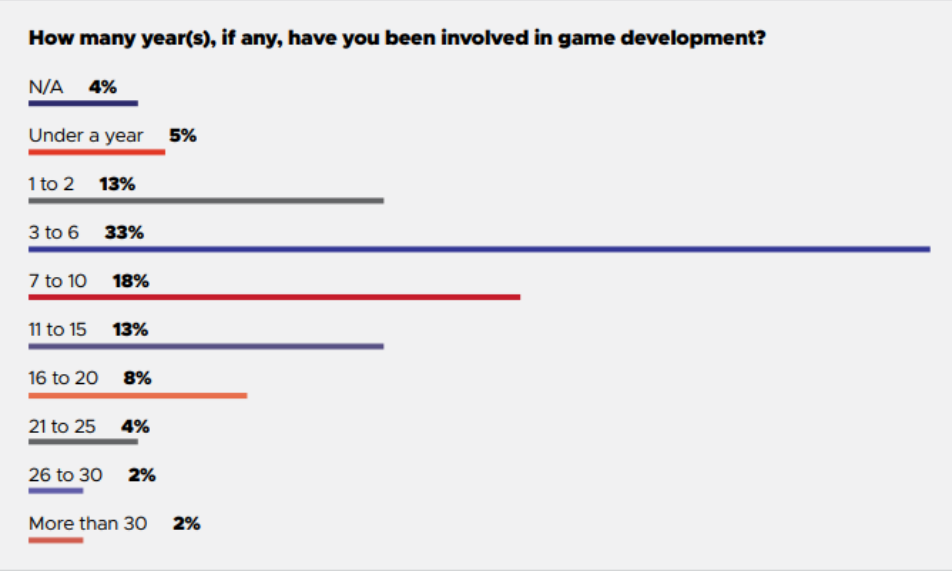

Figure 35YEARS INVOLVED IN GAME DEVELOPMENT

Source: The 2019 State of the Industry Survey, Informa Tech https://tech.informa.com/

Survey results over the past three years have shown nearly the exact same curve, suggesting the game industry (or at least, the portion served by our survey) has a semi-permanent predilection for young talent. In last year's survey, for example, 32 percent said they'd been making games for 3-6 years, 17 percent said they'd been making games for 7-10 years, and 14 percent said 1-2 years.

How many people work at the company? The answer was “Over 500” (19 percent), followed by “Myself only” (19 percent) and “2 to 5” (15 percent). That’s basically the same split we saw in last year’s survey results, cementing our understanding of the industry as a space where small teams can compete effectively with gigantic companies.

Studios in Republic of North Macedonia can be categorized in two major groups:

- foreign capital in a range of 21-50 and 51-100 employees
- domestic capital in a range for 1, to 20 max employees

So these small studios are competing with big companies, the size of the market and the growing trend enable options for slam studios as well.

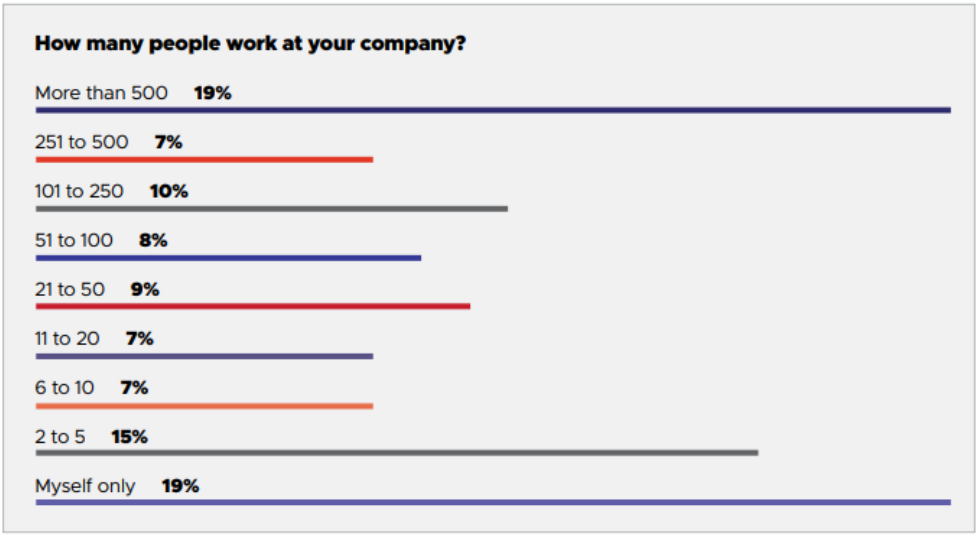

Figure 36NUMBER OF EMPLOYEES IN THE COMPANY

Source: The 2019 State of the Industry Survey, Informa Tech https://tech.informa.com/

PC and mobile are still the top platforms among devs, but PC’s lead is gaining When asked what platform their last game was released on, 56 percent of those surveyed said PC, 33 percent said smartphone/tablet, 24 percent said PlayStation 4 or 4 Pro, and 20 percent said Xbox One or Xbox One X. All the studios in RNM are PS oriented with their published games; eventually they would consider adopting the game for console.

When asked what platforms they’re currently making games for, two thirds of respondents (66 percent) said PC, 38 percent said smartphone/tablet, 31 percent said PlayStation 4/PlayStation 4 Pro, and 28 percent said Xbox One/Xbox One X.

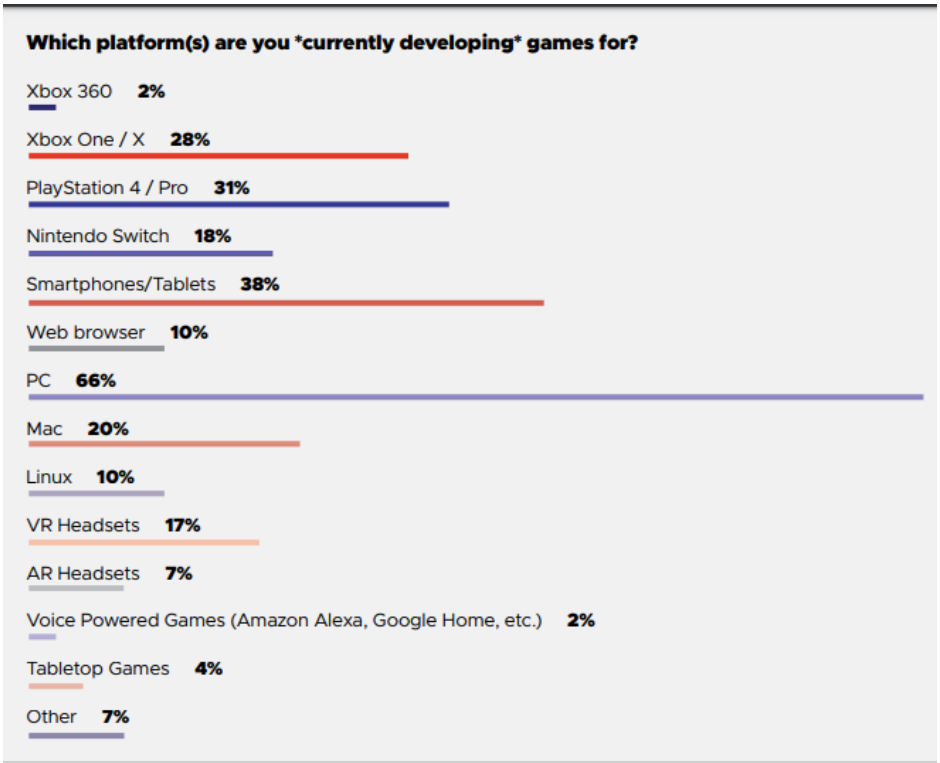

Figure 37PLATFORMS FOR DEVELOPING CURRENT GAMES

Source: The 2019 State of the Industry Survey, Informa Tech https://tech.informa.com/

The game makers we surveyed seem to be pretty bullish on the future of augmented reality, as one in three (34 percent) said "AR" when asked whether they believe AR or VR will be the dominant 'immersive reality' technology in five years' time.

This question is valid only for Kamai media because their game is based on AR, that is a growing trend and according to that, their expectations are high.

Intriguingly, 20 percent said they think AR and VR will be equally dominant in five years, while 19 percent throw in with VR and 18 percent figure neither will be important in half a decade

A quarter of game makers are working with a publisher on their next game How are today's game makers getting the word out about their work? Our survey results suggest mostly on their own, even if they don't have any marketing teams in-house. When we asked them to tell us which service(s) they're using to launch their next game, 37 percent said they do marketing work themselves (in addition to developing games) and 34 percent said they use full- or part-time internal marketing staff they pay themselves.

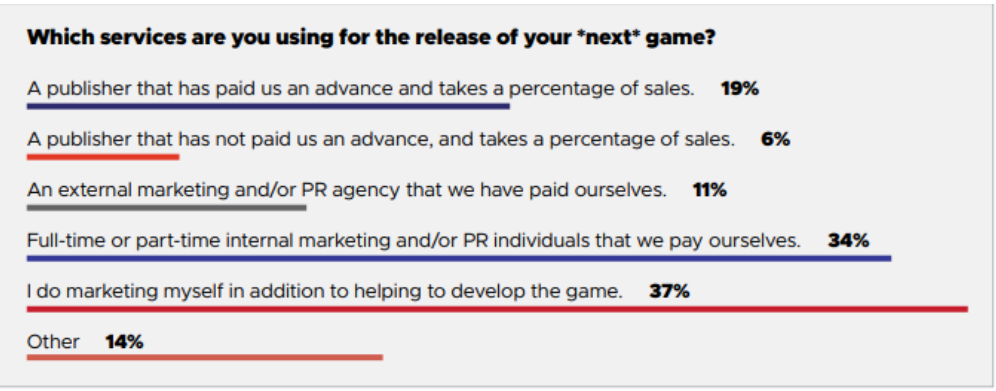

Figure 38TYPE OF SERVICES FOR GAME RELIASE

Source: The 2019 State of the Industry Survey, Informa Tech https://tech.informa.com/

More notably, 19 percent say they use a publisher who pays an advance and takes a cut of sales, while 6 percent said they use a publisher who hasn't paid an advance and will take a cut of earnings. 11 percent said they use an external marketing agency, and 14 percent said they use other means. We note that only one in four respondents are working with a publisher, a slight uptick over last year but still quite a low number compared to the game industry before the prevalence of self-publishing.

The situation in RNM is that studio Tesseract published with publisher (10%), the rest of the studios (90%) published by themselves and are doing their marketing staff that is actually one of the weaknesses of the video game industry. They do not have resources to invest in marketing; they send their idea to major platforms and hope that some editor will publish it.

Most game makers are still self-funded, and interest in crowdfunding is low. As in years past, most of the game makers surveyed rely on company or personal funds to pay for their work, rather than outside investments or crowdfunding.

When asked where their funding comes from, 51 percent of respondents said their company's existing funds and 33 percent said their own pockets. 17 percent said at least some of their funding comes from an external publisher, while the smallest slice (3 percent) of respondents said they get at least some of their funding from pre-release alpha sales on platforms like Steam's Early Access. We saw very similar results last year when we asked the same question, suggesting that big companies maintain a steady foothold in the industry even as one in three devs ends up putting at least some of their own money into their work.

PR

Social media is the #1 way for most game makers to get the word out about their games To get a better sense of how game makers are selling their games, we once again asked survey respondents to tell us what promotional methods they invested in most to help their last completed game get discovered. The most popular answer once again proved to be "Social Media" with 73 percent of respondents saying they'd use it to promote their last game and nearly half of those that did (43 percent) saying it was what they invested the most time into. Word of mouth proved to be the second most popular avenue to invest in with 72 percent, while 65 percent of respondents invested in YouTube videos and 58 percent said they'd invested time or money in promotion on a publisher's storefront. However, on average respondents tended to rank their investment in these promotional avenues lower than they did in social media.

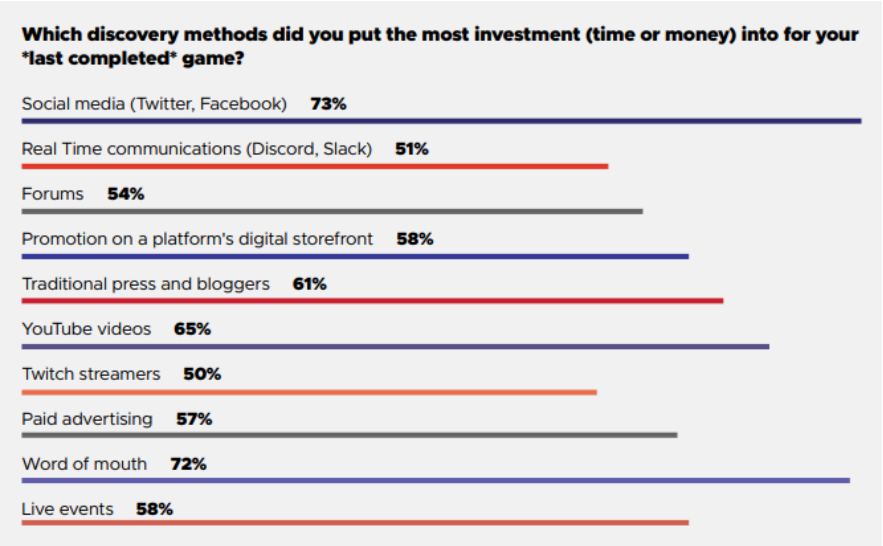

Figure 39INVESTEMNT IN PR&MARKETING

Source: The 2019 State of the Industry Survey, Informa Tech https://tech.informa.com/

Social media was seen to be the most winning investment, with 68 percent saying social media was effective and the largest share (38 percent) of them saying it was their most effective discovery method overall. 66 percent said word of mouth had proven effective, 58 percent said YouTube videos had proven worthwhile, and 55 percent said promotion by a platform-holder proved effective. All macedonian studious used social media, traditional press, you tube videos, word of moutn and life events.

Employment in the video game industry

Working in the computer game industry is beyond a "hazardous" profession. The industry creates $10.5 billion income every year and the employees such amusement planner or artist make about $74,000 yearly, while software engineers get $93,000. The extra benefit is the opportunity be paid to “play” computer games at work. This industry employees around 700.000 people worldwide.

In RNM Macedonia around 500 employees (source the questionaries) that are involved directly of as outsoursing in the video game industry.

65% of the employees create PC games, and 35% mobile games.

The employees structure by education is as follows:

- high school: 9%
- students: 20%
- Faculty education: 60%, masters 11%
- Age: 21% on 18-24, 60% on 25-34, 19% on 35-44
- Employment opportunities: 79% within a company, 21% as freelancers.

Having an occupation in the video game business appears like carrying on with the high life. A steady profession in gaming is to a great extent a one extreme or another, presence in the studio — not really for the income as far as for the creation. The "feast" some portion of the gaming business incorporates a famous "crunch." That is the point at which the entertainment is developing and the businesspersons are working lot of hours to take care of business.

Potential for video game development in the Republic of North Macedonia

Younger generations are accepting world trends and they are the future gamers or developers. The table below presents the availability of internet, information and communication technologies in households as a precondition for having more game developers.

				age groups				
year	Households with broadband Internet connection %	Individuals regularly using the Internet individuals aged 16 to 74 in %	Internet use for playing or downloading games in %	15-24	25-54	55-74	Online purchases by individuals in %	Online purchases of video games %
2007	7	12						
2008	23	26						
2009	34	40						
2010	37	45						
2011	42	54						
2012	58	54						
2013	65	62						
2014	68	65						
2015	69	69						
2016	75	75	27					
2017	74	76						
2018	79	81	22	44	23	4	25	3

Table 13USAGE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN HOUSEHOLDS, IN %

Source: The State Statistics, 2018

Table 12 shows the time series data on the percentage of households with a broadband connection, as well as the percentage of individuals who regularly use the Internet (persons aged 16 to 74 years). There is a continuous increase in the share of households with broadband internet connection, more than 11 times in 2018 compared to 2007. Also, there is a noticeable increase in the percentage of individuals who regularly use the Internet (persons aged 16 to 74) almost 7 times in 2018 compared to 2007. It is an increase in the potential basis for the use and development of video games.

If a proper analysis of these time series is applied and if the best trend is selected on the basis of which this percentage is forecasted, the following graphs are obtained:

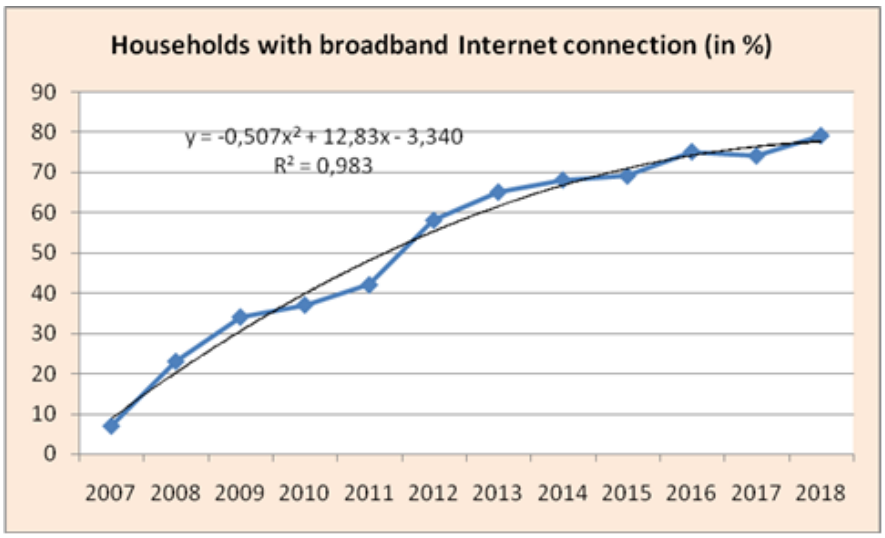

Figure 40HOUSEHOLD WITH BROADBAND INTERNET CONNECTION (IN%)

From Figure it can be seen that the percentage share of households from 2007 to 2013 is increasing intensively and continuously and from 2013 to 2017 the increase doesnot have the same intensity and there is a decrease of that percentage from 2017 compared to 2016 year. The empirical data concerning the percentage share of households with broadband internet connection best approximates the parabolic square trend with significant value of the coefficient of determination that entitles us to make an appropriate valid forecast of this percentage share in the coming period. That percentage share would be around 78%.

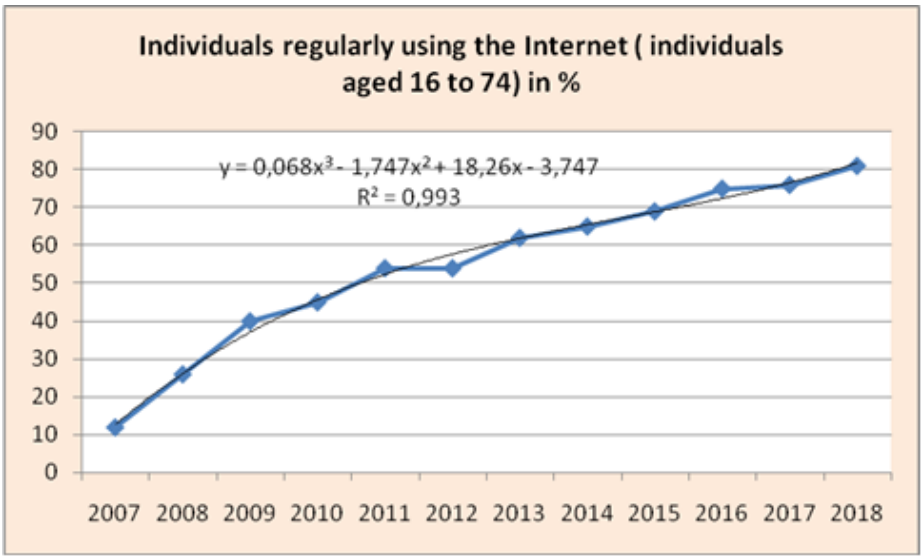

Figure 41Individuals regulary using the Internet (individuals aged 16 to 74) in %

From Figure 2 it can be seen that this percentage share of individuals who regulary use the Internet (persons aged 16 to 74) from 2007 to 2018 has been increasing steadily and

continuously. There is stagnation in 2012 compared to 2011. The empirical data on individuals who regularly use the Internet (persons aged 16 to 74) best approximates the parabolic cube trend with a significant value of the coefficient of determination that entitles us to make an appropriate valid forecast of this percentage share in the next time period. That percentage share would be around 88%.

The calculated correlation coefficient of these time series is quite high at 0.981849, which means that the share of households with broadband internet connection and the share of individuals who regularly use the Internet (persons aged 16 to 74 years) is very strong. correlation.

Interesting fact is that the internet users in 2018 the target group from 15-24 years are using internet for playing or downloading games 43,9 % and the age group from 25-54 is using the 23,4% of internet for downloading or playing games.

100	**Ordered via Internet in the last 12 months** **Good/services ordered via Internet in the last 12 months:**
10,1	Food or groceries
18,0	Household goods
6,8	Medicine, medication
54,9	Clothes, sports goods
6,4	Computer hardware
16,9	Electronic equipment (incl. cameras)
5,4	Telecommunication services (e.g. TV, broadband subscriptions, fixed line or mobile phone subscriptions, uploading money on prepaid phone cards, etc.)
5,2	Holiday accommodation
3,4	Other travel arrangements
4,0	Tickets for events
1,3	Film/music
6,6	Books/magazines/e-books
2,3	e-learning materials
3,2	Video games, other computer software and software upgrades
18,8	Other

Table 13GOODS/SERVICES ORDERED VIA INTERNET IN THE LAST 12 MONTHS (IN %)

Source: State Statistics, 2019

In the Republic of North Macedonia there is no customer attitude to pay for the video games. This fact is that only 3,2% are paying for video games, that is confirmed with

the interviews as well, only 100 paid downloads are from Republic of North Macedonia.[49]

HR potential for video game development

Educational system

The table below presents the IT sector in the Republic of North Macedonia, including the game developers. regarding their educational backround. Most of them are graduates from the faculties and use additional courses for further development from different sources such as private providers or on line support.

Position	formal education	number	%
Programers	high school	83	10.22
	faculty	557	68.60
	student	172	21.18
Total programers		812	100.00
Designers	high school	28	18.18
	faculty	108	70.13
	student	18	11.69
Total designers		154	100.00
	high school	111	11.49
	faculty	665	68.84
	student	190	19.67
Total IT proffecionals		966	100.00

Table 14Formal education of the IT proffecionals

Source : Own calculation based on the it.mk research

Table 2 shows the structure of formal education for different positions of IT as a potential to be incorporated in the gaming industry. It covers 812 developers, 154 designers in total 966 IT professionals. 68.6% of the programmers have higher education, 10.22% have secondary education and 21.18% are students. Among designers, 70.13% are highly educated, with 18.18 with high school and 11.69 with students. In total these two categories of IT professionals, 68.84% are high educated, 19.67% are students and 11.49% are with secondary education. This structure can be visualized in Figure 3. In all positions the most represented are IT engineers with higher

[49]Steam statistics, 2019 for Wounded

education - faculties. Satisfactory and interesting is the percentage of students enrolled in the positions as the most powerful potential for the development of the gaming industry.

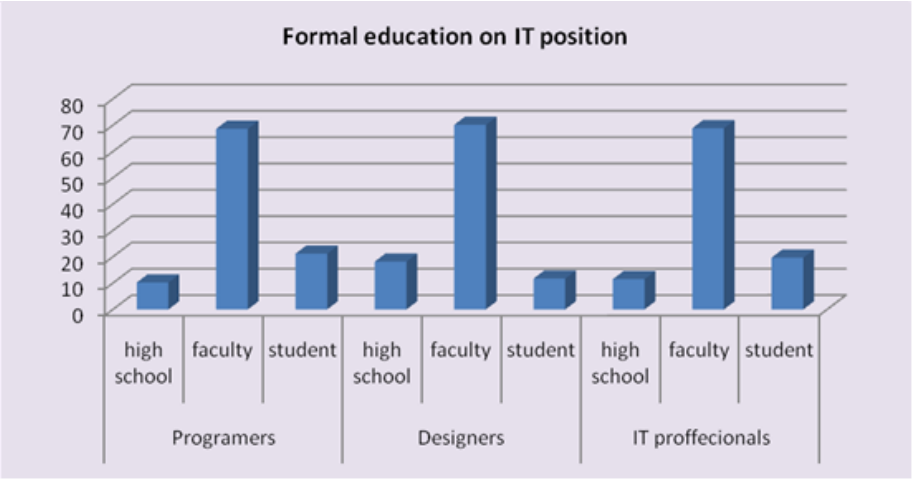

Figure 42FORMAL EDUCATION OF IT POSITIOION

In the Table below, where the number of graduated students in 2018 is presented, the data will be used in a simulation model. The focus will be on the graduated students in Skopje and Bitola where game development community exists. The total number of graduated in Skopje is 474 (more precise 384 from FINKI sand 90 from FEIT) and 26 from IT Faculty in Bitola (data from the interview) in total 500 students, to be discowered 10% as potential game developers in 2019.

Faculties	final year students	Total nub of students
Faculty of Electrical Engineering and Information Technology Skopje	90	1313
Faculty of Information Science and Computer Engineering Skopje	384	3473
Faculty of Information and Communication Technologies Bitola	20*	503
Faculty of Computer Sciences Stip	142	513
Faculty of Information Systems, Visualization, Multimedia and Animation Skopje	6	94
Faculty of Computer Science and Engineering Tetovo	4	114
	627	6010

Table 15STUDENTS ENROLED AT FACULTIES 2018/2019

Source: State statistics, 2019

Training providers for video game production in Republic of North Macedonia

There are options for education for game development, besides the formal education on the IT faculties and ESRA in Republic of North Macedonia. In this topic, the most relevant are presented due to the fact they offer specialized video gaming courses and have relevant experience in the industry.

Position	Local providers of education	online paid tutorials	Practice in the company	selflearning	num of inteviewed
Programers	77	58	111	291	537
participation in%	14,34	10,80	20,67	54,19	100,00
Deginers	29	8	18	73	128
participation in%	22,66	6,25	14,06	57,03	100,00
Total	106	66	129	364	665
participation in%	15,94	9,92	19,40	54,74	100,00

Table 16UNFORMAL EDUCATION OF IT PROFECIONALS

Table presents that programmers as well as designers carry out most of their aditional education activities through selflearning with 54.19% or 57.03%, respectively, and least of all options on online paid tutorials (See also Figure 2). Programmers, unlike designers, are more committed to online paid tutorials and practice in the company while designers are more committed to local providers of education and selflearning activities (See Table 1. and Figure 2.).

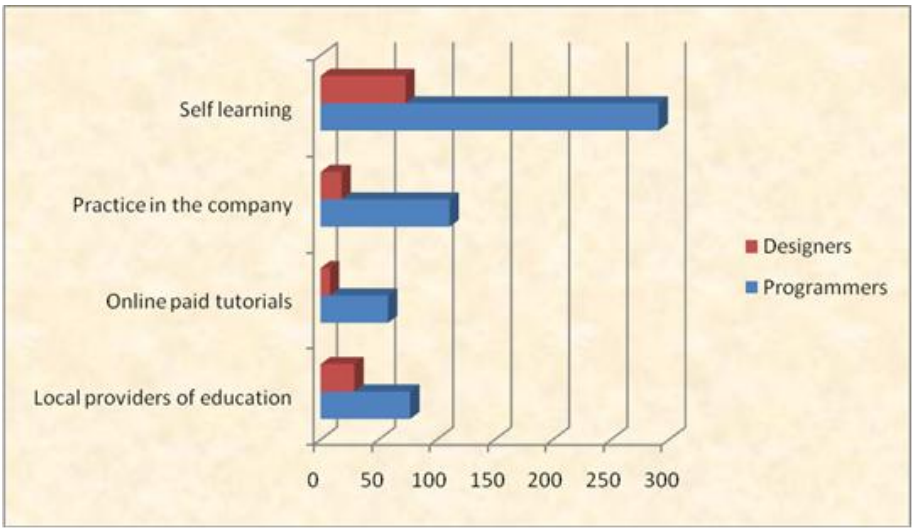

Figure 43UNFORMAL EDUCATION OF IT PROFECIONALS

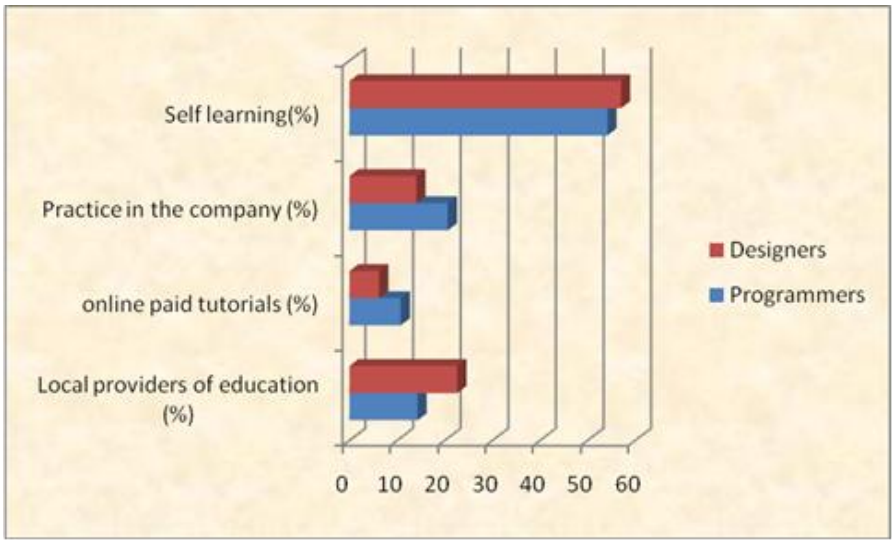

Figure 44UNFORMAL EDUCATION OF IT PROFECIONALS IN%

According the data there are 2 two most known centers of local providers:

Seavus Education & Development Center (SEDC) is a private company established in September 2010 as part of the Seavus Group and a specialized training center for education of staff in the fields of programming, design, computer networks and software testing. Its rich portfolio of educational programs includes organization of annual academies intended for children, young people and adults, specialized trainings for employees and short trainings for individuals. Its educational program provides proof that ‘’SEDC’’ follows the world’s trends by responding to the growing demand for professionals in the IT and the design industry. Since 2018, ‘’SEDC’’ is the largest Academy for technology and design in Macedonia earning the trust of over 250 students, annually.[50]

In 2019, within the educational center, one of the three Accelerators supported by the Innovation and Development Fund which aims to stimulate the entrepreneurship in Macedonia, through support and investment in new startup businesses, is also opened.

Their program offers: 3D GAME DESIGNER

Academy for Game Design combines technical knowledge and artistic skill to produce a portfolio in line with game design industry. Students will learn to design characters and its environments, 3-D image rendering, character development and animation. During the game project, Game Design students create innovative and original games and learn about :

[50] Seavus, https://www.sedc.mk/about-us/

- Creativity
- Game Design Theory
- Drawing
- Texture Creation Using Adobe Photoshop CC
- Beginning Game Programming (Unity 3D)
- 3-D Modeling and Sculpturing (Autodesk Maya)
- Project I
- Introduction to Game Industry
- Introduction to 3D Animation (Autodesk Maya)
- Project II
- Rigging for Animation and Games (Autodesk Maya)

Academy for Design	Game Designer	18 Students	2.550 €

Figure 45AKADEMY OF DESIGN SEAVUS

Source: https://www.sedc.mk/

Up to 2018, there are 10 students per year successfully finalizing the courses or around 40 game design developers are produces since 2015.[51]

The other wellknown provider is**Semos Education Skopje**, they are developing a wide range of courses designed for various end users with a different level of computer technology knowledge. Semos Education develops a system of computer education, as an informal education which elevates the rank of the computer education and it is coordinating and organizing a system of knowledge certification, regarding the international certification system. The fast and efficient use of data is the key of project success in every industry that deals with technical drawings and plans. Three-dimensional modeling, rendering and animation are perfect for 3D designers.

Courses	Number of classes	Price with discount
AutoCAD 2D & AutoCAD 3D & 3DS Max + 2 ACU Exams	120	36.975 MKD

[51]interview with Vesna Ivanoska, CEO of Seavus educational center

Courses	Number of classes	Price with discount
AutoCAD 2D & Revit Architecture & 3DS Max + 3 ACU Exams	120	36.250 MKD
Maya & Adobe CC: Photoshop & After Effects + 2 ACA & 1 ACU Exams	100	34.850 MKD

Figure 46OFFER OF DIFFERENT COURCES FOR GAME DEVELOPMENT

Source:http://www.semosedu.com.mk/Home_page/Education.aspx

UNITY COURSES

Unity is the creator of the world's most widely used real-time 3D creative platform, powering rich, interactive 2D, 3D, VR, and AR experiences. More than 60% of all AR/VR content is made with Unity. Each workshop features a hands-on project that teaches Unity skills as well as best practices for implementation.

Course	Classes	Price
2D Game Development	30	500 EUR
3D Game Development	30	500 EUR
Mobile Game Development	30	500 EUR
Virtual Reality	30	500 EUR

Figure 47SPECIALISED COURCES FOR GAME DEVELOPMENT

Source: http://www.semosedu.com.mk/Home_page/Education.aspx

M3ds (http://m3dsacademy.com)

The M3DS Studio was founded in 2015 by Stefan Mitrov. At the beginning this Studio aimed at becoming an Academy for 3D and game design supported by Autodesk, this establishing itself as one of the best studios on the small market. It was exactly in a one-year time that M3DS obtained itself with Autodesk Authorized Training Center Certification, and consequently reached its goal of becoming one of the most successful studios on the market with a number of more than 100 successfully realized projects. Academy for 3D and game design supported by M3DS is to put the students into operating mood, thus directing them towards upgrading their skills after the completion of the training at the Academy.

- M3DS is the first academy to offer 12 Months of education with practical education and working on real projects for 1900 Eur for the program.
- Focused on highest quality and specialisation in the 3D field.
- Learn the whole pipeline for 3D and the students have the chance to choose whether they want to become a Specialist or a Generalist.

Acceleators for companies in Republic of North Macedonia

The Innnovation fund has financed 3 accelerators in Republic of North Macedonia:[52]

In Seavus, macedonian start-ups for the first time will have an opportunity to access one-stop-shop services in the initial phase of product and business development, through preparation for seed and follow-up investment support and access to foreign markets via developed network of Seavus corporate clients. The uniqueness of Seavus Accelerator is in the pure market and business rational behind the business and technology accelerator. Offering service designed to inspire, guide, coach and grow ambitious tech oriented startups and entrepreneurs. Along with its investments, Seavus Accelerator offers an intensive 6+6 weeks' mentorship-driven program and connect you with more than 1000 tech experts globally.Accelerator Pre-Investment program is focused to the goal of providing intense and structured learning obtaining knowledge and business skills to the entrepreneurs that will make early-stage startups ready for product launch or funding. In addition, the Accelerator provides 6+6 weeks active mentorship in the period of up to 6 months (6 weeks cohort-based and 6 weeks tailor-made for successful companies that

[52]Seavus Accelerator (https://seavusaccelerator.com)

will qualify for Seed investment). This model offers tailor-made approach to each startup that will successfully finish the program in order to make sure that the program impact will accelerate the most critical aspect of each startup accepted in the program.**One video game development studio since 2019 is developing video game in SEDC accelerator.**

Business - Technology Accelerator UKIM Doo Skopje, founded by the University "St. Cyril and Methodius "- Skopje as Lead Partner; Crimson Development Foundation Skopje; Center for Development of Entrepreneurs and Managers - FED Hub Skopje; Foundation "Prof.Dr. Dimitar Stamboliev ".

Affiliates bring the following key elements: 1) Diversity; 2) Access to knowledge and technology infrastructure; 3) Mentoring; 4) Research and development; 5) Networking and 6) Access to finance (up to 25,000 euros for initial investments and up to 75,000 euros for successive investments per start-up company).

The founding partners have exceptional national and international expertise in key areas for the development of a successful and sustainable business-technology accelerator: the development of fundamental and applied research projects; development of small and medium-sized enterprises, startups and entrepreneurship; financing of enterprises and startups at an early stage; technical expertise and business skills that can be applied to users of the newly established accelerator.

The mission of the founders is Accelerator UKIM to combine academic knowledge andresearch with high business potential, with exceptional entrepreneurs. Accelerator UKIM is committed to promoting cooperation between universities and industry, technology transfer, business development and the promotion of spin-off companies.

The head office and administrative office of the Accelerator UKIM are in the premises of the technology campus of the INOCEIT Technology Transfer Center, as well as at other UKIM and CED Hub Skopje facilities, based on the type of activity. For technology development (R&D), all UKIM laboratories are available to startups participating in accelerator programs. UKIM accelerator targets potential high-growth sectors, such as (but not limited to) distributed network systems based on the concept of big data, intelligent environments, artificial intelligence, digital technologies, renewable energy/green technology, smart for the automotive industry and innovative ICT services.

Accelerator UKIM in cooperation with Ceed hab Skopje, "Ss. Cyril and Methodius University in Skopje "and the University of Applied Sciences and Arts from Lucerne, Switzerland implemented an intensive New Knowledge Sharing Program through Booster Week Developing Entrepreneurship Together. The program was intended for participants of the pre accelerator and Accelerator program at UKIM.

The Program included the interdisciplinary teams from different UKIM faculties and startups in the Accelerator Program. In the program were 13 startups with different digital solutions. Together with mentors and students from Lucerne, they developed the business model for their innovations and determined whether that business model or technology solution was appropriate to different market needs and modified and promoted it accordingly.

ARAIG Global, a Macedonian startup opens a new page in the gaming industry.The story in RN Macedonia was brought by Sweden's business partner together with the domestic partnerfounded the company in 2018. The initial strategic partner is the Canadian company IF-Tech, which has developed new technology, a global patent that can be applied to many industries, such as the military and aviation industry, medicine, but the original idea is to be applied in the gaming industry. Araig Global holds the exclusive license to manufacture, market and sell the new product in the gaming industry globally. It is a multi-sensor vest, which is developing together with the Canadian company IF-Tech.Technology has been developed to increase the awareness of gamers. Video games are a two-dimensional product that only delivers a certain experience through sound and video. Through a multi-sensor vest, gamers and other users will have the opportunity to experience a completely new experience in video games. With this vest gamers will be able to feel on their body what is going on in the game itself. Multi-sensor technology, built-in surround system and complete wi-fi solution for the vest allow multiple levels of different dynamic experiences. What we previously could only see in video games and the virtual world now have the opportunity to literally feel for ourselves. The vest is made up of several basic components: Decoder, Exoskeleton and Stim Shirt. The exoskeleton is a key component of ARAIGTechnology, which activates various sensory stimuli (known as the Nervous System), functionality based on 34 sensors, evenly distributed on the front and back of the torso. The inner component of the ARAIG vest is the Stim Shirt, which further stimulates the torso and shoulder muscles. The vest is easily adaptable to PC games,

consoles, and virtual reality gaming devices. In the past they have been working on a number of changes and improvements to existing prototypes. Currently is the process of building the final product that will be released to the world market. It's constantly working on software adaptations for a number of well-known video games whose fans look forward to their new gadget. The official launch and sales will be through the Kickstarter campaign in early 2020. In the first year of sales the direction is towards B2C, which means direct sales to the end user. The presence and exposure to the product, i.e. "Showcase room with demo booth" it's paramount, as such events and hubs have been visited by a huge number of thousands of fans, primarily passionate fans, who will be able to experience the new experience through the product. Regarding the cooperation with other gaming companies, this technology, has been of particular interest to developers who are now facing a new challenge, a new space for developing new video game solutions. Strategic partners are few domestic companies in the production of hardware, software solutions, marketing, gaming and social media. For example, Joopone one is successful company for developing, production and sale of medical devices and equipment, more than 10 years present on the global market, the company solves and finds software solutions and development, than Vertigo Watchmove, the company operating in the film and video industry market in the United States. Plans of the company are E-sports streaming adaptability, the ability to stream live large E-sports tournaments, allowing viewers to experience the experiences their favorite players and teams go through.

2.2 Simulation of a model for development of gaming industry in Republic of North Macedonia – focus on financial benefits

Historical data and current situation in video game industry in theRepublic of North Macedonia are not reflecting the global trend of this growing industry. There are is only one studio Kamai Media in Bitola, in the range of AAA studios with more than 8-years existence that develops own engine and AAA game for the global market.

Globally there are in general two categories of companies in this industry; the first ones are the one with big profits in the industry that create a big-hit with huge budgets. "AAA" is used to refer to blockbuster projects: critical success, innovative gameplay and financial success. Companies are investing into development of hit video games,the examples are billion-dollar franchises such as: Activision Blizzard's *Call of Duty* and *World of Warcraft*, Electronic Arts' *Battlefield* and *Madden NFL*, Take-Two

Interactive's *Grand Theft Auto*, and Ubisoft's *Assassin's Creed*. Grand Theft Auto V took five years to develop and had a budget of $260 million, that is a high risk, but the game earned over $1 billion within 24 hours of its release. Companies to reach and maintain popularity inform their potential users and reviewers about the game, during the development or in gaming wording that is fueling the hype train.

The other categories is the independently developed games or "indie", has no definite meaning, it is used for an individual or small group that develop a game and self-publish it without the help or financial support of an outside source (usually a publisher). Due to the lack of a true publisher, indie games are with minimal funding. Independent games have been gaining a lot of momentum in recent years and many users and developers attribute this to the indie "feel": artistic experiments with mechanics that have never been experienced before and the mindset of freedom no money, marketing, and big business cloud the vision of the game. Many small developers release alpha or beta-builds of their games to the public.For example, Swedish programmer Markus Persson released his developmental (incomplete) version of *Minecraft* in May of 2009, an alpha version in June of 2010, and a beta versionin December of 2010. *Minecraft* surpassed 10 million users and had generated an estimated $33 million by July of 2011, months before its official release in November of that year. Users found and fixed bugs, created new features, and spread the popularity of the game through word of mouth. *Minecraft* has sold over 35 million copies, generated over $250 million in revenue, and has over 100 million registered users.

The other studios are small startups with 3-5 or 6-10 people, examples of creating video games of young enthusiasts that have shown successful appearance on the global platform Steam. The research shown that the grant scheme is open for such business as well as the innovation fund to support them for the beginning of the venture.

Wounded is a brief horror game project with a simple story, made without any funding. The goal of this game is to bring you that old indie horror vibe back from where it all started.

Store (https://store.steampowered.com/app/1015130) | Hub (https://steamcommunity.com/app/1015130) | SteamDB (https://steamdb.info/app/1015130) | Site (https://workbench-ent.com/games/wounded/)

Developer: Workbench Entertainment (/dev/Workbench+Entertainment) **Publisher:** Workbench Entertainment (/dev/Workbench+Entertainment)

Genre: Action (/genre/Action), Adventure (/genre/Adventure), Indie (/genre/Indie)

Languages: English (/language/English), French (/language/French), Italian (/language/Italian), German (/language/German), Spanish - Spain (/language/Spanish+-+Spain), Dutch (/language/Dutch), Swedish (/language/Swedish)

Tags: Horror (/tag/Horror) (26), Violent (/tag/Violent) (24), Action (/tag/Action) (23), Indie (/tag/Indie) (23), Gore (/tag/Gore) (23), Adventure (/tag/Adventure) (23), Survival Horror (/tag/Survival+Horror) (15), First-Person (/tag/First-Person) (7)

Category: Single-player, Steam Achievements, Full controller support, Steam Cloud

Release date: Feb 28, 2019

Price: $6.99

Old userscore: 74% **Owners**: 0 .. 20,000

Followers: 785

Peak concurrent players yesterday: 2

YouTube stats: 41,962 views and 190 comments for videos uploaded last week, 2 new videos uploaded yesterday.

Steam Spy is still in beta, so expect major bugs.

Figure 48WOUNDED DATA ON STEAM

Source: Steam spy, 2019https://steamspy.com/

The model suggests that the accelerators at the ICT faculties in Skopje and Bitola can offer logistical support. The model will be open for student and graduated one to enter the competition for video game design. The equipment will be provided by the accelerators in a value of 10,000 $USA (or grant scheme from Selfemployment program) and the Innovation fund will finance cost and salaries 30,000 $USA for one year.

In total for both accelerator to enter 10 game development studios with number of employees 5 (average salary of 500 $USA + possibility to earn from the profit of the game), or 50 students and graduates (only 10% of the number for 2018-2019)

If the success rate is 70 % according the data from the self-employment program there will be 7 game published. The genre of the games will be chosen according the latest trend. The complexity of the development to be medium range and the timing for development 6-12 months.

		employees	months	$ USA	$ USA	Structure in%	Investor
1	Salaries	5	12	500	30.000	73,17	Innovation fund
2	Logistic		12	100	1.000	2,44	Accelerator
3	Equipment	5		2.000	10.000	24,39	Selfemployment
	Total investment in one studio per year				**41.000**	**100,00**	
	Total investment in 10 studious per year				**410.000**		

Table 17CALCULATION OF THE COST FOR DEVELOPMENT OF 10 INDIE STUDIOUS

Source: Authors calculation based on the reseach

The table 16 presents the optimistic option that 70% of the game developers publish a video game with success.The investment per studio is 41000 $USA for period of 1 year.

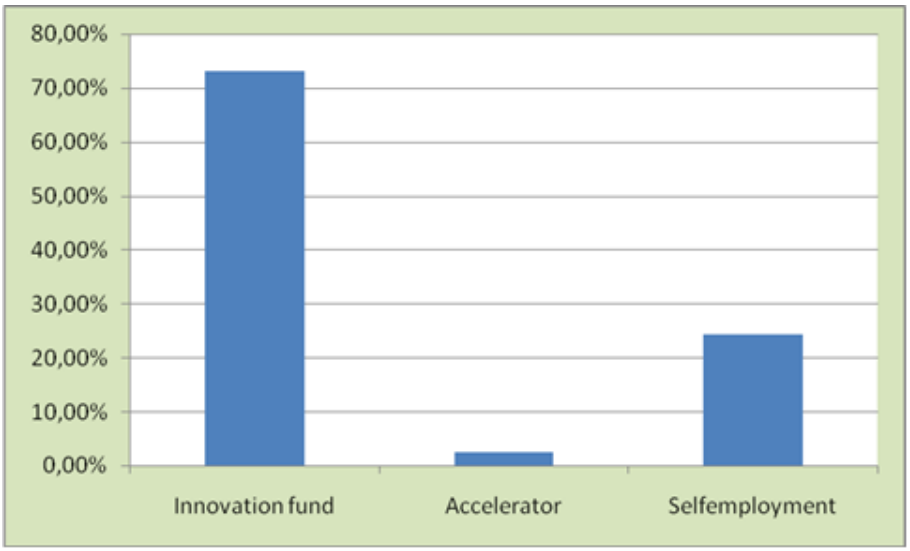

Figure 49 STUDIOS INVESTMENT STRUCTURE

The same sheme, according the actual data collected, is applied on the investment in the studious where the largest investment item, or more precisely, more than 70% of the investment structure of the studios is from the Innovation Fund and the smallest is from the Accelerator with 2,44%.

	Studio	**Name of the video game**	**Time of release**	**STEAM estimation downloads**	**average price $ USA**	**$USD potential**
1	Studio 1	Game 1	2020	20.000	6,99	139.800

2	Studio 2	Game 2	2020	20.000	6,99	139.800
3	Studio 3	Game 3	2020	20.000	6,99	139.800
4	Studio 4	Game 4	2020	20.000	6,99	139.800
5	Studio 5	Game 5	2020	20.000	6,99	139.800
6	Studio 6	Game 6	2020	20.000	6,99	139.800
7	Studio 7	Game 7	2020	20.000	6,99	139.800
	Total estimated revenues in $USA					**978.600**

	Total estimated revenues in$USA	**978.600**
	Total investment in 10 studios in $USA	**410.000**
	Total estimated operational profit	**58%**

Table 18THE POTENTIAL OF THE REVENUES ACCORDING STEAM ESTIMATION

Source: Author calculation based on the research on the current studious

This is the optimistic option that 70% of the game developers publish a video game with success. The operational profit is attractive with 58%. The predicted sales is for the first 6 months.

The more realistic scenario is if the games are in 50 % realization of the steam projections.

	Studio	**Name of the video game**	**Time of release**	**5% STEAM estimation downloads**	**average price $ USA**	**$USD projection with 50% of the estimation**
1	Studio 1	Game 1	2020	10.000	6,99	69.900
2	Studio 2	Game 2	2020	10.000	6,99	69.900
3	Studio 3	Game 3	2020	10.000	6,99	69.900
4	Studio 4	Game 4	2020	10.000	6,99	69.900
5	Studio 5	Game 5	2020	10.000	6,99	69.900
6	Studio 6	Game 6	2020	10.000	6,99	69.900
7	Studio 7	Game 7	2020	10.000	6,99	69.900
	Total estimated revenues in $USA					**489.300**
	Total investment in 10 studios in $USA					**410.000**
	Total estimated operational					**16%**

	profit		

Table 19THE 50% POTENTIAL OF THE REVENUES ACCORDING STEAM ESTIMATION

Source: Author calculation based on the research on the current studious

The estimated operational profit is not so attractive only 16%. The model shows that there is a potential in the video game development and high risks to be consider. This model is suitable to be applied as a project of the accelerators on EU or cross border call for funding project, so they can develop good infrastructure for the industry. Such example is shown below.

Support projects and organizations

Projects for awareness of the potential for the game development in RNM

The project for awareness of the potential for the game development was explained in the interview with Prof. Igor Nedelkovski, an academia representative, adequate for evaluating the investments and potential of the gaming industry. He has pointed out the activities of the IT accelerator in the frame of the FIKT-Faculty for Informatics and Communicational technologies and the implementing project Employouth.

Project EMPLOYOUTH addressed the problem of youth high unemployment rate in the cross border area RN Macedonia and Greece. The FIKT and Preda Plus implement it with purpose to build human capital and contribute to networking and establishing synergies between the Academic Institutions and the business. Projects from this range are opportunities for young people to enter the labour market and to readjust their qualifications and skills or either to start their own business self-employment.

The project provided deployment of structured /coaching mentoring approach to support and lead young people through the process of business idea and business plan development. In parallel, the participants are upskilled with peaching skills to go through competitive selection process and access of investment of prepared business plan.

The methodology and organization of the assignment composed of services delivery in two phases: (1) business idea development and (2) Business plan development.

First phase was composed of applicable knowledge, advices, exercises and tools for leading young people to development their business idea though group and individual coaching/mentoring sessions, compiling it with communication and presentation tools, resulting with improved skills to attract interest for their business idea.

Second phase has supported the candidates to transform the successful business ideas into business plans with deep and specific explanation of the idea or prototype, market potential and investment options. The candidates received extensive knowledge and experience trough the complete process of upgrading the innovative ideas into business solutions to become attractive to investors. Their soft skills has advanced on a high level, becoming aware of the power of the team, the idea and the actual business plan.

The project is included in the potentials of the gaming industry due to the fact that students and graduated IT young people has shown high interest for video game development – they were mainly first and second year of studying or/and at the beginning of the career development.

The results were:

- 60 applicants on the web links for participation in Coaching/mentoring program;
- 47 candidates or 78% from the initial applicants were included in coaching/mentoring services in two groups: A with 22 candidates; and B with 24 candidates ; Group A composed of 4 teams (3-4 members) and 6 individuals ; Group B composed of 3 teams (4-5 members) and 5 individuals
- 18 Business Concept developed and presented on the Demo day, held on 9 April 2019

The whole process was organised according the schedule:

January 2019, Application, review and selection of candidates, the project team announced the call for applicants from 14- 27 January 2019 and list of 60 applicants was submitted to experts' team to proceed further steps.

January 2019, Preparation of coaching/ mentoring tools composing of Handbook and template for development of Business concept/idea.

February 2019, networking events, forming two groups and establishing a teams for similar business ideas.

February-March 2019, Coaching/mentoring services for technical and business issues related to business idea of candidates

March-April 2019, Preparation of pitching presentation and development of presentation skills of candidates;

Applicants profile review

27 students from FIKT Bitola with ideas for development of web and mobile application

20 graduated young people or 42,5 % from FIKT were with ideas for video games and web platform for game development;

10 employed young people with idea for games and innovative products related to clothes, housing, energy efficiency and household services.

Business idea development was designed to lead candidates to describe business idea in terms of answering 19 main questions. Three category of coaching/mentoring issues were designed: *entrepreneurship cycle* (idea, product, consumer, production and selling of services); *business operations* (legal form of the business, identity, market communication, reaching the targeted consumers, following market trends and competition); *financingof business idea* (income and costs structure, cash flow and profitability).

	Title of business idea	**Team members**
1	Alternative tourism - web and mobile application and video game apps	4
2	Web platform for game developers and companies and video game competition, tutorials	3
3	Video game- Auto chess	1
4	3D modeling and animation of buildings projects	1
5	Video game –Escape Room	5
6	Video game- Taxi simulator	1
7	Video Game – Low Polly	1
8	Sierra Delta tech- Video game	3
9	Video game RG BOB	1
	Total number of ideas for video games: 9	20

Table 20LIST OF PREPARED BUSINESS IDEAS

Source: Autors list based on the research

The total number of presented ideas were 18. 50% of the business ideas were video game development, with already develop prototypes. Interesting fact is the 3 female that want to develop or participate in development of video games.

The successful process of development of the business ideas into business plans and further selection has continued in the second phase as follows:

- Introduction to the business plan development stage, scheduling meetings, explanation of the general template of the Business plan
- Preparation of coaching/ mentoring tools composing of template for development of Business plan.
- Coaching/mentoring services for technical and business issues related to business plan of candidates
- Preparation of pitching presentation and development of presentation skills of candidates;

In the period of 6 months experts carried out the coaching sessions of the candidates, which consist of:

- 15 students from FIKT Bitola with 5 Business plans for development of web and mobile application for job placements, alternative tourism, video games education, app for skill experts for households, smart parking solutions
- 3 graduated young people from FIKT with BP for video game;

#	Business plan	Team members
1	Alternative tourism	4
2	Video Game – Sierra Delta	3
3	Game development platform for developers	2
	Total number of Business plans:3	9

Table 21LIST OF PREPARED BUSINESS PLANS

Source: Autors list based on the research

The project reflects the interest among young IT students, at the same time only 3 business plans were developed on the topic of video games. The survival rate is:

33% (3 BP out of 9 ideas) of the game development teams although only in the process of idea development and prototyping of the game.

45% (9 out of 20 participants) are continuing the process of video game development

This supports the proposed model of 10 studious to be developed for video games, three of them to be at the accelerator in Bitola.

Supporting events key element in promotion of the video games

The Gobal game jam is one time per year event organized by the Macedonian Game Development Association (MAGDA). It is an association (CSO-Civic society organization) whose goal is to support the creation of video digital games, organize events and training for people who are professionally or enthusiastically working or interested in work in video games development on the teritory of Republic of North Macedoniaand in the region.

The main purpose is to:

- encourage and facilitate the exchange of information and communication between industry professionals for the development of digital games operating in the territory of the country and in the immediate geographical region;
- To be a common voice of all those working in the digital gaming industry and to affirm and solve their problems;
- To raise the profile of the digital game development industry in the country and to promote digital games as an art form and opportunity for business;
- Provide an example and support for the next generation of professionals in the digital gaming industry;
- Undertaking and supporting any activities that improve or affirm the digital gaming industry.
- Organizing events and trainings of interest to the community working in the digital gaming industry;
- Develop partnerships with higher education institutions that train the profiles needed for the digital gaming industry.
- Collaboration and presenting the community to the business sector
- work on blue print suggestion for legislation

Members are the professionals from the gaming industry, enthusiasts and especially young people from all over the country, interested in this industry are the main target group of MAGDA, they strive to promote cross-sectoral cooperation and cooperation with government institutions in order to develop this creative industry branch.

International events with more than 250 participants on two location sponsored by the local community, universities and business sector are:

• Global Game Jam Macedonia 2019 held in Bitola and Skopje

MAGDA is the organizer of Global Game Jam Macedonia and it is our biggest project and event we have been organizing once a year since the organization was founded in 2013. So far, 7 events have been held in Bitola and Skopje.

"Gaming is sport" promotes **The Macedonian e-Sport Federation**, (hereinafter referred to as MeSF). MeSF is registered as a non-profit organization, first of this type in Macedonia. It has been founded by association of few other gaming associations, operating in the field of e-sports. Their mutual interest and goals brought them together and in 2009, MeSF begun its operations. Promotion of e-sport and organizing various e-sport events, with focus on World Cyber Games (WCG) national championship and Grand Final Participation. Macedonia is part of WCG since 2005, but MeSF takes over the organization in 2009. Since then, MeSF has organized 3 National finals and participated on 3 world championships and one European championship. In 2006, more than 100.000 viewers watched the national final in 3 titles.

IT-new competition for 3D modeling, where developers are trained to create models and a concept for a video game. After the training, participants received an international certificate globally recognized with identification number, which has entry points for each faculty. For fourth years, out of the 750 participants, 600 are trained. Success is considered if 10 percent of them become part of the visual industry in the future. Of the 120 trained in 2016, 30 are enrolled in field studies, while five are working in the visual industry, and of the 220 who have undergone training in 2017 are working 20.

The Conference for 3D modeling, May 2018 Skopje, unites some of the global leaders in technology, innovation and business. Influential figures in the world of computer graphics, including 3D areas, animation, film production, game production, virtual reality. Top companies and studios provided advices on the computer animation, modeling, gaming and film industries. There were about 300 participants, key spikers from Sony Pictures, and from Lucas Films Goran Kochov, a Macedonian known in the industry for filmmaking.

In Bitola, in March 2018,**the first cultural heritage hackathon** project of Arkham - a non-governmental organization from Bitola, with information tools, told the story of Bitola Jews through the Jewish Cemetery and Park of the Living in Bitola. The Ministry of Foreign Affairs of Israel and the Ministry of Information Society and Administration

of the RN Macedonia in cooperation with the Faculty of Information and Communication Technologies - Bitola, supported the Hackathon competition.New IT solutions have been developed with teams of young IT professionals, innovators and creators from all over Macedonia. Mentors and judges were eminent experts from Israel and Macedonia in the fields of informatics, Jewish history and culture, archeology, media, technology park leaders, investors and university professors, as well as leaders in the Bitola Jewish Revival Project and editing Memorial Park of the living at the Eva Eey cemetery in Bitola. They used rare documents, photographs, videos and other resources that testify to the Jewish community in Bitola, which are collected from different research institutions, universities, museums, Ladino centers and private collections around the world.Competitors work on creating holograms, video games, applications, web pages, interactive 2D or 3D maps, animations and other IT tools thematically related to the history and heritage of the Jewish community in Bitola. It is also working on developing digital albums to serve as educators or as tourist guides.Contestants Learn about Jewish Heritage in Bitola for the best IT solutions, the three winning teams received a paid study visit to Israel, Startup Design. High-tech parks, multinationals, accelerators and cultural and historical sites such as the Tower of the Museum of David, Caesarea and other sights are visited in Jerusalem and Tel Aviv .

Startup Macedonia[53]

Is relatively new organization that supports connecting, strengthening and growing the startup ecosystem of Republic of NorthMacedonia. The great potential for starting and growing a business in the Republic of NorthMacedonia is based to exceptional access to talent, networks, knowledge and markets. An association created by a group of Macedonian startup enthusiasts, experts, investors, accelerators, and other organizations, who have one common goal: to connect the Macedonian startup community through a data – driven approach and encourage and help create favorable work environment for startups in Macedonia. With the support by our wide network of key actors in the innovation ecosystem, the aim is to unite the Macedonian startup ecosystem into one single connected hub by driving digital transformation to connect, visualize and make data flow within the ecosystem. Building and scaling startups, supporting entrepreneurship and innovation by empowering ecosystem development through

[53]https://startupmacedonia.mk

standardization, unified methodology, framework and tools for data-driven development. Global recognition of the great potential that the Macedonian startup community has.

Gaming media in Republic of North Macedonia

Gaming community is a key component for the success of the video games. In the Republic of NorthMacedonia, there are two relevant media that are publishing information for the video games and their studios.

IT.mk is an online promotor of the it news, by respecting journalism and blogging codes, ethics and principles of publishing information and always tries to publish accurate and relevant data. IT.mk is part of the initiative for a better professional relationship between the media and all other online content creators, as well as a member of IAB Macedonia. For the past 10 years, it is most relevant medium that gives information for the video gaming studious and games from Republic of NorthMacedonia.

GG.mk is online gaming show by enthusiasts to promote video gaming industry, specially the games from Republic of NorthMacedonia. It has around 10000 followers on facebook.

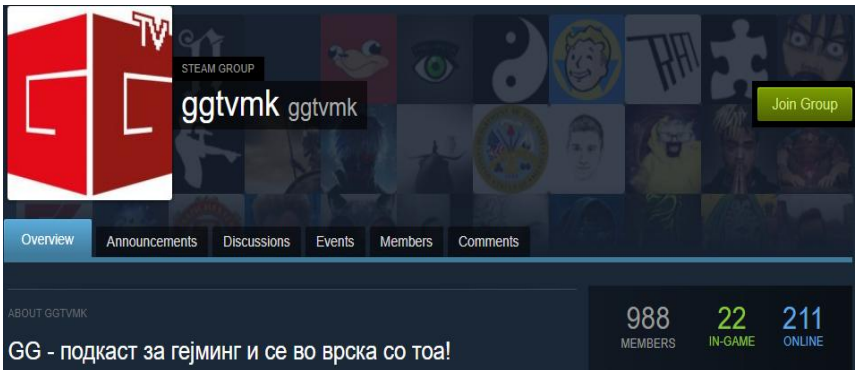

Figure 50GAMETV IN RNM

Source: https://gg.mk/

Analyses of the benefits of using computer games in the education

Carefully selected concepts and accompanying pictures create a pleasant and creative atmosphere from which children can learn and acquire knowledge, through various activities of the games and the tasks. For example, a Quest to learn is a school open in

New York, and the education of the children is exclusively through video games. The children are taught how to solve programming and mathematical problems, which prepares them for a career in the information sciences. The learning model in the school is based on 30 years of research that showed that people learn faster when in a social context where they can use the knowledge. Children learn more, for example, when they imagine being Spartan spies collecting data for Athens, rather than memorizing data on ancient Greece.[54]

Educational games can be divided into several categories: mathematical games, linguistic art, games with animals and nature, word games, logical games, memory games, preschool games, games for quicker keyboard work, geographic games, games that will help the child to cope with everyday life and at the same time raise his / her behavior in the environment.

Children also want to play memory games. These games help children to improve their short-term memory and advance the skill of quick recognition.

The game My Word Coach offers a fun and challenging way to improve verbal skills through a range of activities and exercises. While the game Mathematics 5-8 is meant for exercising and repeating tasks from 5 to 8 grade in primary schools. A fun interactive picture book on a CD for children in kindergarten and pre-school children presents a fun game for children.

There are games CDs that consist of animal images where every child can hear what his animal's natural animal voices are called, be able to paint, represent a themed game with animals. Games for training on mental abilities, memory, perception and concentration.

Mozgalomania - more than 500 different visual, educational and logical tasks at various levels and with different levels of difficulty. It is used for:

- exercise on the memory;
- exercise the concentration;
- training memory ability;
- Improving the logic of thinking. It is useful for children and adults.

Bookstore (Slovarica) is a multimedia game that in an advanced and acceptable way for children allows learning the letters reading, writing words letters through image listening and discovering new terms.

Orange Revolution - Orange Revolution is a game that represents a simulation of the Orange Revolution. The title is taken from events that took place at the end of 2004 and

[54] https://www.q2l.org/

early 2005 as a result of Ukraine's presidential election that were challenged by leading candidates. Players learn the causes of the crisis and make decisions and decisions that must be democratic and non-violent in order not to provoke the revolt of thousands of protesters.

Haiti is a video game with roles, in which the player plays the roles of members of a family living in rural Haiti. During the game, the player should learn to choose the most necessary in different conditions. For example, gaining education, earning money, keeping your health and maintaining happiness by facing unexpected events.

GRUP is a game that consists of answering questions and teaches children a healthy diet and life, which also increases their knowledge of different dishes.

Globaloria is a social network that helps young people decide to become creators and designers of interactive games and simulations, their personal and professional development and the social and economic benefits of their communities.

The immune system defense force is a game in which a player needs to manage an army of macrophages and dendritic cells in order to fight against the bacterium that attacks.

Immune Responses is a game in which the player passes through ten interactive stop locations and learns how our immune system protects man and how he can harm.

Playing with a diabetic dog is a game in which the player takes care of a dog who has diabetes and thus learns how to handle it diabetes in real life.[55]

Ever since the advent of the first computer games, children prefer playing video games rather than listening to teachers' lectures. And therefore, instead of fighting the playing of the games, they began to use this obsession of the children in the best possible way. The game is made and depends on the very age of the children.

On-line learning games for children are a great way to acquire the skills of students in order to be able to succeed and advance in the school. Educational games for children make learning fun and interesting.

Reseach of educational games confirms that they can become part of the school's teaching. Teachers can introduce educational and interesting elements in the learning process. With the help of computer programs, students can help students to socialize, in terms of learning to learn with criticism, communicating with others based on knowledge, and gaining the skills to effectively navigate into interpersonal relationships.

[55]Eric Klopfer, Scot Osterweil, and Katie Salen “The Education Arcade: Massachusetts Institute of Technology”, 28 October 2011

As computer games are slowly included in the teaching process, more and more attention is paid to their design and their content in order to gain an effective teaching tool.

Level 1: Learning "How"

The most explicit level of learning is when a player plays a video game, he learns "how" to do something, how many different characters, figures, or elements of a game can move, and what can be done with them. The learning is how to draw elements from the menu to build complex cities or parks. Player can learn how to train an animal and how to teach it to fight, how to use weapons, the physical manipulation that is needed to take over the controllers of the game in order to achieve all of this.[56]

For example, when we play a game like Tetris, by matching the figures and their proper setting player develops mental spatial abilities that can help us in the real world.

The more a game simulates the real world, the more the player himself learns how to do certain things in the real world. Not everything can be learn through a game but through various games and in particular simulation games, it can learn certain skills. Person can learn how to orient on an oil platform, how to use financial instruments for trade, how to manage a company, how to aim with a gun or rifle, how to aim precisely, how to handle bends when driving at high speed, in which he should start using the brakes, etc., from the curve.

The important thing in playing games is that players learn the rules of the game or how certain procedures and procedures are performed also they continue to practice them until they lead them to perfection.

There are also so-called hidden information ie. secondary information that is learned through games such as parallel processing and multitasking when we perceive and process information from different sources and parts of the monitor to perform certain moves to win the game.[57] So while playing a game, he sees the terrain, he needs to quickly spot the enemy troops to be in context with the mission, ie. what he needs to do is look at the map, ie. in position. He uses a parallel zoomed view on the field seen through a binoculars or a sniper rifle, to hear the movements of enemy tanks and to assume on what part of the terrain they are, to hear from where the shots arrive, run the

[56]Haley, R. Video Games: The Cycle Plays On. New York: Gabelli & Company Inc,2018
[57]Herman, L., Horwitz, J., Kent, S., & Miller, S. The History Of Video Games. Oxford,2019

terrain, he avoids rogue bullets while at the same time he aims and shoot at enemy targets.

Level 2: Learning "What"

By learning the rules of a game, player learns what is possible and what can be done around the game itself. Before the emergence of video games, players first learn the rules of a particular game and only then began to play the same. Today you learn by playing, you do not know the real, you may have a general idea of the same, but you start playing the game and try to find the so-called "in the same" and "learn" the rules. Player learns through trial and error. The most important is based on exercising reflexes and that all the time players compare the game with a familiar situation from real life.[58]
Players compare the rules all the time. The game played with previous games, making comparisons and making clips, drawing on previous experience. All the time, players wonder if the rules of the game are fair, correct ie. Corresponding with the real world, etc. Generally more attractive are games that simulate or replicate the real world. If a game is more realistic is more attractive for the players.

Level 3: Learning "Why"

The third level of learning in video games is learning why something is done. When playing the games, player learns that in certain situations in order to win, he have to make an open attack and in other undercover assault. Player learns from some games that he need to be stingy and greedy and to be good and generous to others, to be cooperative. It is learned that small items have more power if they are used as a group. The combination of strokes is more effective than a single stroke. Buying all the items in the game or building the fastest can give or not give a result. Reserving part of our resources for the selection can be very important. Uniting and cooperating with other players, as they would jointly beat a stronger player. Blows in the head are much more effective than shoulders in the shoulder.
From life experience, the hierarchy of force between the different species is proportional to their size. Logical conclusions that the character in the game is small, he will need

[58]Hunicke, R., LeBlanc, M., & Zubek, R. (2014). MDA: A Formal Approach to Game Design and Game Research . Game Developers Conference. San Jose.

something extra - force, tactics, weapons, magic - to be stronger and be able to defeat the bigger ones.

The armies of different countries have been aware that the strategy can be learned by playing of strategic games, so is used as part of the training of their military personnel. All generations of the Army use video game combinations from recruits to commanders. Military pilots travel dozens before they land on a real plane and carry out flights hours in a flying simulator. Strategies that can be used in sports and business can also be learned through playing video games.

Level 4: Learning "Where"

Psychologists argue that games are ways in which today's children learn about the world around them. The player learns about the game world and the advantages it brings.He learns cultural metaphors and images that describe the real world.

Video games propagate certain ideas ie. myths of the culture as being in command versus wrong, good versus evil, victory versus defeat, skill versus happiness. Player learn about desire to help, efforts to rise to something better, how to deal with dangers, betrayals, and things that are more powerful, things that cannot be change, ie. the harsh truth that if he kills the bad man and save the girl in the end, players will also die.[59]

Players learn about cultural relativity, i.e. that on a particular planet in a particular society in a world x things cannot be permitted, although they are perfectly normal and can be made in world. We learn the ideas of achievement and leadership. Players learn that it is really difficult to defeat enemies, but that if they are really persistent and practice enough, they can defeat enemies and win the game.

Children playing their favorite character in their favorite game are associated with the characteristics of their hero. They want to be brave, resolute, strong, righteous and good. Whether it has positive or negative connotations, children use video and computer games as a filter for understanding their lives.[60]

Level 5: Learning "When"

This level includes unconscious emotional messages. This is the level where players make moral and value-based decisions, to whether things are right or wrong. That is why

[59]Nielson Games. Video Gamers in Europe – 2008. London, 2018

[60]Nievera, H. How technology is shaping the way customers engage. Harvard, 2016

this is the most problematic of all levels of learning and the new one that causes the most controversy.[61]

The mechanisms used at this level can be from the simplest and most obvious to the most complex. Players simply learn by repeating certain procedures. The lessons learn the use of allegories and symbols, the manipulation of images, situations, sounds, music and other effects that produce emotions and a combination of effects.

3.3 Macedonian companies for development of educational games

This chapter is mapping the studios/companies that have developed educational video games for PS or mobile. The same approach is used here, decription of the companies or the produced game, topic of the games, devices to play and the financing source.

Anima

In 2009, Anima as a private company in Macedonia started producing multimedia computer courses and educational games discs, with which children have fun and study. These are computer games in Macedonian and Albanian languagehttp://anima.com.mk/.

Solaris production

Computer Game " Alexander the Great's Conquests " 2013 is first game on a platform the "Creative Skopje", as an initiative aimed at education, promotion and creation, specific products and services. The game is the Flash version and contains 40 different levels. Before each level, there is a text explaining the life and work of the world's greatest conqueror. The game is presented on the festival "Creative Skopje" under the auspices of the City of Skopje.

4Virtus

4Virtus.com is a company specializing in development of web based solutions and mobile applications, which are in function of improving the functioning of business processes. Within the company there is a department for creative design and digital marketing.[62]It's a company that successfully designs and develops new Andorid and iPhone applications. They make games for Symbian, Windows Mobile and iOS. This company with its game BeeClever won the competition organized by the VIP mobile

[61]Pearson, D. (2018). Gamezindustry.biz. Lund
[62]Scanlon, J. (2017). The Video Game Industry Outlook: MKD31.6 Billion and Growing, Paris

operator for a tidy Adnroid game. The range of games offered by this manufacturer are increasing, but are currently offered by the following games: beeLetters ABV, beeNumbers 123, beeShapes, beeColors, beeJungle, beeFarm.[63]

beeNumbers 123

It's about a game through which kids can learn the numbers from 1 to 20. The game has multiple parts.[64]

- "Counting" - Each number is associated with the same number of interesting subjects.
- "How many" - teaches children to find the exact number of the number of offered numbers. This interesting game teaches children to recognize the numbers.
- "Comparing numbers" - comparing the numbers on one side and the other. The idea is to motivate children to breathe the right equation
- "Simple math" - Children are encouraged to perform basic collection and subtraction operations
- "Memory" - It's about the well-known "memory" game, but this time it's adapted with numbers. With the help of this game the memory of the children develops.

beeLetters ABV

This is a game through which children can learn the letters of the alphabet. The game has multiple parts.[65]

- "Learning Letters"
- "Create the word"
- "What's Next"
- "Missing letter"
- "Alphabet song"

Wootra Games

Wootra Games (http://wootragames.com/) is a independent (Indie) studio. They make mostly Flash games, the main advantage of these games is that they run on all operating systems, ie they are played in the web browser itself and do not depend on the operating

[63]Armstrong, M. (2018). The Companies Making the Most from Video Games.
[64]Batchelor J. (2018) GTA V is the most profitable entertainment product of all time. Games Industry
[65]Big Fish, (2018). Mega-Million Dollar Games.

system.There are only two developers and one external music collaborator in the studio and they have created a dozen games that are quite successful on a world level.

Their Ambush game is a military strategy game in which player controls one of the armies and you try to win different enemies from the game to beat your opponent. The game itself has quite a lot of playfulness and a variety of options and does not lag behind its competitors in this category.[66]

Another game is No Retreat, a military strategy game in which player control an army and he tries to defeat enemies.

The well-known producer of games shows his ranking on the prestigious portal for online games www.kanogames.com where Wootra Games is represented by two games Carveola Files and Carveola Incident, and the overall average score for these two games is 4.25 on a scale of 5.

Finalware

The Memory Islandis a mobile game, in the category of logic games, launched in 2018, at the Android Market for Free Games and Applications and is aimed at improving the memory of the brain. There are 4 different islands that range from easiest to most difficult with different signs and shapes. Ranking is live and players can compete with friends. The Memory Island game can be downloaded at the following link.[67]This project is implemented by Finalware Startup, 2 freelancers from Kocani.They deal with the design and development of useful applications and games. This is their first joint project and in the future, they will announce interesting publications for entertainment and education.[68]

Kodwell

Kodwell has developed an application Pharma.Sharmafor children in the Republic of North Macedonia. The mobile app studio has launched its first pre-school game for iOS operating system - on macedonian-language for iPad. Pharma is a set of games from the educational children's train others AST between 4 and 8 years. It consists of 2 games - memory and hide and seek - that will trigger thinking. The game is great for practicing

[66]Cherney, M. (2018).

[67]https://play.google.com/store/apps/details?id=com.zgdevelopment.finalver.memoryislandgam

[68]https://citaj.mk/)

and improving memory and for learning and repeating alphabet letters and reading simple words in Macedonian language, two more games will follow: Jigsaw - a game that will awaken the child's logical thinking and resourcefulness, as well as a game that will help children learn the colors.[69]

3.4 MICROSOFT partners in learning

Microsoft's Innovative Educator Program allows teachers to effectively use technology in their classrooms in order to develop 21st century skills.

These skills are developed through:[70]

- Professional development of teachers: Proven and comprehensive professional development that provides proven approaches and practices that lead to improvement of student learning;
- Global Community: The ability for teachers to connect and collaborate with other innovative teachers and educated experts from around the world;
- Career development of teachers: An opportunity to present their good school practices to teachers from around the world and their innovation will be recognized;
- Innovative teachers who collaborate with Microsoft have the opportunity to share their school innovative practices with colleagues around the world at the 2013 Global Innovative Teachers Forum, and thus become the makers of a global policy for the effective use of technology in education.

The Republic of Macedonia has already participated twice with its representatives on the Global Forums 2011 and 2012, and the projects presented for both years have been rewarded by the commission and the participants. Encouraged by the awareness of the importance of parents' involvement in the educational process, the goal is through this project to achieve a partnership with parents and the community, which will enable children to develop positive social attitudes, to perceive the school as a place where they build personal integrity and self-confidence in order to achieve better learning outcomes. In collaboration with Microsoft with the help of SkyDrive, various folders with educational content are created. The folders contain a variety of video presentations through which students can learn through games. Video game presentations for learning in English and German, computer science, integrated teaching, anatomical atlas are

[69] https://www.mkd.mk/makedonija/ekonomija/kodvel-izraboti-aplikacija-za-deca-na-makedonski-jazik)
[70] Zackariasson, P., Wilson, T.L. eds. (2012). The Video Game Industry:

created. Children and young people today are familiarizing the digital world through video games and the way they communicate with technology can be a change in the way we learn and produce knowledge. As books and movies, video games are used in a variety of ways.

Project "Bambini Game"

The "Babini Games" project of Macedonian educators, within the framework of Microsoft, which aims to promote learning through the game, won the second prize at the World Innovative Teachers Forum in Washington. Microsoft's Learning Partnership initiative aims to apply modern technology in education.

The games, such as steel, hide, tile, mosque, ring, grandmother, found themselves in the project of a group of educators from Republic of North Macedonia who, with 700 colleagues from 67 countries of the world, were competing in Washington, to encourage children to overcome learning difficulties.

The team from Macedonia with the "Babini Games" project has already won at the European level,

"Bambini games" is a kind of building bridge between the new generation of information technology with the old and cultural values of the country. The author of the project is Marina Vasileva, a departmental teacher in the elementary school "St. Cyril and Methodius "from Skopje. The purpose of this game is to revive old old-fashioned games that have been forgotten, to teach children that computers can use them as a tool, and to make a bridge between history and the current IT generation that goes a long time before computers.

3.5 Learning through video games developed by projects

.

Video games will be based on the objectives set out in the curriculum, and will contain elements appropriate to the age of the students and will have an optimal level of information for achieving the goals. In the first phase, video games will be created for the subjects.[71]

"Let's Learn Together"

The project (http://daucimezaedno.wordpress.com) was a school initiative to involve families and the local community in the promotion of children's education, and

[71]Pullen J. (2012), The next revolution in videogames, CNNMoney

wasrealized through the cooperation of the school "Gligor Prlicev" primary school Ohrid with the Foundation for educational and cultural initiatives "Step by Step".[72]
Let's learn together project provided guidance for the involvement of individuals and groups in the local community in the education process.

Miss Stone Affair

FINKI students developed an educational tool for the historical event is shown as a video game with information on all events.The tool can be used by elementary and high school teachers to make class and learning more interesting for students.The new educational tool "The Miss Stone Affair" was promoted by the Museum of the Macedonian Struggle. It was developed by students from the Faculty of Information Science and Computer Engineering-FINKI with the support of the British Council and under the mentorship of prof.Boban Joksimoski. It is an interactive 3D web site, with full animaton designed for primary and secondary school students and anyone who wants to learn more about this event from Macedonian history. The tool can be used as an ICT method in the teaching process and has been promoted to primary and secondary school teachers in Skopje.
The public knows the example of the Miss Stone affair and 194 teachers from Skopje and 30 for other cities use it on the classes.[73]

Petko

Macedonia Telekom and OXO have created an educational mobile game with favorite animated character Petko - to help children learn through play.The application contains a selection of interactive educational activities to develop basic logical operations for children and foster their creativity. It consists of 4 initial fun activities: Coloring, Reading, Singing, Playing games. Through coloring, children can "revive" drawings with Petko, who can then read and tell them; through singing - they can select, listen to and sing the famous songs on the 5+ Band, fill in the missing words. Playing games as a 5+ activity is a preplanned fun with clear messages on environmental issues, basic bon-

[72]http://www.stepbystep.org.mk/
[73]https://makfax.com.mk/makedonija

ton rules, good neighborly relations, traffic rules, healthy eating and healthy habits.The app can be downloaded on Play Store, App Store.[74]

Bibi

An educational app with the Bibi is available on **Google Play** . The favorite character of the baby audience - Bibi is also available on the app where children can learn letters, recognize them, learn words. "Bibi World" is a collection of educational and fun games with the character of a Bibi and is designed for children from 2 to 8 years. In developing this application is also preserved the social momentum and time limit available for play during the day. After the time has elapsed, the application locks and becomes available for use the next day. It is Bibi who addresses the children and tells them that it is time to hang out with friends and family.

Letters

From 2018, "Letters", free can be downloaded from “Google Play”, where there is excellent comments, rating 4.9 and over 10,000 downloads. Educational, fun, innovative and safe game about the Macedonian alphabet made by father and son. Dimitar Mitrov has been doing it for three years and it was released on December 31, 2017. The kids can play for ten minutes and then come back the next day - and this is interesting for both children and adults. In addition to learning the letters, there is a part to balance, a part to developing logic. It is intended for ages 3 to 7 years.[75]

Green game

The game is made by the company Vestel with the support of the DutchEmbassy in Republic of Norht Macedonia. The game is created in 2017. It is designed for iOS and android, tablet or PC devices in order to be accessible to every child on line or without internet, on the simple drag and drop principle, and then selfie. The game is based on waste selection, has options and ways to proper waste selection, and then takes it to a new level for mapping locations across the Republic of North Macedonia. Zero Waste

[74]https://www.fakulteti.mk/news/27012019/aplikacijata-svetot-na-bibi-dostapna-na-gugl-plej
[75]https://deca.mk/sinot-konstantin-i-tatkoto-dimitar-ja-napravija-prvata-igra-za-makedonskata-azbuka

and Pakomak have set up infrastructure (containers and bins) for waste selection: waste batteries and accumulators, waste electronics and electronic equipment and waste from waste (paper, plastic, metal, glass, composite and wood).

According to the need to educate the whole population, starting from the children, the two companies operating in the Republic of Macedonia, Zero Waste DOO Skopje in the field of waste batteries and accumulators, waste electronics and electronic equipment, and PAKOMAK DOO for packaging waste (paper, plastic, metal, glass, composite and wood) teamed up with another project to create a co-product, a children's game, with the support of the Dutch Embassy. The overarching goal is education adapted to the new age where interest is maintained through play, and one learns the basics of waste selection that is generated daily. The game is a new concept, or a creative way to learn about waste selection, through play and fun, the children learn to first select the waste they create.[76]

Umko

Umko.mk is an educational game for preschool children and first graders in Macedonian language. Children 4-7 years of age through play and fun will acquire basic knowledge of letters, numbers, colors, relationships, logic, sequences, coloring, magnitudes, maps, puzzles. Umko.mk is a collection of 36 thematic educational games. The questions with beautiful illustrations are presented textually and audio. Children "drag" or point to the answer on the screen of the mobile phone. Children can play alone or with their parents, at home or on a car trip. All questions and answers are set by a pleasant voice that gives guidance and helps children to handle numerous tasks.

Private tutorial website for video game learning [77]

On the letter (nabukvata.mk)is a web application for computer and mobile devices designed by Aleksandar Trimcevski. Used is a miniature vector graphic design, tailor-made for children, fast for loading. The app contains acoustic representations of letters and words that coincide with the image and animations as they are written. Through play, children write the letters on the screen correctly, following the trajectory.[78]

[76]http://komunalec-strumica.com.mk/
[77]https://izvorcemk.wordpress.com/
[78]http://moedete.mk/

Educational video games in the archeological museum [79]

With educational videos for children, titled "Archeology", the Archaeological Museum of Macedonia tries to bring its contents closer to children. The games are installed on the museum's computers, but will also be available online on the museum's website.The purpose of these educational video games is to introduce the youngest population to the material archaeological artefacts through play and entertainment. We believe that young children should recognize the most valuable artifacts, such as the figure of the Great Mother of Tumba Madzari, the Tetovo Menada, the shield of Bonce and the Roman ritual chariot.The first game "Jigsaw" consists of a background of 16 fields, which is a picture of an artifact with basic information about it.[80]

Safe or Protected

The website (CRISP) is designed to contribute to greater security and protection of children's rights and privacy online. The site is part of a project on the Protection and Safety of Children and their Rights on the Internet (or abbreviated CRISP) implemented by the Metamorphosis Foundation with financial support from the European Union. This website contains tips and guidelines on safe Internet use, general information about the Internet as a medium, the opportunities it offers, the dangers it brings, and how to protect ourselves from it. The contents of this website are tailored to users of different levels (from those with minimal internet knowledge to those who are regular users) as well as to different age categories (primary school children, teenagers, and adults).[81]

#Inno4Edu

In 2019, a hackathon was held, as is part of the project "Creating an Environment that Improves the Quality of Teaching and Learning through Co-Creation and Innovation". It is funded by the UK Government through the British Embassy in Skopje. Supporters are the Ministry of Labor and social policy, Ministry of Education and Science, Bureau of Educational Development and UNICEF, and implementations by SmartAppLaboratory

[79] https://amm.org.mk/games/
[80] http://novamakedonija.com.mk/
[81] http://crisp.org.mk/

for Social Innovation.[82]Inspired by the creation of the new national education web platform, all creative gamers, developers, graphic designers, artists and enthusiasts of all kinds can create games for the youngest, kids 3 to 10 years. To create the best and shortest possible online or digital short game according to the themes offered by the organizer. Participants were provided with mentors from the education sector, practitioners and access to sample materials. The website is under development and soon be filled with a large number of materials, physical and online games and will be a place where educators, teachers and parents can provide materials for better classroom performance and better spending time with the youngest. The aim is providing play and learning material through play and character education will provide better education to new generations and thus improve direct and practical education! The hackathon lasted for 3 days, from 18th to 20th July,2019, at NSC "St. Kliment Ohridski ", informal, with over 10 mentors and networking and co-creation opportunities. The event was attended by teams from several companies that have decided to help and it will also be an opportunity for extra socializing and sharing experiences.

Hackathon for development of new tools to study French language

Mini-hackathon on "Development of new tools to study French language" took place in the laboratory of Technology and Metallurgy Faculty in July 2019. It was aimed for pupils and students of informatics, with one day teamwork in groups of two (programmer and graphic designer), to design new and stimulating tools for learning French (applications, video games, online tutorials). The hackathon was realized with the support of the French Institute in Paris and in cooperation with the French Institute in Serbia, the Embassy of France in Kosovo, the Embassy of France in Albania, Foundation "Prof. Dr. Dimitar Stamboliev ", Seavus Education Center, Faculty of Information Science and Computer Engineering in Skopje, Semos Education and MOddou.[83]

	Name of the company/project	Name of the game	topic	device to play	financed by
1	Anima	educational games discs	language, math, nature	PS game	commercial company

[82]http://skrati.mk/KreirajIgri
[83]http://ifs.mk/mk/Home/FrankofonijaContent/4118

2	Solaris production	Alexander the Great's Conquests flash game	history	PS game	project
3	4Virtus	bee Letters ABV, bee Numbers 123, bee Shapes, bee Colors, bee Jungle, bee Farm.	language, math, nature	PS game	commercial company
4	Wootra Games	Range of flash games	memory	PS game	commercial company
5	Final ware	The memory island	memory	mobile game	commercial company
6	Kodwell	Pharma.Sharma	memory	mobile game	commercial company
7	Microsoft's Innovative Educator Program	Bambini games	history	PS games	project
8	Foundation for educational and cultural initiatives "Step by Step	Let's Learn Together	socializing	PS games	project
9	Museum of the Macedonian Struggle	Miss Stone Affair	history	PS games	Project
10	Macedonia Telekom and OXO	Petko	music	PS/mobile	Project
11	Faculteti.mk & Deca.mk	Bibi	language, math, nature	PS/mobile	Project
12	Dimitar Mitrov	Letters	language	PS/mobile	private initiative
13	Vestel & Dutch Embassy in the Republic of North Macedonia	Green game	ecology	PS /mobile	Project
14	Komma design & Bitsia systems	Umko		PS/mobile	Project
15	Aleksandar Trimcevski	On the letter (nabukvata.mk)	language	PS/mobile	private initiative
16	Izvorce.mk	Private tutorial website for video game learning	language, math, nature	PS games	private initiative
17	Archaeological Museum	Archaeology	history	PS games	Project
18	Safe or Protected CRISP	greater security and protection of children's rights and privacy online			Project
19	Inno4edy	event for creating educational video games	free themes	PS/mobile	Project
20	Hackathon for development of new tools to study French language	event for creating educational video games	language	PS/mobile	Project

Table 22MAPPING EDUCATIONAL GAMES

Source: Autors list based on the research

For the analysis of educational video games,we have taken 20 games created by companies, individuals and projects mapped in the Republic of North Macedonia. The analysis provides information for the studios, the name of the game, the theme of the game, the playing devices and the model of financing (by company, individual or project). Namely, all the mapped companies, projects are creating educational games in the studios only the last two projects use an event model for creating such video games. Most of the educational games, more than a third or precisely 38.89% are developt for learning languages, math skills and information for the nature (plants, animals); 22.22% of educational games are about history (events from the past), 16.67% are about memor, and 5.56% are about socializing (family time), music, ecology and free themes.

Figure 1 shows the number of different types of educational games, while Figure 2 shows the percentage of participation of different types produced by companies or projects

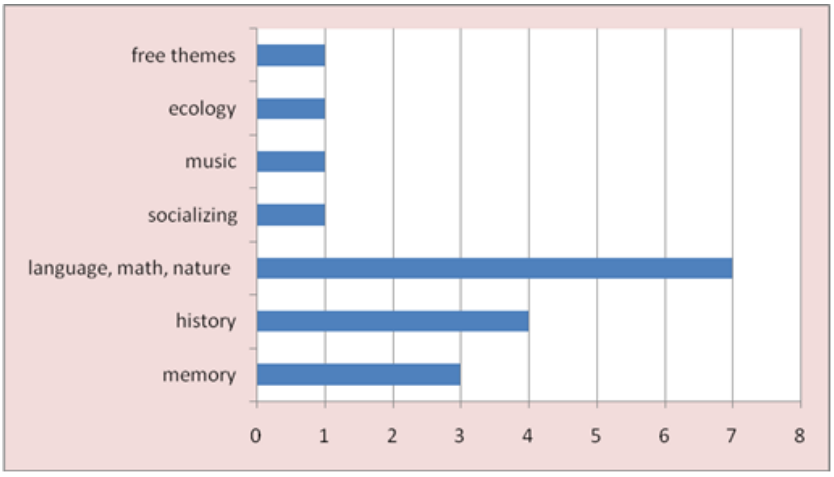

Figure 51NUMBER OF DIFFERENT TOPICS OF EDUCATIONAL GAMES

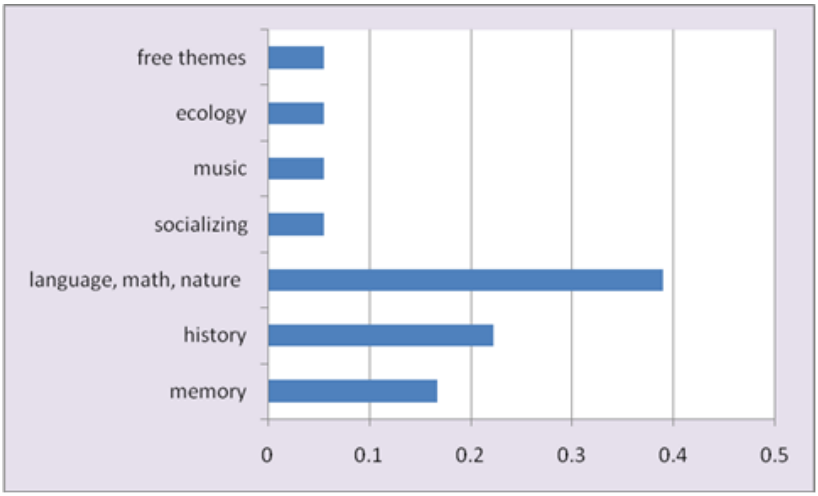

Figure 52PERSENTIGE OF DIFFERENT TOPICS OF EDUCATIONAL GAMES

The aspect on which device the game can be use, show that almost half or 47.37% of companies or projects are developing PC games only 10.53% are devoted on creating only mobile game. 42.11% are creating both versions for PC and mobile. (See Graphic View Figure 3 and Figure 4).

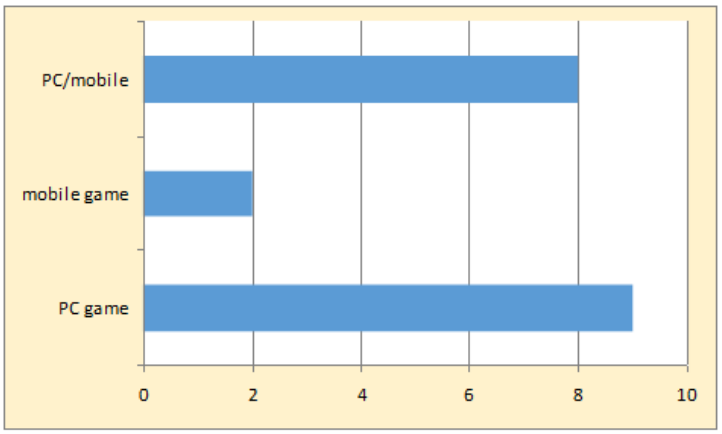

Figure 53NUMBER OF DIFFERENT DEVICES FOR PLAYING EDUCATIONAL GAMES

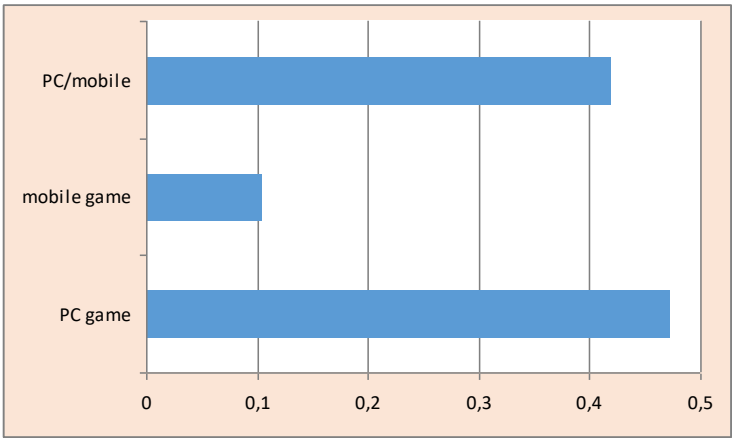

Figure 54PERSENTIGE OF DIFFERENT DEVICES FOR PLAYING EDUCATIONAL GAMES

From the financing aspect, 60% of the educational games are project funded, 25% or a quarter are funded from the commercial companies and 15% are funded by a private initiative. (See Graphic View Figure 5 and Figure 6)

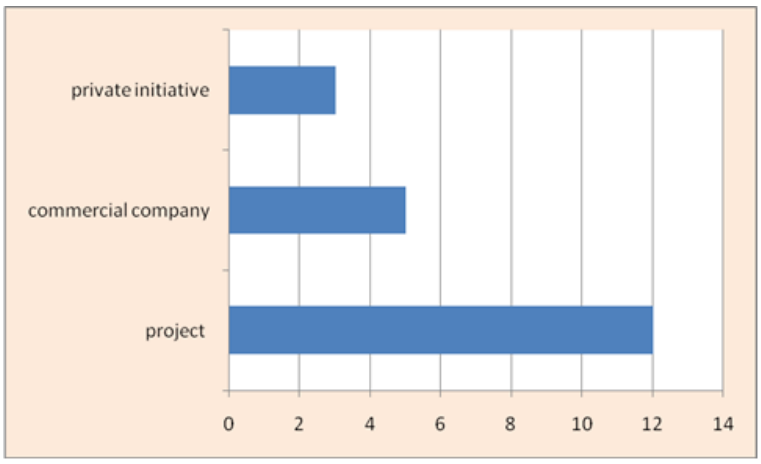

Figure 55NUMBER OF DIFFERENT FINANCIAL SOURCES FOR EDUCATIONAL GAMES

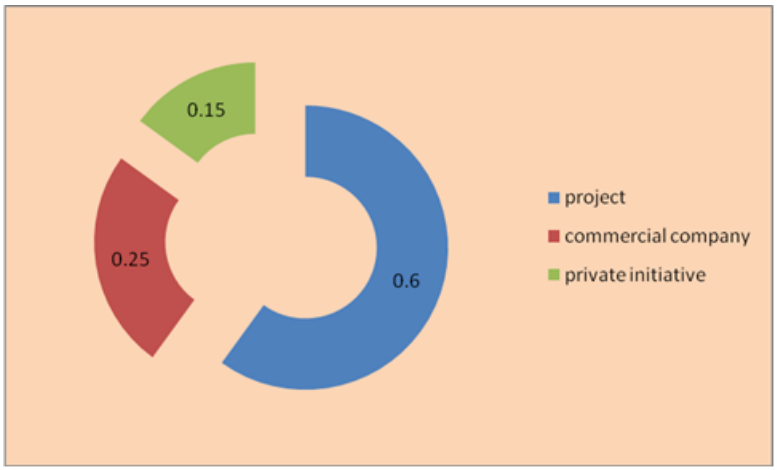

Figure 56PERSENTIGE OF DIFFERENT FINANCIAL SOURCES FOR EDUCATIONAL GAMES

3.6 Analyses of the benefits of using computer games in the education

From a survey of 30 students in the fourth grade (programming club) from the elementary school in Bitola, a series of language and mathematical games were tested. In each game, the character and the environment around had certain common elements such as the way the task was presented, the way it was solved, the positive and negative lessons learned at the end of the task, the way the interaction with opponents, the rewards that are gained and the calculation of the player's results. An important feature of these games was that they included a system of self-regulation, a set of rules that adapted the game and its content to the level of the player. This part was to be eliminated frustration caused by too difficult levels as well as boredom of too light levels. There were two goals in the field of mathematics. The first one was to familiarize children with basic mathematical operations, skills and way of thinking, and the second goal was to

learn and apply basic mathematical content focusing on the arithmetic and geometry fields. A key factor in the success of this project was that teacher themselves had the opportunity to use this tool. The opinion and evaluation at the end of the experiment was positive. The teacher felt that video games were an easy-to-use educational tool with the potential to become a substitute or support in the process of studying new substances.

Well-designed play-based learning has several advantages over traditional experiential learning methods. It is cost-effective, low-risk, and at the same time there are significant advantages in the learning process.

Based on the observation the table below shows comparison of three approaches:

- Passive training methods, such as lectures and online tutorials;
- Realistic training, such as schooling programs; and
- Learning based on the game.

	Traditional training (Lectures, online tutorials)	**Real-life training**	**Learning based on the game**
Effective in terms of price	X		X
Low physical risk /responsibility	X		X
Standardized estimates Provide comparisons betweenstudents	X		X
High engagement		X	X
Pace of learning customized for each student		X	X
Rapid reaction in response to mistakes of the student		X	X
The student can easily transfer learning to the real Light		X	X

Table 23COMPARISON OF THE TRADITIONAL TRAINING, REAL-LIFE TRAINING AND GAME BASED LEARNING

Source: Calculation on basis of survey

What are the changes in learning?

Studends nowdays learn from games, events that has done a fundamental change in the overall environment.Today's students represent the generation that grew up from the kindergarten to the university with the help of new technology. They spent their entire life surrounded by computers, video games, digital video players, video cameras, smartphones and various other digital toys.

As a result of the overall digital environment that is formed around us as well as through the size of the data that we exchange with and through this environment, today's students think and process the information in a fundamentally different way.

Why do young people like games?

Today's education systems, the learning process itself is rarely a motivational factor. Although there are exceptions in which students are interested in an object (usually a course for computers or a course on how to make money), the general conclusion is that the motivation that students have is an external ie. to satisfy their parents, to avoid some punishment or to receive a reward.

The idea is to create games in an integrated learning environment in which the initial lessons, ie. getting acquainted with objects from exploring the basics of a particular area will be performed through such video games. Usually the content of a game cannot be strictly limited to one particular area, it is general and have touch points with different areas and themes.

For example, if the Age of Empires II4 game is used, the social aspects from the development of a particular societyand the leadership and management of one state is learned. At the same time improves spatial abilities, the ability to notice, improves the ability in terms of geometry, defensive positions and the places that are needed to position the catapults in order to successfully strike the opponent.

The use of already known games is an advantage in the fact that most of the students are familiar with these games so there is no need to spend time learning the basic rules of the game. The methodology used to create environments is based on four types of activities:

1. Experiment - During the session, the objectives of learning and the activities to be performed are established. Students should record the decisions they have to take in the game and analyze the results they have achieved.
2. Reflection - At the end of the sessions, the results achieved are compared and analyzed the different strategies.
3. Activities - Specific circular activities are designed for the game. Students should combine other materials they used as books and online searches for the game.

4. Discussion - Throughout this process, two aspects are particularly important, the impact of the actual learning process and the common discussions in relation to the undertaken activities.

Such example is The Angry Birds video game, Rovio game, cataloged as a "physical game" because its motion algorithms are based on missile kinematics. Kinematic analysis of the game can be a great teaching strategy at all levels education, either as an introduction to a subject, or as an application of kinematics and dynamic concepts, with ability to solve tasks. Prof. Delevski shows how with help of the video game and video analysis and modeling software "Tracker", can define strategies for teaching in the field of Kinematics in schools.[84]

Designing game as learning material

Apart from certain exceptions, learning games are not really realistic games, they are akind of multimedia lessons and instructions filled with images, music and video that givea certain reward through points.These games are diametrically opposed and less attractive than games such as The Sims, Unreal Tournament, Need for Speed, etc.

Although it is possible to combine the pleasure from playing a real game by learning some educational content, it is not easy. The main goal that the developer wants to achieve in order to have a playful game is that the game is attractive to be played and be so attractive and contagious that the players themselves can play it for hundreds of hours.

The developer invents the contents of the game - worlds, characters, weapons, traps, obstacles, etc. - to achieve a specific goal. In the process of designing the game, each element or idea can be accepted and inserted into the game if it contributes to the attractiveness of the game itself and is rejected if it does not make the game more attractive for playing. At the end of the entire process, the game maker creats concept explaining the story of the game, the goals, the various characters and everything that makes the game interesting.

The fundamental difference with the educational games is that from the start to the end, becausethere is a a ready-made book - what needs to be learned - and the developer need to move towards creating a game that will achieve what is in the book.

[84]Учење базирано на игра – Видео игрите во наставата по физика Никола Делевски СОУ “Никола Карев”, Струмица, Р. Македонија

Therefore, the developer has two main directives that should be followed simultaneously, the game to be attractive to play and follow the book ie. to be accurate, ie full of educational information. Another point to consider is the effectiveness of the game i.e. is the game makes people learn.

From the main elements that form a computer or video game, the graphics that the players see and the actions the player takes, ie. playfulness of the game itself is what makes the difference between a bad, good and extra good game. Players expect great graphics with many details. But there are exceptions to this rule, and they are seen in legendary games such as Pong, Asteroids, Tetris that have a lot of rudimentary graphics but a really huge playfulness. The playfulness of the game is far more important than its appearance so they devote themselves to fully to creating a fun and exciting playfulness.

How to combine playfulness with learning

Learning through digital video games in terms of two dimensions needs to be combination of Playability and Learning.

A commercial video game usually offers higher playtime but does not teach traditional educational content. Learning with digital games is possible when it has high playability and a high level of learning.

While designing learning games, it needs to keep the agility and learning. If more attention goes to dying, the game will not be attractive. If the attention to playfulness is higher and it continues with the moment of learning the game will attractive for playing, One of process for creating a digital learning-based game is as follows:

1. Creating a game of great playfulness that will interest players;
2. Finding learning activities and techniques that will teach what is needed;
3. Successfully compile the two postulates.

Getting to know the players

The most important element is to know the potential players i.e. the target group. The factors to be considered for the decision what type of video game should be created, are:

- Age
- Gender
- Competitiveness
- Previous experience with games

Alternative strategies for creating games for educational purpose can be:

1. Regarding a style of play that is common with all different types of players, a format adequate for both men and women, i.e. gender-neutral, further neutral in relation to competitive and non-competitive workers, can include:

- Detective games;
- Adventure games;
- Games with puzzles;
- Strategic games.

2. Creating more than one game. For example one for cooperative and one for non-cooperative players. Commercial Virtual World Centers in the United States started offering two games - one very aggressive with lots of shooting and a second much less aggressive game of racing cars. Games 2train has created a template in which a user can choose between six different games to learn the same content.
3. Creating an alternative to an audience that is not interested or attracted to the game.

Selecting a style of play

Choosing a game style from the presented categories can be done in several ways. There may be a commercial game (designed for children or adults) that is logical and intuitive in terms of its content.

The diversity of playing experience between playing The Sims, Alpha Centauri, Baldur's Gate and Roller Coaster Tycoon is different. The reason these and other hit games are good models is that their playfulness is already proven. However, a good idea is to create a whole new game from the beginning that will contain playfulness from different games. The most important thing is that for one game to be a good teacher, first be a good game and then a teacher.

3.7Contribution

For children, video games are very effective in learning the basic concepts of mathematics and grammar. For adults, game based learning is particularly useful when it

comes to developing skills needed in business, communication skills, negotiation, leadership skills, time management, and so on.

Traditional learning methods have serious shortcomings. The challenge of the game is to develop a new business strategy for the airline during a virtual day design and implementation.

For example, M-NAV in RN Macedonia for Flight Controllers uses Eurocontrol's FEAST test (www.feast.info) to check the specific skills and skills necessary for this profession. Specific skills and predispositions for this candidate can also be tested through the online games at https://www.nats.aero/careers/trainee-air-traffic-controllers/games/ and to test their knowledge of English, which is also the official language for communication in air traffic, here is a free preliminary e-test via the link.[85]

Video games can be effectively used to educate people of all ages.If these results are applied in the training of companies, they have to deal with certain issues differently. Serious games effectively transfer applicable knowledge. In addition to gaming this method also provides a huge reduction in organization costs. Lecturers, classrooms or business trips are no longer needed for this type of training, and it can be choosen the time during which the game will be played conveniently.

Other possibilities are open for usage of the video games, such as researches for medical purpose. Example for that is an analysis released by the Pew Internet & American Life Project, playing computer games can have a positive social, intellectual and ethical effect. Positive data from the study, which examined 1,200 children between the ages of 12 and 17, showed that games improve motoric, memory, concentration, multi-functionality, decision-making, and rapid response. Studies have shown that gamers have improved visual contrast sensitivity, and that time spent playing a video game can be a successful treatment for amblyopia, known as "lazy eye" syndrome.

The philanthropic mobile game "Sea Hero Quest" has been created with the ultimate goal to create a database that will be used in scientific research to tackle the growing dementia worldwide. Sea Hero Quest's ambition is to direct part of the time people spend playing games to something important and valuable to humanity, such as medical research on the most complex, non feared disease - dementia. Just 2 minutes of play in this innovative game provides data that in similar laboratory conditions would in reality be obtained in 5 hours. One of the first symptoms of dementia is loss of navigation ability. Doctors often avoid diagnosing dementia because of the inability to distinguish

[85]http://www.cambridgeenglish.org/test-yourenglish/ .

between loss of space in old age or dementia. That's why Sea Hero Quest is an innovative and fun solution that allows you to fill databases of your in-game navigation that will develop new tools and tests for early diagnosis of dementia. Sea Hero Quest was downloaded by more than 140,000 mobile phone users worldwide in the first 24 hours of launching the app on the App Store and Google Play. In the Republic of North Macedonia, the gamesupported by Telekom became a big hit, in the first few days of launch, it was the number one downloaded game from Google Play. Downloading for free and gaming is a caring approach to a better future for human health.Video games have won the learning world and have proven that they can be as effective as company's training.

4. Results and discussion

The research on the topic of video game industry is linked to the audiovisual domain that includes radio, television, film, video**, multimedia (including video games)** and sound recording. Multimedia is in itself a cultural product whose status implies several cultural domains also graphics and designs of Visual arts and Advertising.

According to UNESCO, multimedia is ‘A publication in which images, sound and text are integrated’. Multimedia therefore may be used in the following: Video games, Advertising, Films and animations, Artworks, Presentations.

In 2009, UNESCO creates the Audio-visual and Interactive Media as such: the core elements of this domain are Radio and Television broadcasting (including Internet live streaming), Film and Video, and Interactive Media. Interactive Media covers video games and new forms of cultural expressions that mainly occur through the Web or with a computer. It includes online games, web portals, websites for activities (e.g. social networks such as Facebook), and Internet podcasting such as YouTube. However, Internet software and computers are considered to be infrastructure or tools and, for the production of interactive media content and should be included in the transversal domain Equipment and Supporting Materials. Interactive media and software are important fields of activity. While many interactive media products and services have a cultural end use (computer and video games, interactive web and mobile content), the same cannot be said for the software industry. Interactive Media is considered to be part of the Audio-visual and Interactivemedia domain.

Under the UNESCO framework, audiovisual and interactive media are placed together in the same category. The ESSnet-Culture framework does the same but just call the

domain ‘Audiovisual, Multimedia’. Audiovisual has gone under huge technological changes these last years and the interactivity is indeed a very present concept, especially for cultural practices (e.g., the videogames went from individual game plays to the now social multiplayers on-line games or simulation life games, or even serious games just like in India where they are used for national healthcare prevention). The interactive media is thus a digital tool that transforms any domain, it is used everywhere (see interactive films, interactive museums, interactive art etc. to entertain, to engage, to educate at everyones’s own pace etc.). Besides the UNESCO concept is a broader concept including software in its Audiovisual domain. The Multimedia concept, as intended in the ESSnet-Culture framework, may also be interactive but not necessarily (an artwork made of sound, text and images do not necessarily request engagement from the audience). For measuring Audiovisual/Multimedia, some NACE classes consist entirely of audiovisual activities. These are mainly the NACE activities relating to production, distribution, publishing and broadcasting. They fully cover the activities of Audiovisual/Multimedia, even at the aggregated division (2- digit) and group levels (3-digit) of the NACE Rev.2:

59. Motion picture, video and television programme production, sound recording and music publishing activities;

59.1 Motion picture, video and television programme activities (detailed by 4 NACE classes: 59.11, 59.12, 59.13,59.14);

59.2 Sound recording and music publishing activities (59.20).

60. Programming and broadcasting

60.1 Radio broadcasting (60.10);

60.2 Television programming and broadcasting activities (60.20);

The 58.21 class, Publishing of computer games, is an entirely cultural class from the Audiovisual/Multimedia domain.

The classification is used in Eurostat, the cultural sphere in business statistics is therefore captured through the following NACE Rev. 2 codes, when they are covered (see 3.3. Sector coverage for details):

C18 Printing and reproduction of recorded media

C32.12 Manufacture of jewellery and related articles

C32.2 Manufacture of musical instruments

G47.61 Retail sale of books in specialised stores

G47.62 Retail sale of newspapers and stationery in specialised stores

G47.63 Retail sale of music and video recordings in specialised stores

J58.11 Book publishing

J58.13 Publishing of newspapers

J58.14 Publishing of journals and periodicals

J58.21 Publishing of computer games

J59 Motion picture, video and television programme production, sound recording and music publishing activities

The same methodology is applied in the State Statistics in RNM. The National Classification of Activities - NKD Rev.2 is a classification of economic activities in the Republic of Macedonia used for collecting, processing and publishing of statistical data, as well as for analysis and giving directions of the social and economic development and its structural changes.The primary objective of the Classification of Activities is to provide a basis for comparing statistical data of the RN Macedonia on European and world level. The National Classification of Activities - NKD Rev.2, in its content and structure is completely harmonized with the European Classification of Activities NACE Rev.2, (Regulation (EC) No.1893/2006 of European Parliament and Council of 20 December 2006 establishing the statistical classification of economic activities NACE Revision 2 and amending Council Regulation (EEC) No 3037/90 as well as certain EC Regulations on specific statistical domains OJ L/363).In 2013, by Decision of the Government of the RN Macedonia, amendments were made to the National Classification of Activities - NKD Rev.2. According to this Decision, the activities in the National Classification of Activities - NKD Rev.2 are grouped at the level of sections, divisions, groups, classes and subclasses. The Classification of Activities**has 21** sectors, 88 divisions, 272 groups, 615 classes and 4 subclasses. The amendments to the National Classification of Activities - NKD Rev.2 are being implemented from January 2013.

J/S				Information and communication
	58			Publishing
		58,1		Publishing books and other activities

		58,2		Publising software
			58,21	Publishing computer games

Table 24CLASSIFICATION OF THE VIDEO GAME INDUSTRY IN THE STATISTICS

Source: The State Statistics, 2019

The data for the turnover in the video game industry in the Eurostat database are available for EU countries, but for RNM are not available, neither are available in the national statistical office. The table below is pointing the EU countries development, Sweden, Finland, Romania, Poland, Cyprus are having exclusive growth.

GEO/TIME	2010	2011	2012	2013	2014	2015	2016
European Union - 28 countries	:	3.181,9	3.587,2	4.016	4.953,9	4.944,7	5.458,7
Belgium	21	1,1	1,1	2,1	4,6	4	5,9
Bulgaria	:	:	4,6	4,7	4,3	4,2	3,3
Czechia	:	:	:	:	:	:	:
Denmark	59,6	33,3	42,1	29,3	65,8	65,3	**63,1**
Germany (until 1990 former territory of the FRG)	461,1	393,4	366,6	446,8	532,4	509,6	**472,9**
Estonia	**:**	**:**	**:**	**:**	**1**	**0,7**	**1,2**
Ireland	:	:	:	:	:	:	:
Greece	0	8,3	0	0	:	0,4	0,4
Spain	:	:	:	:	:	:	**204**
France	1.206,2	1.231,6	1.513,5	1.309,4	2.085,2	1.686,4	**1.953,1**
Croatia	:	0,1	0,1	0,3	1	:	0,2
Italy	3,9	3,6	2,6	3,3	0	0	0
Cyprus	4,8	5,8	219	:	492,9	507,8	**540,5**
Latvia	:	0	:	0	:	:	0,1
Lithuania	:	2,1	1,8	2,8	3,3	7,1	11,5
Luxembourg	0	0	:	:	:	:	:
Hungary	5,3	4,9	3,5	3,6	3,9	4,9	5
Malta	:	0	0	0	:	:	:
Netherlands	:	:	:	:	:	:	:
Austria	5,7	4,1	3,2	2,1	2,6	:	:
Poland	15,3	46,9	71,7	47,2	55,7	123,2	**135,9**
Portugal	0,6	0,6	0,5	0,3	0,7	1,4	1,5
Romania	18,3	19,9	23,6	26,2	35,9	42,5	**41,6**
Slovenia	0,3	0,1	0,2	0,1	0,4	0,6	1,5
Slovakia	0	0	:	:	:	:	0,1
Finland	:	9,9	15,8	:	22,6	23,6	**44,4**

Sweden	312,9	439,6	570,9	647,9	515	809,3	**1.055,2**
United Kingdom	750,3	915,8	861,4	803,7	841,6	783	**790,1**
Iceland	:	:	:	:	:	0,6	0,4
Norway	14,9	:	:	6,7	9,1	11,8	11,3
Switzerland	:	:	:	:	:	:	:
North Macedonia	:	0	:	:	:	:	:
Turkey	:	:	:	:	:	:	:
Bosnia and Herzegovina	:	:	0,1	:	0,6	1,1	0,7

Table 25TURNOVER OF THE GAMING INDUSTRY IN MILLION EURO

Source: Eurostat, 2019

Though the chapters for investment and financial benefits from video games the general hypothesis -H0: The process of creating a video game is progressive. The general hypothesis tends is confirm that the trend of creation and application of video games is developing and progressive. This industry rapidly grows and makes funds much more than other industries from the audiovisual domain. The video games industry has earned more revenue than the movie and music industries combined.

The figure below shows that from 2001-2005 the revenues in the three industries were more tham 20 mil$, from 2005-until today, the music industry has ups and downs yet around the same amount. The film industry is growing up to 50 mil$, and higiest growth has the video game industry to 137 mil$.

This data are confirmed with the data form the Global Games Market[86]that indicates that **in the next 9 years PC and console games will register a 30% growth**and are ephasised because are the focus of this thesis,althougt the brither future is envisioned for the mobile videogames with 51% of the turnover.

[86]Newzoo. (2018). Top 25 Companies by Game Revenues. Oxford

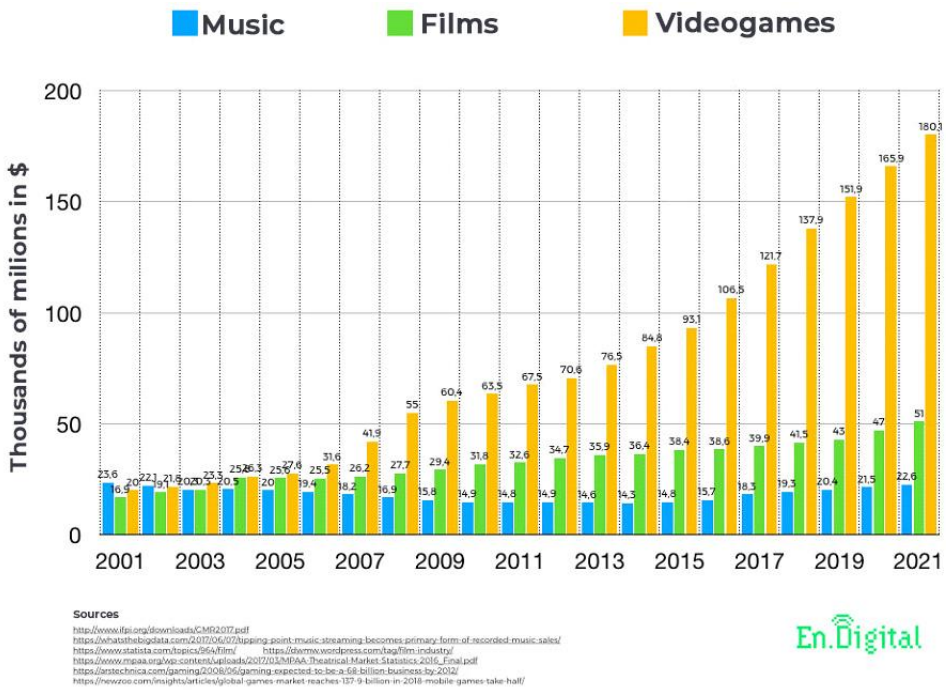

Figure 57COMPARISON OF THE TURNOVER FROM IN AUDIO-VISUAL INDUSTRIES

Source: https://lpesports.com/e-sports-news/the-video-games-industry

The general hypothesis is supported with:

H1: The situation in Macedonia in relation to video games is in a developing stage.

This hypothesisis proven with the mapping of the video game studious and evaluating their potential trough published games and the available opportunities for supporting the industry. The industry in the Republic of North Macedonia is still marginal with over 20 start-up companiesestablished in the last 10 years. The specifics of the companies are presented trough case studies for the structure of investments and models for generating income from the successful launch of the video games and their efforts show their presence globally. The available official statistical data for the Republic of North Macedonia, are presented in the database of Eurostat, there are for the number of companies that are connected to publishing of computer games.

GEO/TIME	2010	2011	2012	2013	2014	2015	2016	Total
European Union - 28 countries	:	:	:	:	2.000	2.000	:	4.000
Belgium	82	10	9	15	15	15	23	169
Bulgaria	:	5	9	14	14	19	22	83
Czechia	:	:	:	:	:	:	:	0
Denmark	26	32	47	52	70	74	88	389
Germany (until 1990 former territory of the FRG)	131	77	53	41	143	44	98	587

Estonia	4	1	1	8	9	10	11	44
Ireland	:	:	:	:	:	:	:	0
Greece	0	7	0	0	:	14	14	35
Spain	:	:	:	:	:	:	89	89
France	192	162	200	465	400	364	485	2.268
Croatia	4	4	7	8	9	9	12	53
Italy	10	8	8	16	0	0	0	42
Cyprus	9	5	6	:	7	9	8	44
Latvia	1	0	2	3	5	4	7	22
Lithuania	2	3	5	10	12	12	27	71
Luxembourg	0	0	3	5	5	7	5	25
Hungary	44	45	44	47	51	50	57	338
Malta	:	0	0	0	:	:	:	0
Netherlands	2	3	4	10	15	25	28	87
Austria	8	7	7	7	6	8	7	50
Poland	121	186	214	263	300	329	400	1.813
Portugal	12	10	11	17	24	21	27	122
Romania	66	53	59	62	66	71	82	459
Slovenia	4	4	5	4	7	11	17	52
Slovakia	0	0	:	:	:	:	3	3
Finland	12	13	15	12	15	19	20	106
Sweden	245	339	422	483	556	582	655	3.282
United Kingdom	107	127	100	141	187	209	236	1.107
Iceland	:	:	:	:	:	4	6	10
Norway	15	11	13	16	19	19	19	112
Switzerland	:	:	:	:	:	:	:	0
North Macedonia	:	6	6	6	5	2	3	28
Turkey	:	:	:	:	:	:	:	0
Bosnia and Herzegovina	:	:	4	:	4	6	6	20

Table 26NUMBER OF ENTREPRICES FOR PUBLISHING VIDEO GAMES

Source: Eurostat, 2019

The statistical data are supported with the interviews of video game studious and mapping of the gaming studious in the period 2009-2018 including tne number of developers.

Year	Game developers	Video game development studious in the R of North Macedonia
2009	1	53
2010	3	134
2011	2	151
2012	1	157
2013	1	160
2014	1	170
2015	3	200

2016	0	200
2017	3	234
2018	3	242

Table 27Number of the video game studious and the game developers in the Republic of North Macedonia in period 2009 - 2018

Table 1. provides time series data related to the number of game developers and video game development study in the Republic of North Macedonia from 2009 to 2018. The number of game developers is highly variable in this time period, reaching its maximum number in the last two years in the observed period (See Figure 1.) This variability does not allow this data to be seen as a trend that is confirmed and by the low value of the coefficient of determination in all trend modes. If one observes the number of video games being developed by the study then there is a continuous, significant and intense development in the observed period. Namely, the number of video games developing the study in 2018 increased by 4.56 times compared to 2009. If a proper analysis of these time series is applied and the best trend is selected accordingly, this forecast of the number of video games developing the study yields graphs that are five-sided in Figure 2. From this graph you can It should be noted that the number of video games developing the study from 2009 to 2010 has had the most intensive growth, after which that number is continuously and significantly increasing until 2015 where that number is identical to that in 2016. Then, for the last three years of the observed time period, we have again intensifie development. The empirical data concerning the number of video games being developed by the study has an approximated Linear trend with a significant value of the coefficient of determination (0,880) which gives us the right to make an appropriate valid forecast of this number for the futire period.

Figure 58Num of the video game development studious in the R of North Macedonia in period 2009 – 2018

Namely, assuming that the trend of developing the number of video games will be realized as a Linear trend, in 2020 the number of developers is expected to be 280. Important information from the trend line is that in this observed time period of 2009 by 2018, the number of video games developed by the study, on average, increased by 17 each year.

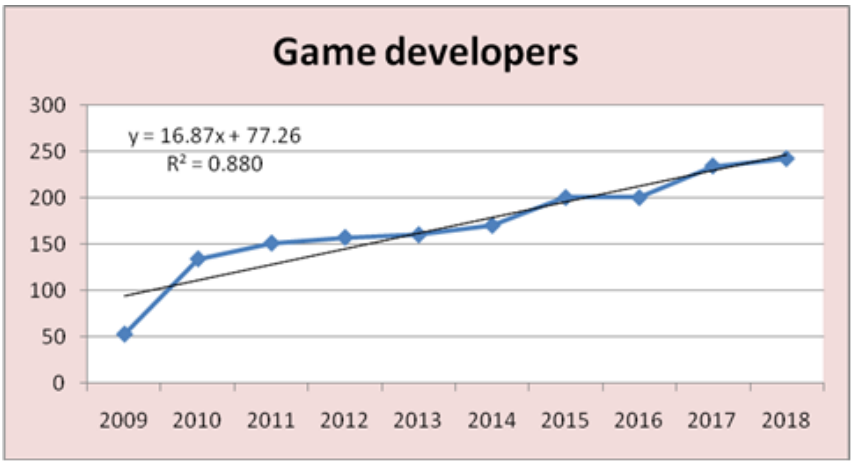

Figure 59Num of the game developers in in the R of North Macedonia in period 2009 - 2018

Further, the statistical data are supported with the interviews of videogame studious in the Republic of North Macedonia and their performance and adequate statistical analyses is performed.

	Name of the studio	Nb of employees	Faculty	High school	genre	Engine for development of video games	Platform to be published on	Complite product from Idea to product
1	KAMAi MEDIA	12	8	4	adventure, simulation	own engine, CryEngine, Unity and Unreal.	Steam for PS	own product + outsorsing
2	Tesseract games	6	6		Action, strategy	Unity	Steam for PS	own product
3	Workbench Entertainment	10	8	2	Horror, adventure	Unity	Steam for PS	own product
4	Endy Milojkovski	1	1		Puzzle, strategy	Unity	Steam for PS	own product
5	NapNok Games	27	22	5	Frenetic action, strategy		Diffent platforms	outsoursing support to the Danish studio
6	Koloss collective	3	3		action, casual	Unity	Steam for PS	own product + outsouring
7	Dark-1	4	4		Action, adventure	Unity	Steam for PS	own product +

								outsouring
8	Maximus Ludos Studious	3	3		Adventure , puzzle	Unity	Steam + other platforms	own product
9	Return Zero	3	1	2	Adventure , puzzle	Unreal	work in progress	own product

Table 28ANSWERS (Q1) OF ENTREPRICES FOR PUBLISHING VIDEO GAMES

Regarding the answers to the first questionnaire, we can set the following null hypotheses regarding the success of the studio.

H_1: The success of the studio does not depend on the number of employees.

CBS-Chi-Square Analysis

Results - Expectations

	X1	X2	X3	Total
1 =	3	0.50	0.50	4
2 =	1.50	0.25	0.25	2
3 =	1.50	0.25	0.25	2
Total	6	1	1	8

Critical chi-square: 9.4877
Computed chi-square: 4.3333
p value: 0.3593
Conclusion: *Do not Reject Hypothesis*

We accept the null hypothesis, and conclude that the success of the studio does not depend on the number of studio employees.

H_2 :The success of the studio does not depend on the level of education of the staff.

CBS-Chi-Square Analysis

Information Entered - Observations

Number of Columns: 2
Number of Rows: 3
Alpha Error: .05
Degrees of Freedom: 2
Critical chi-square: 5.99147

	X1	X2	Total
1 =	18	4	22
2 =	9	2	11
3 =	6	0	6
Total	33	6	39

Results - Expectations

	X1	X2	Total
1 =	18.615	3.385	22
2 =	9.308	1.692	11
3 =	5.077	0.923	6
Total	33	6	39

Critical chi-square: 5.9915
Computed chi-square: 1.2893
p value: 0.5115
Conclusion: *Do not Reject Hypothesis*

We accept the null hypothesis, and conclude that studio success does not depend on the level of education of the studio staff.

H_3: The success of the studio does not depend on the type of game.

CBS-Chi-Square Analysis

Information Entered - Observations

Number of Columns:	3
Number of Rows:	3
Alpha Error:	.05
Degrees of Freedom:	4
Critical chi-square:	9.48773

	X1	X2	X3	Total
1 =	2	1	0	3
2 =	1	0	1	2
3 =	0	1	0	1
Total	3	2	1	6

Results - Expectations

	X1	X2	X3	Total
1 =	1.500	1	0.500	3
2 =	1	0.667	0.333	2
3 =	0.500	0.333	0.167	1
Total	3	2	1	6

Critical chi-square:	9.4877
Computed chi-square:	4.6667
p value:	0.3199

Conclusion: *Do not Reject Hypothesis*

We accept the null hypothesis, we conclude that the success of the studio does not depend on the type of game.

H_4: The success of the studio does not depend on the game creation software

CBS-Chi-Square Analysis

Information Entered - Observations

Number of Columns:	2
Number of Rows:	3
Alpha Error:	.05
Degrees of Freedom:	2
Critical chi-square:	5.99147

	X1	X2	Total
1 =	1	3	4
2 =	0	2	2
3 =	0	1	1
Total	1	6	7

Results - Expectations

	X1	X2	Total
1 =	0.571	3.429	4
2 =	0.286	1.714	2
3 =	0.143	0.857	1
Total	1	6	7

Critical chi-square:	5.9915
Computed chi-square:	0.8750
p value:	0.6345

Conclusion: *Do not Reject Hypothesis*

We accept the null hypothesis, we conclude that the success of the studio does not depend on the game design software.

H_5: The success of the studio does not depend on the platform on which the game is published

CBS-Chi-Square Analysis

	Statistics (calculated value) of χ^2 -test	df	Theoretical (table) value of the χ^2 -test	P-value	Statistical conclusion (acceptance or rejection of the hypothesis)

Information Entered - Observations

Number of Columns:	3
Number of Rows:	3
Alpha Error:	.05
Degrees of Freedom:	4
Critical chi-square:	9.48773

	X1	X2	X3	Total
1 =	3	0	1	4
2 =	2	0	0	2
3 =	1	0	0	1
Total	6	0	1	7

Results - Expectations

	X1	X2	X3	Total
1 =	3.429	0	0.571	4
2 =	1.714	0	0.286	2
3 =	0.857	0	0.143	1
Total	6	0	1	7

Critical chi-square:	9.4877
Computed chi-square:	0.8750
p value:	0.9277
Conclusion:	*Do not Reject Hypothesis*

We accept the null hypothesis, that is, we conclude that the studio's success does not depend on the platform on which the game is published.

H_6: The success of the studio does not depend on whether it is its own product or outsourcing.

CBS-Chi-Square Analysis

Information Entered - Observations

Number of Columns:	2
Number of Rows:	3
Alpha Error:	.05
Degrees of Freedom:	2
Critical chi-square:	5.99147

	X1	X2	Total
1 =	1	3	4
2 =	2	0	2
3 =	1	0	1
Total	4	3	7

Results - Expectations

	X1	X2	Total
1 =	2.286	1.714	4
2 =	1.143	0.857	2
3 =	0.571	0.429	1
Total	4	3	7

Critical chi-square:	5.9915
Computed chi-square:	3.9375
p value:	0.1326
Conclusion:	*Do not Reject Hypothesis*

Hypothesis 1	4.3333	4	9.4877	0.3593	Do not Reject Hypothesis
Hypothesis 2	1.2893	2	5.9915	0.5115	Do not Reject Hypothesis
Hypothesis 3	4.6667	4	9.4877	0.3199	Do not Reject Hypothesis
Hypothesis 4	0.8750	2	5.9915	0.6345	Do not Reject Hypothesis
Hypothesis 5	0.8750	4	9.4877	0.9277	Do not Reject Hypothesis
Hypothesis 6	3.9375	2	5.9915	0.1326	Do not Reject Hypothesis

Table 29STATISTICAL PERFORMANCE FROM TESTING THE HIPOTESIS FOR THE SUCCESS OF THE GAMING STUDIOS WITH χ^2-TEST

Based on the processed available data, we can conclude that on the success of the studio interactively influences many factors that actually occur in practice. But if we individually test certain influences, as we did by applying the independence test (the χ^2-test) we can statistically conclude, in the six cases, that the success of the studio does not depend on: the number of employees, the level of education of the employees, the type of game, the game design software, the platform on which the game is published, and the fact that it is a product of its own or they work on outsourced product.

The data from the studios are used for futher statistical analyses:

	Studio	**Name of the video game**	**Time of release**	**Num of developers**	**Revenue per employee in $USA (for the game)**
1	Endy Milojkovski	Raining Blobs	2016	1	
2	Tesseract Interactive	Excubitor	2016	5	19.987
3	Koloss Kolektiv	SlimeBrawl	2017	3	6.644
4	Kamai Media	Sonder	2017	12	2.217
5	Dark 1	Odium to the Core	2018	3	**11.089**
6	Maximus Ludos Studios	Echoes World	2018	3	6.650
7	Workbench Entertainment	Wounded	2019	9	**5.178**

Table 30REVENUES PER DEVELOPER PER GAME

Source: Own calculation based on the interviews

If we create a regression model we define **revenue per employee** as a dependent variable, and independent variables are: price of the video games $ USA, the potential revenuesin $ USAand number of developers. Then, based on the processed data available for the study, we obtain the following output performance:

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.984549722
R Square	0.969338155
Adjusted R Square	0.923345388
Standard Error	5.137113562
Observations	6

ANOVA

	df	SS	MS	F	Significance F
Regression	3	1668.574	556.1912	21.07588	0.045638
Residual	2	52.77987	26.38994		
Total	5	1721.353			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	24.64715892	8.164748	3.018729	0.094447	-10.4829	59.77723	-10.4829	59.77723
Price $ USA	6.258788589	3.972532	1.575516	0.255826	-10.8336	23.35122	-10.8336	23.35122
$ USA potential	-0.202377046	0.283585	-0.71364	0.549491	-1.42255	1.017791	-1.42255	1.017791
Num of developers	-2.40003096	0.646213	-3.71399	0.065459	-5.18046	0.380398	-5.18046	0.380398

RESIDUAL OUTPUT

Observation	Predicted Revenue per employee	Residuals	Standard Residuals
1	59.96	7.11E-15	2.19E-15
2	24.05869659	-4.1257	-1.26984
3	4.669665635	1.980334	0.609522
4	28.48119195	4.785808	1.473011
5	26.26994427	0.330056	0.101587
6	18.50350155	-2.9705	-0.91428

PROBABILITY OUTPUT

Percentile	Revenue per employee
8.333333	6.65
25	15.533
41.66667	19.933
58.33333	26.6
75	33.267
91.66667	59.96

Based on the results we create the following information regarding the interaction of the dependent variable revenue per employee and independent variables: price per game $ USA, potential revenue $ USA and number of developers:

- Multiple correlation coefficient is 0.985 which means there is a very strong relationship between revenue per employee, price of the games $ USA, potential revenue $ USA and number of developers in the studious.

- The corrected coefficient of determination is 0.9233 which means that 92.33% of the variability of the revenue per employee is explained by the relation that exists with price $ USA, potential revenues $ USA and number of developers.

  7.67% of the variance of revenue per employee is the result of the effect of other factors not included in the model.

  92.33% change in revenue per employee are due to changes in price $ USA, potential revenues $ USA and number of developers.

- The standard error has a value of 5.14 and shows that the average deviation of the original revenue per employee values from the theoretical (expected) values of the revenue per employee obtained from the regression equation is $ 5.14 USA.

- The null hypothesis is set that the partial coefficients in the regression model are equal, namely that price $ USA, potential $ USA and number of developers have equal impact on revenue per employee. The table ANOVA shows the significance of the calculated value of the variable F having a value of 0.045638. Since the theoretical value of the variable F = 0.05> F = 0.045638,that rejects the null hypothesis with a 5% error risk and it can be concluded that price of the games $ USA, potential revenues $ USA and number of developers have **different impact** on revenue per employee.

- The regression coefficient b = 24.65 shows the theoretical or expected value of revenue per employee when price $ USA, potential $ USA and number of developers have zero value. This is only a theoretical value that has no economic significance and has no role in creating the regression model.

- The regression coefficient b = 6.26 indicates that with each increase in price $ USA for1 $ USA, revenue per employee increases on average by $ 6.26 USA, provided that the values of potential revenues $ USA and number of developers are unchanged.

- The regression coefficient b = -0.202 indicates that with each increase in the value of potential revenues $USA for1 $USA, revenue per employee decreases on average by 0.202 $USA, provided that the values of price $ USA and number of developers remain unchanged.

- The regression coefficient b = -2.4 indicates that with each increase of number of developers for one, revenue per employee decreases by an average of 2.4 $USA, provided that the values of price $ USA and potential revenues $USA remain unchanged.

- The partial resilience coefficients have respectively:

  KE1 = 1,466; KE2 = -0,861 и KE3 = -0,519

This means that with the increase of price $ USA by 1% revenue per employee will increase by 1,466%, increase of potential revenues $ USA by 1% revenue per employee will decrease by 0.861% and increase of number of developers for 1%, revenue per employee will decrease by 0.519%. This means that price $ USA has the largest share of revenue per employee (or has the most impact). The potential revenues $ USA has a greater impact on the revenue per employee than number of developers.

The H2: The SWOT analysis of various software tools for making video games aims to success.The analysis of various tools for making video games are supporting the successful creation of products and their sales on the global market. According the questionnaires', three software engines are used for game development and are sufficient for production of quality gamers. For this purpose the comparison with the global trend of the developers is done.

The Figure 8 shows the usage of different softwares for game development from Net.core with 77%, to .Net with 61%, Unity 3D and Unreal with 60% and CryEngine 42.7% according the possibilities offered and preferencies of the developers. In the Republic of North Macedonia 90% of developers use Unity, 20% of them use Unreal and only 10% Cryengine. Compared with the global percentage Unity is used 30% more from the Macedonian developers, while Unreal is used with 40% less and Cryengine is used 32.7% less than the global trends. Regarding the other software opportunities, there are considered as potential to be used by Macedonian developers.

The analysis is continuous with evaluation of the level of development of the development and promotion of video games.

Activity stages	Level of development		
	high	**medium**	**Low**
Game development	1.Attractiveness to work in gaming studious 2.Creativity and profit driven 3. Low cost for development compare to EU and other developed countries	1.Computer games production studious 2. Network of cooperation with international game developers (outsourcing to RNM studious) 3.State support for opening gaming studious 4.Innovation fund support video games	**1.Number of professionals in certain area of development**
Video games promotion		Global game jam event to promote game development Other events: hackathons, projects It.mk gg.mk Social networks You tubers	**Active community for support of national video games**

Table 31ESTIMATION OF THE DEVELOPMENT ACTIVITIES IN VIDEO GAMES IN RNM ACCORDING THEIR STAGE

Source: author`s overview based on the research

Based on the hypothesis to evaluate all the necessary elements for game development, full analyses is done of the IT sector, special focus on the game developers. The studios are questioned about the opportunities where to find team members, do they need training, are they willing to invest in training and what are their suggestions for educational options.

	Name of the studio	Where did you find the team	is it easy to find team members	professionals work experience	additional training	invest in training	different education options
1	KAMAi MEDIA	Interviews, Global game jam, accelerator,	yes junior not senior	no	yes	yes	new multydiscilinary cources

		events					
2	Tesseract games	Faculty, friends, events, Global game jam	yes junior not senior	no	yes	yes	Practical projects
3	Workbench Entertainment	Faculty, friends, events, Global game jam	yes junior not senior	yes	yes	no	mixed cources artist and 3D
4	Endy Milojkovski	freelancer			yes		cooperatin wth gaming studious
5	NapNok Games	Interviews, Global game jam sponsorship	yes junior not senior	no	yes	yes	
6	Koloss collective	Faculty, friends, events, Global game jam	yes	no	yes	no	practice in the gaming studious
7	Dark-1	Faculty, friends, events, Global game jam	yes	yes	yes	no	practice in the gaming studious
8	Maximus Ludos Studious	Faculty, friends	yes	yes	yes	no	
9	Return Zero	Faculty, friend, Global game jam, accelerator	yes	yes	yes	no	fast cources for game development

Table 32ANSWERS (Q1) OF ENTREPRICES FOR PUBLISHING VIDEO GAMES

Based on the answer, 77.78% of the study recruits the team through Global game jam event; 66.67% of the study recruited the team through faculty and friends; 55.56% recruit team through other events, 22.22% through accelerators and interviews, and freelancer are represented with 11.11%. The structure of the views of the study are presented in Figure 1 and Figure 2

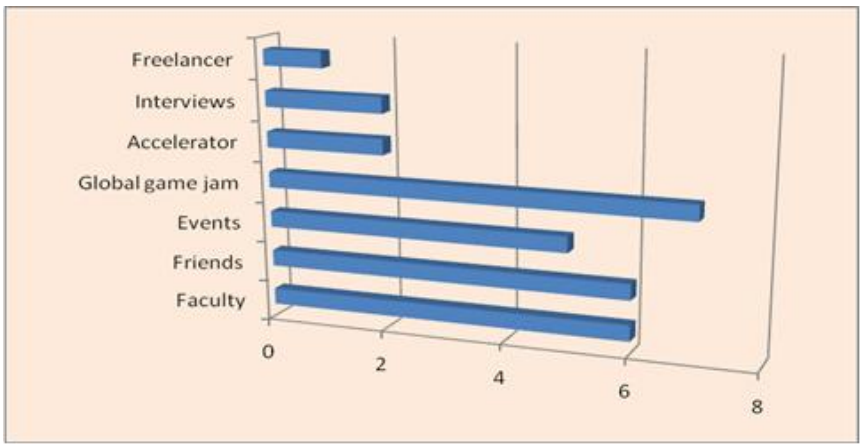

Figure 60STUDIOS ANSWERS ON: WHERE DID YOU FIND THE TEAM?

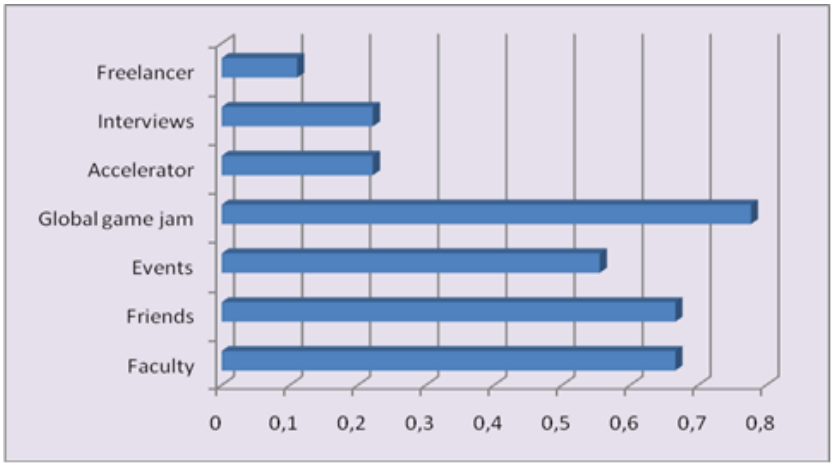

Figure 61PERCENTAGE OF PARTICIPATION ACCORDING THE QUESTION: WHERE DID YOU FIND THE TEAM?

Half of the studious believe that game developers are easy to be find and half of the study hold that yes is not easy for senior programmers.

The views on the question: Are there educated professionals in the labor market for video game development? In that respect, half of the study stated that there are such educated professionals and half of the study stated that there are no such professionals for video game development.

To the question: Is there a need for further education and training of developers? All studies have stated that there is a need for this.

37.5% of the study stated that they can investing in training, and 62.5% of the study stated that they cannot invest in training.

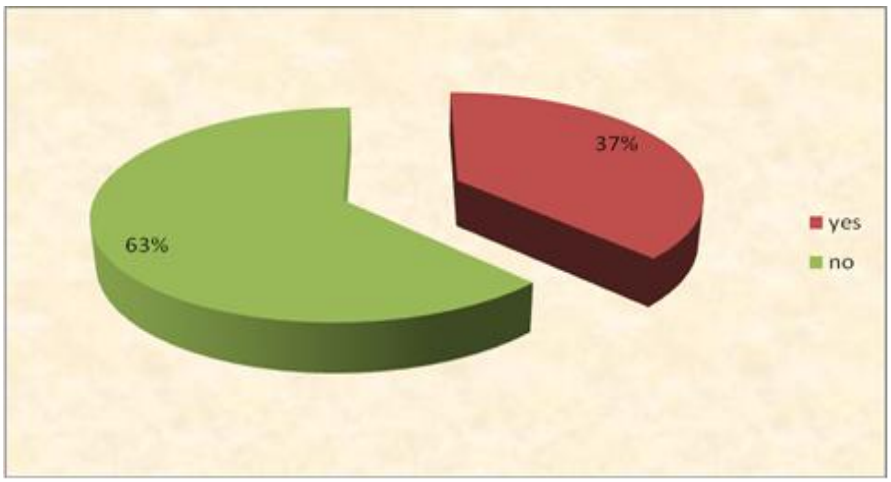

Figure 62PERCENTAGE OF PARTICIPATION ACCORDING THE QUESTION: ARE THE COMPANIES READY TO INVEST OR NOT IN TRAINING?

Regarding the attitudes to this question, we can set the following zero hypotheses regarding the success of the studio.

H_1: The success of the studio does not depend on the readiness to invest in training.

CBS-Chi-Square Analysis

Information Entered - Observations

Number of Columns:	2
Number of Rows:	3
Alpha Error:	.05
Degrees of Freedom:	2
Critical chi-square:	5.99147

	X1	X2	Total
1 =	1	3	4
2 =	0	1	1
3 =	1	0	1
Total	2	4	6

Results - Expectations

	X1	X2	Total
1 =	1.333	2.667	4
2 =	0.333	0.667	1
3 =	0.333	0.667	1
Total	2	4	6

Critical chi-square:	5.9915
Computed chi-square:	2.6250
p value:	0.2580
Conclusion:	*Do not Reject Hypothesis*

We accept the null hypothesis, and conclude that the success of the studio does not depend on the need to invest in training.

On the question of what is needed for development of a professional developer staff there are different and divided views of the study: new multidisciplinarycourses, practical projects,mixed courses, artist and 3D, cooperation with gaming studious, practice in the gaming studious and fast courses for game development.

The salaries are major investment in the development studious, they are also elaborated trough the statistical analysis.

H_0: There is no difference in the monthlynet salaries for developers and designers

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Monthly net salaries (programers)	5	276600	55320	1.15E+09
Monthly net salaries (designers)	9	314460	34940	1.01E+08

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1335035571	1	1.34E+09	2.961313	0.110935	4.747225
Within Groups	5409907200	12	4.51E+08			
Total	6744942771	13				

By applying one-factor ANOVA and two modalities based on the data of the monthly salaries of the developers and designers for the two samples investigated, it can be statistically concluded that there is no difference in the monthlynet salaries between developers and designers. This statement is with a confidence threshold of 0.95 or 5% error risk and we base it on the factor that the calculated statistic value of F = 2,961313 is less than the theoretical value of that variable F *crit* = 4,747225, obtained on a basis at (1.12) degrees of freedom and a confidence threshold of 0.95. The same conclusion is confirmed by comparing the calculated value of p = 0.110935 that is greater than the theoretical value of p = 0.05.

Further, in the research is evaluated the opinion of the studious regarding their product, support, attitude, benefits, plans and the future of the video game industry in the Republic of North Macedonia.

	Name of the studio	quality of production, price or time of preparation?	help from institutions, organizations and specialist	support for foreign markets	attitude of the country towards this industry	benefits that you can apply	what need to be changed	expand your business	other sphere or games for the other platforms	the future of video game in the RNM
1	KAMAi MEDIA	1. Quality - innovation; 2. Time of production	international consultants	marketing of the game	low awareness	business competition; innovation fund	positive example of succesful game, educational approach, financial support	PS downloadable games; AR	business model for selling our own engine, outsoursing work for other studious	creativity, low cost, innovative ideas
2	Tesseract games	1. Quality - action; 2. Time of production	supporting events, exchage of ideas	marketing of the game	not recognized as profession	Self-employment grant	education and financial support	PS downloadable games;	new game, ousorcing for others	enthusiasm
3	Workbench Entertainment	1. Quality - Creativity; 2.Price	supporting events, exchange of ideas	bilateral agreements with USA for double taxation	low awareness of the talent and creativity		financial support, acceleration, international programs	PS downloadable games;	new episodes of the Wounded	creativity
4	Endy Milojkovski	1. Quality - Creativity; 2.Price	supporting events, exchange of ideas	easy market to be entered	not interested in the industry				outsourcing	creativity
5	NapNok Games									Low cost
6	Koloss collective	1. Quality; 2.Price	supporting events, membership in international organization	marketing of the game	low awareness of the talent and creativity	Competitions for reward	financial support	PS downloadable games; mobile games	new mobile game, outsourcing	creativity
7	Dark-1	1. Quality; 2.Price	supporting events, membership in international organization	marketing of the game	recognised by the Innovation fund	Self-employment grant + Innovation fund	promotion of the studious	PS downloadable games; mobile games	New game	creativity, innovative ideas

8	Maximus Ludos Studious	1. Quality; 2.Price						PS downloadable games; mobile games	new mobile game	creativity
9	Return Zero	1. Quality; 2. Time of production	supporting events, accelerators for video games			Project funding	financial support, acceleration	PS downloadable games;	finalising the game	enthusiasm

Table 33ANSWERS (Q3) FOR THE FUTURE OF VIDEO GAMES

Regarding the question, "What attracts customers: quality, price or time of game creation?" The views of the respondents are different. Everyone agrees that customers are attracted to quality of the game, and some of them even add quality modalities like quality and creativity and quality and action. 71.43% of the study consider that price attracts the customer and 28.57% of them consider that the time of production is important for attracting customers.

Regarding the attitudes to the above question, from the given answers we can set the following zero hypotheses regarding the success of the studio.

H_1: The studio's success does not depend on the quality of production, price or time of preparation.

CBS-Chi-Square Analysis

Information Entered - Observations

Number of Columns:	3
Number of Rows:	3
Alpha Error:	.05
Degrees of Freedom:	4
Critical chi-square:	9.48773

	X1	X2	X3	Total
1 =	4	3	1	8
2 =	2	2	0	4
3 =	1	0	1	2
Total	7	5	2	14

Results - Expectations

	X1	X2	X3	Total
1 =	4	2.857	1.143	8
2 =	2	1.429	0.571	4
3 =	1	0.714	0.286	2
Total	7	5	2	14

Critical chi-square:	9.4877
Computed chi-square:	3.3250
p value:	0.5013
Conclusion:	*Do not Reject Hypothesis*

We accept the null hypothesis, and conclude that studio success does not depend on quality, production or time of preparation of the video game.

Regarding the question for help from institutions, organizations and specialist, most of the study or 85.71% have opinion for supporting events; 42.86% of studios are for exchange of ideas; 28.57% for membership in international organization and 14.29% for international consultants and accelerators for video games.

Regarding the question What kind of support the studious need 66.67% of them are in need for marketing support of the game and 16.67% of them are for initiative to the Government for bilateral agreements with USA in order to avoid double taxation.

The answers regarding the attitude of the country towards this industry, benefits that you can apply, what need to be changed,expand your business, other sphere of the video game industry or develop games for the other platforms and the potential and the future of video game industry in the Republic of North Macedonia, are different with divided opinions.

For additional support of the H2 hypothesis, we also included SWOT matrix for the vido game industry and mood barometer to present the real situation and the future trends. SWOT matrix means base for attracting investors in this industry, which implies new employment opportunities for gaming developers.

STRENGHTS	**WEAKNESSES**
Gaming studious with successful published games and international experience, they are small size and flexible Universities and vocational training for HR development (including online support) Accelerators for practical development (opportunity to have mentoring support) Developers in the community have international experience and network Start-up mentality Creativity	Low financial opportunities of gaming studious (VC/business angel community, grants, innovation funds) Low Knowledge of application procedures Lack of skilled specialists in Unity, Unreal and other profiles Lack of communication and lobby outside the game developers community
OPPORTUNITIES	**THREATS**
Building a culture of the hackathons Establishing industry lobby group and creating strategy for outside community	Still existing negative bias towards games and gaming

Raising money from European funds, investors, public sources Ecosystem with low labor cost Increased demand and low barriers for market entering	Adequate legal solutions

Table 34SWOT ANALYSES OF THE VIDEO GAME INDUSTRY IN RNM

Source: author`s overview based on the research

The unequal, unavailable documented facts and statistical figures for the RM involved in the Game Industry are the motivation to include the mood barometer as an instrument to create the profile of the game industry. The main objective of the analysis is a support of a SWOT of the current situation of the game industry. To back up the various figures and statistics, top-ranking experts within the game sector were asked their well-informed opinion on the different areas of interest for the project goals.

The survey was conducted amongst the highest-ranking experts (such as national game associations).

The survey

How would you assess your game developing industry?

1. How strong would you estimate the entrepreneurial spirit of game studios in your country to be?

E.g. in some countries there is in particular with start-ups and small mature studios a tendency to consider their work as primarily an artistic creation, and therefore neglect or reject acquiring entrepreneurial skills. Rate from 0 (non-existent) to 5 (very strong).

2. How easy can game companies find young staff?

Does your country provide enough young talents (e.g. because of a local university offering game design studies or because the city attracts young people) or do you need to target and attract them? Rate from 0 (extremely low availability) to 5 (very satisfactory availability).

3. How easy can game companies find experienced staff?

Do games companies have difficulties in finding and hiring experienced staff in your region? Rate from 0 (extremely difficult to find senior talents) to 5 (the region is very attractive for senior talents).

4. Are your game studios successful on the international consumer market?

The games that are sold, are they mainly sold on the home market or on the international market?

Rate from 0 (only home market sales) to 5 (mainly international market).

5. How good do you think is your country's reputation as a good game producing industry?

This is meant to reflect on how aware are international publishers and investors of the game industry, in a positive sense? Rate from 0 (no international awareness) to 5 (highly reputed in the world).

6. Investment climate into games production

How would you judge the general investment climate towards games in the country? Are there reservations towards the game industry or is the industry considered a promising sector? Rate from 0 (no investment into the game industry) to 5 (very favourable investment climate).

7. How strong and influential is the game community in your region?

How well is the industry represented? Rate from 0 (hardly any community) to 5 (strong community).

How strong is the lobby towards the policy-makers in your region? Rate from 0 (no lobby support) to 5 (strong and influential lobby support).

How appealing would you judge their region to be in terms of living, working and hiring?

We are looking at this in terms of attracting talents and companies to settle down in your region. Is it expensive to live in your region? Do you earn well? Are work costs (employer's additional costs) high (this will be the same throughout your country, and possibly not regionally different)?

8. Would you say living costs are high (compared to the medial income)?

Rate 0 (yes, people tend to struggle to make ends meet) to 5 (no, in general people can afford a high living standard).

9. Would you say salary levels for game developers in your region are high or low (compared to similar types of jobs in other sectors)?

Rate 0 (yes, much lower than similar jobs) to 5 (no, much higher than similar jobs).

The results

Though these diagram only reflect an informed, yet subjective assessment, the idea is that with these diagrams and regular updates, it can track the development of the game industry within the Republic of North Macedonia, and also detect the impact of the measures taken over time.

Figure 63MOOD BAROMETAR FOR REPUBLIC OF NORTH MACEDONIA

Source: Authors design based on the research

In the barometer, highest value has the availability of young staff, and lowest are the positive awareness and good salaries. The talents and international success is evaluated as medium, and the investment climate, game community and supporting lobby as well as living costs are on the beginning position.

Regarding the dependent variables trends and applications of video games, the interviews present that video games studious decides to develop video game according their preferences rather than following the trends. The only difference is Kamai Media that has innovation in the engine and in the game genre including AR (artificial intelligence).

The data produced with the study are from a small sample because the industry is at the beginning, there are not sufficient and adequate data. For that purpose the depedent varialble is analised from the international data and the set hypothesis is proven.

The trend of the genre of the video games is presented trought the data from the Steam platform.

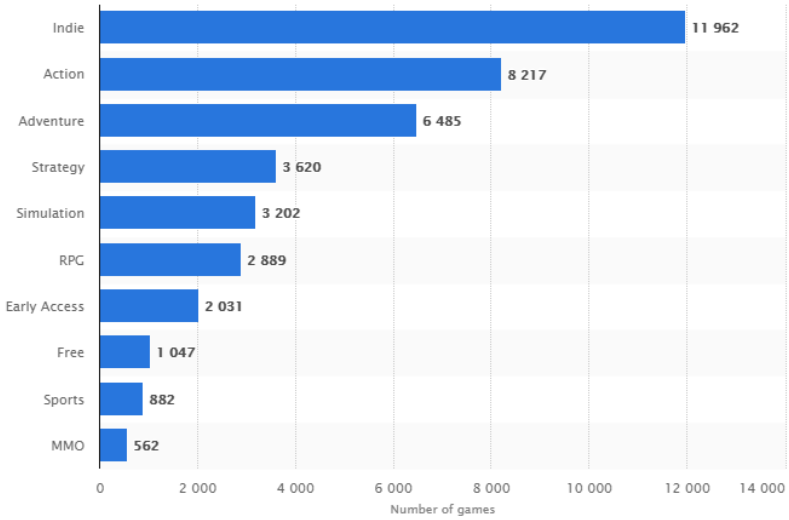

Figure 64NUMBER OF GAMES RELISED ON STEAM BY GENRE, 2017

Source: Statista, 2019

This statistic presents information on the cumulative estimated number of games released on Steam worldwide as of November 2017, by genre/category. According to the calculations, there were 11.96 thousand indie games released on the platform in the measured period.For 2018, worldwide, the higiest number of games are Indie video games, and the least MMO video games, or 21 times more. There is a large and significant number of Action and Adventure video games.

Further the playing time of certain genres and in different countries is taken in consideration to prove the actractivness of the game for the players, trough their playing time.

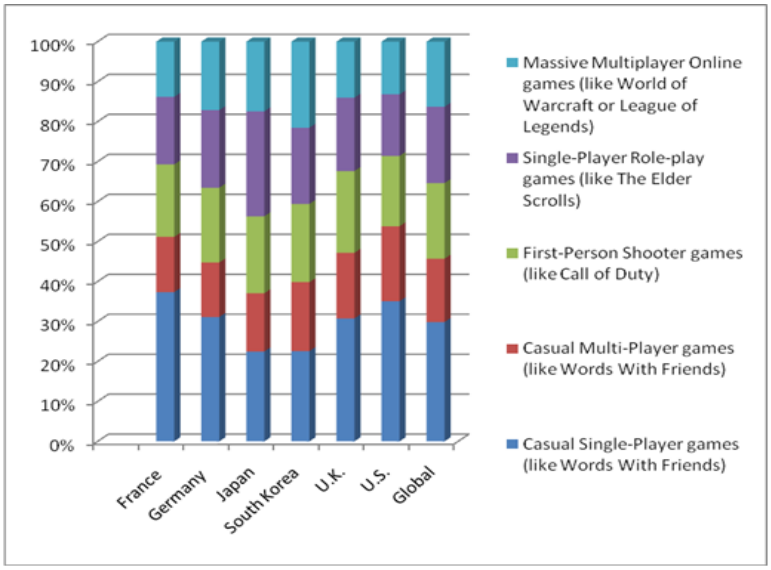

Figure 65PLAYING TIME WITH DIFFERENT GENRE

Source: authors figure based on

https://www.limelight.com/resources/white-paper/state-of-online-gaming-2019/

In this case the following hypotheses can be defined:

H1: There is no difference in the choice of the games for different countries.

H2: There is no difference in the choice of games in terms of different game genre.

To test these hypotheses we use ANOVA when we have two factors and several modalities. In doing so, we get the following outputs:

Anova: Two-Factor Without Replication

SUMMARY	*Count*	*Sum*	*Average*	*Variance*
Germany	5	5.72	1.144	0.14263
Japan	5	5.56	1.112	0.06332
South Korea	5	7.71	1.542	0.02607
U.K.	5	6.7	1.34	0.18725
U.S.	5	6.82	1.364	0.35013
2.43	5	9.22	1.844	0.17813
0.9	5	5.3	1.06	0.06595
1.18	5	6.22	1.244	0.03728
1.1	5	6.32	1.264	0.03788
0.9	5	5.45	1.09	0.1025

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	0.619696	4	0.154924	2.322559	0.101087	3.006917
Columns	2.010336	4	0.502584	7.534541	0.001302	3.006917
Error	1.067264	16	0.066704			
Total	3.697296	24				

The theoretical value of the variable for an appropriate degree of freedom (4.16) and a significance threshold of 0.95 m is 3.006917 in the case of both defined hypotheses. Since the theoretical value is greater than the calculated value of 2,322559, the hypothesis is accepted that there is no difference in the choice of games in different countries. Since the theoretical value is less than the calculated value of 7,534541, the

hypothesis thatthere is no difference in the choice of games with different game genre. This means that **different game modes influence the choice of games**.

Conclusions on the results

All the tools used from primary and secondary sources were selected according the relevance, analised and structured as:

- *Evolution* – short global evolution and trends, analises and first steps of this industry in the Republic of North Macedonia;
- *Issues* – providing information about the global environment of the industry and characteristic of gaming studious, investments, human resources/education/salaries, genre of games, revenues, potential;
- *Current situation* – providing an insight about the current status of the industry and of its environment, special aspect educational games;
- *The industry's global and domestic potential* – providing information about the changes that lead to the exponential growth of the industry, suggesting adequate model for busting the industry by involving more stakeholders

The purpose to evaluate the potential of the gaming industry in the Republic of North Macedonia has been achieved, actually, the potential is evaluated in a segment of young entrepreneurs with IT and creative skills that can form a small indie studious and develop video games for Steam and other platforms. Case study have provided specific information about companies facing challenges to maintain and expand their business.For this to happen more focused actions are needed such as accelerators, support from the Innovation fund and Universities to build up solid base for the gaming industry. The interviewed studious emphasized the importance of successful examples to take the lead such as Wounded, Dark 1, as well as Kamai Media, and other presented examples.

The first studious were established around 2011, and almost every year pop up one or two studious or some of the existing IT companies produced video game. All of the gaming companies have an entrepreneurial background. The majority of the companies are micro- sized enterprises, Kamai Media and WorkbenchEntertainment have over 10

and the outscoring companies have more than 25 employees. Investment climate is modest. Only three studious received investment capital – grants from the Self-employment program and 2 grants from the Innovation fund. There are also foreign direct investment in gaming due to the affordable human resources with low wages compared to the global trends.All studios have difficulties finding a skilled workforce; even an outsourcing expert,especially in the fields of programming, design, and marketing. All of the owners in the small companies deal with several functions such as project management and marketing. In relation for what platform the games are developed, all the interviewed companies are focused on PS downloadable video games. The number of gaming companies is very limited in comparison to the economy and population. Most of the gaming company managers know each other, which can be beneficial. They exchange information about potential employees. It is easy to establish a network among the video gaming companies, because there are so few of them and they communicate trough events like Global Game Jam, 3D Conference but to maintain the activities financial sources are needed. The entrepreneurial activities suggested in the model means that by improving the quantity and the quality of the activities the progress of the video gaming industry will be stimulated, more interest, more production, more income will be generated. They suggest to implement educational policies regarding the training of people for game development. Such policies should be implemented in accordance with the demands of the private sector. Game development is not the only process in the gaming industry; marketing and projectmanagement are also important aspects. Therefore, young people should also be educatedin these fields, since secondary schools there should be specific gaming-related courses, such as game development and marketing.

Video gaming is related to developments of new technology. Therefore, the private sector should closely monitor the developments in technology and prepare projections of the future and to present the opportunities to the policy makers and together to create strategy for support.

Also to develop supportive legislation also needs a specific, and clearly established, a legal framework for IP rights, so the negative perceptions of video games can be diminished via proper regulations. Develop marketing and payment systems for the gaming sector to perform well, it is important to implement specific development and

product models. Especially, marketing and proper payment systems that are specific to games, this year the PayPal initiative is the option that was waited for a long period.

Specifics of the market

The model of the gaming market is a monopolistic competition that attracts more companies if the existing one on the market are earning or have the potential to earn high profits. The Increased competition means development of 'substitutable games.' Consider the MOBA example where Dota 1 was the first example of this game type existing in the market in 2003. Years later (around 2009–2013), games in the same genre such as League of Legends, Dota 2, Smite, Heroes of the Storm, Infinite Crisis, and Vain Glory entered the market. From a consumer perspective, entry of firms (and their products) means there exists greater choice and greater flexibility as to which product to choose from. From a company's perspective, the availability of substitutes means that demand for their particular product will most likely decrease, which will lower profits. The ideal position of the company is to become the market leader by either early entry or innovative product. The general PC video games industry is consistent of monopolistic competition due to the fact that companies are profit oriented, otherwise they will not survive on the market. The products are similar yet differentiated products. For example, Dota 2 by the Valve Corp. and League of Legends by Riot Games inc. are both categorized in the MOBA genre but the play feels mechanically different. The global market has many consumers and many companies and companies can have only some control over price.There are few barriers to market entry/exit. Virtually anyone can obtain the software and hardware necessary to develop a basic game. There are no regulatory factors or phenomena such as predatory pricing to inhibit entry. Predatory pricing is a pricing strategy that involves setting prices low with the intention of driving out competition. The analise show that price ie most important with the impact on the revenue so the studios need to have good pricing policy.Developers should be prepared for the challenging aspects of their sectors before entering the market. Experience, and the learning by doing, are critical in the video gaming industry especially if is done in aadequate environment as accelerators. To develop the video gaming industry, the participating companies need to collaborate and NGOs are important in this respect, to support the development of culture.

Positive example of developing gaming

The example of Estonia is used to present how the support of the video game industry can be done. Estonia has made a name for itself for the innovative application of communications technology, where state-of-the-art technologies are a way of life. In 2016, the city Tartu hosted more than 60 startup events (from hackathons to Mobile Monday to sTARTUp Day etc), with more than 5000 people from the tech industry getting involved. Beside the Gaming focused Gamefounders, the game startups can also apply for other grants meant for startups. Estonian start-up companies and well-established and fast-growing companies expand and finance their growth. The activity was aimed for providing sufficient local capital and the comprehensive development of the venture and private equity market. For investors, was important to have constant investment opportunities of a suitable risk level and size. Within the framework of defined investment strategies, the provider of public capital have choosen the fund managers, together with public funding, were involved on the same grounds. The Fund communicates with KredEx, they work with market participants and international institutions, including the Estonian Private Equity and Venture, Capital Association (EstVCA), Estonian Business Angels Network (EstBAN) and their members, the European Investment Fund (EIF) and the European Venture Fund Investors Network (EVFIN). They organized different competitions such as Ajujaht, that is the largest competition of business ideas in Estonia that was initiated 2007. The prize fund of the competition are 60 000 €. The success stories of Ajujaht include: Click & Grow, Minukleeps, Bikeep, Timbeter, GoWorkaBit, Taxify, Huntloc and SprayPrinter. Equity financing is an alternative and is basically an acquisition of funds by selling common or preferred stock to individual or institutional investors. In return for the money paid, shareholders receive ownership interests in the corporation. A company canfinance equity through: private equity companies financed by institutional investors (such as investment banks, funds etc) and private investors. There is a wide array of private equity types and styles and the term ‘private equity' has varying connotations in different countries. Among them are: venture Capital a type of private equity capital typically provided to early-stage, high-potential growth companies.VC fund investors accept a higher risk of failure than is normally the case for other more conservative investments. The most known VCs in Estonia are: Karma Ventures, Mobi Solutions, Astrec Invest, Tera Ventures, Spring Capital. Also there is EstVCA, which is the

representative body of Private Equity & Venture Capital Industry in Estonia. Their goal is to develop a sustainable and attractive ecosystem for the benefit of innovative, ambitious and high-growth potential enterprises, as well as fund managers and institutional investors. Today EstVCA represents 16 member firms and 22 associate members. This example can be used in the Republic of North Macedonia, especially in Bitola and Skopje as a key game developemnt. The aspect of acceleration is the most adequate for implementation since the infrastructure and funds are available. There is a need for more narrow actions in that direction, to specify certain fund only for game development with free topics to express the creativity of the developers and to guide them throughout the whole process.

1. Conclusions and implications

5.1 General summary of the study

The final part of the doctoral thesis presents the conclusions and implications that represent a summary of the results obtained from the conducted research on the potential of the video game industry in the Republic of North Macedonia. The results from the empirical research, statistical analises and the proposed model, are supported by theoretical elaboration and practical examples. This section highlights both the scientific and the applicative contribution of this doctoral thesis. It also presents the limitations encountered during the research, to anticipate problems and questions for further research.

The video games are constantly present in our lifes as a need for the individual amusement and accomplishment, learning skills as well as for the social connections trough the gamesis accomplished. The development of technology and the Internet has empowered the gaming.

The aspects of the video games, especially as a service are presented though literature review and a simplified model is created to express the key elements important for the developers, publishers and players.

The growing demand for video games opens a huge market. The digital game sector remains very strong, even bigger than other media industries. The explanation of the industry is supported with the model of the video game industry based on the different definitions and gives overview of the processes how this industry is functioning.

New investments in video gaming and programming are transforming the traditional understanding of the games. According to the latest data, in 2019, there are 2 billion 341 million active video game players around the world, which means that video games cover the enormously wide spread market they are offering video content, products, virtual reality, special events and video game tournaments. The production and distribution of video games are high-risk venture because it depends on the positive response of video games consumers. Video game is product/service of highly competitive industry, but they also have beneficial effects on players and society as a whole. New platforms to fund projects such as the Kickstarter, Internet Portal completely change the role of the publishers and enable development teams to dedicate themselves uncompromisingly to the implementation of their ideas. Although this fact should have a positive impact on the product itself, the development teams still need some incentive and timeframe to complete the project in due time.

The video game industry emerges due to the continuous innovation. For example, the concept of "gamification" suggests that the psychological elements involved in the game affect the motivation of employees. The video game industry has numerous working areas that create a place for hiring professionals around the world.

The revenue from this industry also means revenue from adding complementary goods and services to core products, which have the potential to strengthen business models.

The companies must understand the needs of the market and offer video games to the future users, not as an ordinary product, but as a cultural product which will satisfyplayer' needs and desires. That is proven trought the analyses of the genre of the games and their connection to the playability.

Despite the great progress in almost every, and especially the technical aspect of this industry, its future remains uncertain. Cloud gaming, although a significant innovation in the field of interactive entertainment is a huge threat to the industry itself. Server data processing and their streaming end users make the console itself unnecessary, and therefore compel producers to reorient to other types of earnings. Wireless technologies, portable consoles and social networks have integrated video games into every aspect of society and everyday life. The Republic of North Macedonia offers adequate infrastructure – internet with 78% coverage, while the curture for online ordering especially on video game is just starting. The focus is on younger generation 15-24 that a re using 43% of the time for playing games.

At present, the industry is at a turning point. Its progress, the impact on society and other industrial branches are indisputable. Although young, this industry brings a lot of money, employs many people and continues to influence primarily the information technology, and therefore changes the world around it.

The video game industry is an interactive entertainment is an economic sector that includes a range of activities such as the development, marketing and sale of video games, which includes a large number of different jobs and employing thousands of people around the world. This economic giant goes beyond the barriers of hardware platforms, and with the emergence of social networks, it moves into every aspect of society.

From art, to education and office work, there are lots of places, where the video game industry leaves its mark. Educators are increasingly recognizing the impact of video games on the public, that is, their potential and application in education. Recognizing cultural and technological changes in the 21st century, many new possibilities have been opened for the further development of the response system using popular software intended primarily for entertainment. Video games can be used to acquire many life skills, as well as positive habits in children and students of all ages. Most of the educational games are project funded and ….

The Republic of North Macedonia, is just a pioneer in these investments and so cannot be expected to participate in the creation of the mentioned revenues (it has a marginal role in creation revenues). There are more than 20 active video game companies across the Republic of North Macedonia, over 237 employees or freelancers mapped in the study, directly involved as game software developers or artists, with monthly earnings from34940 to 53320MKDand more and several successfully published video games.

The existing studious have shown potential for development of this industry, several successful projects and grants are implemented. The interviewed studious express satisfaction from the expected results in development, team organization, creativity and publishing the games. Since they have their first game published, the satisfactory comes from the finalizing the whole process and opportunities to upgrade the existing games based on the reviews from the players.

Those facts, results and practical experience are inspiration for the proposed model for boosting the potential of the gaming industry – creating accelerator for video game development. Accelerator as a legal entity provides services for startups such as: office

space (optional), administrative support, training, counseling and/or mentorship, access to business support resources as well as financial investments and access to capital. Accelerators implement programs designed to assist and accelerate the activities of startups.Based on the research, the investment in indie studious is structured and compared with the expected revenues, the sustainability of the studios is evaluated and the future opportunities are projected. Small teams creating a game to be publish on a digital platform and to have income for themselves that not only allows them to keep making games, also encourages them to grow their business. Also the accelerator can support opportunities for existing developers to grow their business and share their experience to the new startup teams.The model requires a relatively low cost investment by the governmental and private institutions into a massively exportable and profitable industry to provide sustainable growth and innovation. The existing and upcoming talents in partnership with well-established digital distribution can create jobs of highly educated and skilled developers. Startup community for video game development are a proven method of establishing gaming community and infrastructure, such example is Estonia.

The purpose of the model is to provide a set of quantitative and qualitative data that will be available at all times to stakeholders and enable them to enrich the ecosystem for games development.

The model can be used as guide towards the final goal - to develop structure that can support startups in their journey from idea to creating a product, to growth and expansion phases, and increase the volume of companies that can grow and compete on the international markets.

The model further can be used as a base for creating adequate curricula for providing educated proffecionals in this area. The curricula can be cross sectoral as the industry including programming and art, also it will include practice in the accelerator. The recommendation is to be dynamic and flexible as the demand in this industry.

The research detected the main obstacles for game developers in The Republic of North Macedonia :

- funding sources;
- the lack of adequate educational programs and, consequently, quality and educated staff;

- the problem of double taxation.

The lack of incentives for the video game development as a source of funding because this is a fast growing sector, bigger investments are needed to further accelerate this growth. Game production budgets are growing, the most successful and best-selling games have budgets that match the movie budgets productions. Without major investment, it cannot be expected that a game will be marked with big profits. Therefore, manufacturers face the problem of shortages initial funding.

Next is the lack of adequate staff, which is a consequence of the lack of systematic education for game developers at both secondary and tertiary levels of education. Video game industry has not been recognized by economic policy makers. Some countries (Finland, Norway, France, United Kingdom) are recognized the potential of this sector and supported it with significant financial resources (fast growth and high return on investment) and tax credits (Canada and USA, UK, France). For example, computer game developers in the UK can take advantage tax deductions of up to 25 percent of 80 percent of the total cost of producing a video game, so it is estimated that this will result in savings of this industry of around 35 million pounds. Similar tax incentives are being applied in France, so are French developers of video games can save up to 20 percent of the cost of producing a game. This is about one of the few sectors in which industry can compete on international level.

The situation is complicated by stringent banking regulations that require less risk exposure, and banks are particularly reluctant to finance innovative projects, without pledging. Enterprises in this sector are not of high value long-lived assets, but that is why their employees possess valuable knowledge. However, banks do not value this when granting loans. The problem of double taxation is related to the operations of companies in the international market. The sales are made in higher presents on the USA market, sales revenue is taxed in the US and thereafter re-taxed in the Republic of North Macedonia in accordance with the national tax legislation. Double taxation is otherwise regulated through bilateral interstates agreement, in such a way that the domicile only charges the difference in tax (recognized tax paid abroad, and the difference in the amount of tax paid abroad is charged and the amount of the same tax that would have to be paid in the country).

There are non-systematic only sporadic aimed generally at the development of the small economy and entrepreneurship, but not targeted at developing this industry. Since this is

about in a rapidly growing sector with high rates of return, the state should find interest in boosting additional investments in this sector. Although some programs offers grants as part of its competition companies in this sector, it is a non-systematic approach that targets specific categories entrepreneurs.

5.2 Conclusion on the research question

The amount of investments and financial benefits of video games are confirming the general hypothesis that the trend of creation and application of video games is developing and progressive.The video games' industry has earned more revenue than the movie and music industries combined.

The situation in RN Macedonia in relation to video games is in a developing stage. This hypothesis is proven with the mapping of the video game studious and evaluating their potential trough published games and the available opportunities for supporting the industry. The industry in the Republic North Macedonia is still marginal with over 20 start-up companies established in the last 10 years. The analysis of various tools for making video games are supporting the successful creation of products and their sales on the global market. There is adequate hardware equipment and software engines available for the production process. Skilled persons with IT and creativity background are located at the Universities and at the private providers of certified participants. The organised events for game development are meeting points for creating teams and the accelerators are the nursing systems with full support or product creation and launch on the global market.

The general picture of the video game industry is completed with the SWOT matrix as a base for attracting investors in this industry, which implies new employment opportunities for gaming developers and educators with knowledge-based games and barometer by expert marking the indicators important for the video game industry. The emphasis is on the availability of young talents (mostly because of their creativity), expert’s talent and international success.

Further the model of Estonia is explained linked to the suggested model, where they have developed gaming community with accelerator support.

The globalisation and the digital platforms are open possibilities for progress in video game industry in the Republic of North Macedonia.

5.3 Theoretical and practical implication

There are is wide literature review covered and stylized in simplified models for video game and video game industry. Different models for investment and revenues are presented in the thesis. The theoretical models are linked with practical examples from the world and the studious in RNM. Special focus is given to the successful game published on Steam, to the availability of game developers and the options for providing them with adequate education and practical experience. The practical results from the business and the implemented projects are transferred in a model for acceleration. Key investors and actions are envisioned for a period of one year, with proven sustainability to be supported in a period of 5 years. Solid base of 250 developers in period of 5 years will be driver of this industry.

Further, the educational games are elaborated as a product for learnings skills, and their usage in different industries. Practical processes are presented as a guide for next projects.

5.4 Limitations of the study

The data regarding the gaming industry are generate by platforms, projections of the revenues and trends may vary.

The video gaming industry is relatively new, so proven and academically described topics are not synchronized with the dynamic trends and changes, based on the comparison with the platforms, game experts blogs and other sources of information.

The gaming community has their own communication language that is unique, so additional definitions are needed.

The focus of the thesis are PC downloadable games, the limitation is that the other segments such as mobile games are not included.

The official data for the revenues of this industry in RNM are not available. The industry has a marginal role although it is so attractive on global level.

The researched data from the studious are not confirmed with official report and they are not running evidence of the productive working hours on specific project-game.

5.5 Future areas for research

Building relationships among all stakeholders in the video game industry can be supported with building adequate platform for communication between game developers on national and international level. Anything that brings more teams together to share knowledge, contacts and experience is valuable.

The projects that got funding from the Innovation fund or educational projects are excellent exercise in testing the game industry, so this practice need to be upgraded with the specialized programs.

There are interesting topics to be researched :

- model of investments – business angels
- International opportunities for game studious – promotion and marketing
- different streams of revenues from video games
- mobile games
- ethical issues of video games

Terminology

- Augmented reality (AR): A technology that supplements real-life views of users with computer-generated sensory input as images or sounds.
- Boxed revenues: Revenues generated by the sales of games or game-related content delivered on physical storage media (i.e., discs or cartridges). Also includes physical copies ordered in online stores.
- Browser PC games: Games played on casual game websites or social networks.
- Cloud gaming: Also referred to as gaming on demand, cloud gaming is the ability to play a game on any device without owning the physical hardware required to process it or needing a local copy of the game itself.
- Compound annual growth rate (CAGR): The constant growth rate over a period of years. In this report, all CAGRs are based on the years 2018-2022.

- Consolegames: Games played on a TV screen directly or through a console, such as Xbox, PlayStation, and Nintendo, or on handheld devices, such as a Nintendo DS or PS Vita.
- Digital revenues: Revenues generated by the sales of games or game-related content purchased directly from an online store, without a physical product being delivered. Digital revenues include in-game purchases, subscription revenues, and any additional downloadable content (DLC).
- Downloaded/Boxed PC games: PC games downloaded from websites or services (e.g., Steam or Epic Games Store) or purchased as a boxed product (CD/DVD), including client MMO and MOBA games.
- Esports: Competitive gaming at a professional level and in an organized format (a tournament or league) with a specific goal (i.e., winning a champion title or prize money) and a clear distinction between players and teams that are competing against each other.
- Free-to-play (F2P) games: Games that are (legally) free to download and play, often offering in-game spending opportunities.
- Game enthusiasts: All people who engage with games through playing, viewing gaming content, and/or hardware or peripheral ownership.
- Game revenues: Consumer revenues generated by companies in the global games market, excluding hardware sales, tax, business-to-business services, advertising, and online gambling and betting revenues.
- Gamer personas: A new way of segmenting game enthusiasts across their playing, viewing, and owning behavior. Please refer to the Special Focus Topic (page 23) to find the definition of each persona.
- Games as a service: Also known as GaaS, games as a service provides game content or access to games on a continuous revenue model; for example, via a game subscription service or a season/battle pass.
- Smartphone games: Games played on smartphones.
- Online population: All people within a country/market or region who have access to the internet via a computer or mobile device.
- Payers or paying gamers: All people who have spent money to play games on a PC, console, or mobile device.
- Pay-to-play (P2P) games: Games that must be paid for upfront or are paid subscriptionbased games.

- Peripherals: Gaming-related hardware products that are used for gaming, such as gaming mice, keyboards, headsets, controllers, or monitors.
- Players or gamers: All people who play (digital) games on a PC, console, or mobile device.
- Spend per payer: Annual average revenue generated per payer (game revenues/payers).
- Tablet games: Games played on a tablet (e.g., iPad).

  Virtual reality (VR): The computer-generated simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a headset with a screen inside or gloves fitted with sensors.

List of Tables

List of Figures

List of References

1. Ackerman D. (2012) E3 2012: Five trends that will change video games, Cnet,
2. Armstrong, M. (2018). The Companies Making the Most from Video Games.
3. Atari age, (2019)
4. Batchelor J. (2018) GTA V is the most profitable entertainment product of all time. Games Industry
5. Big Fish, (2018). Mega-Million Dollar Games.
6. Bonardi, J.-P., Durand, R. (2003). "Managing network effects in high-tech markets", The Academy of Management Executive, 17(4), 40-52
7. Bryant, J., & Vorderer, P. (2016). Playing Video Games: Motives, Responses, and Consequences. Portland: Powells.
8. BusinessTech. (2015). The biggest entertainment markets in the world, Harvard
9. Castronova, E. (2018). Virtual Worlds: A First-Hand Account of Market and Society on the Cyberian Frontier. CESifo Working Paper Series No. 618. Moscow
10. Casual Games Association, (2019)
11. Chapple, C. (2015). Clash of Clans the highest grossing App Store game ever. Retrieved from Develop: NY
12. Cherney, M. (2018). This violent videogame has made more money than any movie ever.
13. Chikhani, R. (2015). The History of Gaming: An Evolving Community. Retrieved from TechCrunch: Tokyo
14. Coursera. (2017). Gamification. Beijing
15. Cowley, R. (2017). Supercell sees revenues grow to MKD2.3 billion in 2016 thanks to success of Clash Royale. NY
16. Crecente, B. (2018). Grand Theft Auto 5 hits MKD1 billion in three days, sets new record. Harvard
17. Datamonitor. (2018). Global Games Consoles: Industry Profile. Retrieved from Datamonitor. Harvard
18. Derks, D., & Bakker, A. (2018). The Psychology of Digital Media at Work. Hove, MACEDONIA: Psychology Press.
19. Diamandis, P. (2016). Demonetized Cost of Living. Cambridge
20. Digital worlds, (2019)
21. Dogtiev, A. (2016). App Store Statistics Roundup. Moscow
22. Egenfeldt-Nielsen, S., Smith, J. H., & Tosca, S. P. (2016). Understanding Video Games: The Essential Introduction. New York: Routledge.

23. Entertainment Software Association. (2016). Essential Facts About the Computer and Video Game Industry. London
24. Entertainment Software Association. (2019). Facts for the Video Game Industry. London
25. Entertainment Software Assotiation, (2019)
26. ESA. (2018). Essential Facts About The Computer and Video Game Industry 2008. Cambridge
27. Eurocom, (2019)
    a. Formation, Present State, and Future. New York: Routledge
28. Galloway,A. R. (2006). Gaming: Essays On Algorithmic Culture (1st ed.). Minneapolis, MN: Univ Of Minnesota Press.
29. Greenberg, S. (2018). Video game industry is booming with continued revenue.
30. Haley, R. (2018). Video Games: The Cycle Plays On. New York: Gabelli & Company Inc.
31. Herman, L., Horwitz, J., Kent, S., & Miller, S. (2019). The History Of Video Games. Oxford
32. Hubpages, Independent Video Game Development: A Reversal of Industry Trends, (2019)
33. Hunicke, R., LeBlanc, M., & Zubek, R. (2014). MDA: A Formal Approach to Game Design and Game Research . Game Developers Conference. San Jose.
    a. J. (Eds.), Understanding digital games. London: Sage, 95-111
34. Kain, E. (2019). 'Grand Theft Auto V' Crosses MKD1B In Sales, Biggest Entertainment Launch In History. NY
35. Kent, S. (2018). The Ultimate History of Video Games: From Pong to Pokemon--the Story behind the Craze That Touched Our Lives and Changed the World. California: Prima Communications, Inc.
36. Kerr, A.(2006). The business and culture of digital games: gamework/gameplay. London:Sage.
37. Kessler A (2011) How Videogames Are Changing the Economy, The Wall Street Journal,
38. Kucklich, J.(2006). Literary theory and digital games. In: Rutter, J., Bryce,
39. Leigh A. (2011) Microsoft: Kinect Hits 10 Million Units, 10 Million Games, Gamasutra,
40. Maher, R. (2019). Casual Gaming Is A Spectacular Business, With Profit Margins Near 90%. London
41. Melason D. (2009) Nintendo Wii sets record as fastest-selling console in the US, Joystiq,
42. Moulthrop, S. (2005). After the Last Generation: Rethinking Scholarship in the Days of Serious Play. In Proceedings of Digital Art and Culture Conference, 208-215. Copenhagen, Denmark: ITUniversity, Copenhagen.

43. NeoGames. (2015). The Game Industry in 2014. NY
44. Newzoo, (2019a)
45. Newzoo, (2019b)
46. Newzoo. (2016). CLASH ROYALE REVENUES TOP MKD80 MILLION IN FIRST MONTH MAKING IT WORLD'S TOP GROSSING GAME. Cambridge
47. Newzoo. (2017). Newzoo Methodology. NY
48. Newzoo. (2018). Top 25 Companies by Game Revenues. Oxford
49. Newzoo. (2019). The Global Games Market Reaches MKD99.6 Billion in 2016, Mobile Generation 37%. Harvard
50. Nielson Games. (2018). Video Gamers in Europe – 2008. London
51. Nievera, H. (2016). How technology is shaping the way customers engage. Harvard
52. Pearson, D. (2018). Gamezindustry.biz. Lund
53. Pong story, (2019)
54. Pullen J. (2012), The next revolution in videogames, CNNMoney,
55. Rayna, T., Striukova, L. (2014). Digiworld Economic Journal, no.94, 2ndQ, 61-81, p.66.
56. Reimer J (2005) The evolution of gaming: computers, consoles, and arcade, Ars technica,
57. Rysman, M. (2009). The Economics of Two-Sided Markets, "Journal of Economic Perspectives, 23, 3, 125–43, p. 136.
58. Scanlon, J. (2017). The Video Game Industry Outlook: MKD31.6 Billion and Growing, Paris
59. Sherr I. (2012) Videogames reach for the cloud, The Wall Street Journal,
60. Statista, (2019a) Number of active video gamers worldwide from 2014 to 2021 (in millions).
61. Statista, (2019b)
62. The Entertainment Software Association (2018). Essential Facts About the Computer and Video Game Industry, p.14.
63. The Nielson Company. (2017). The State of the Console: Video Game Console Usage USA 4th Quarter 2017. Neilson Media, NY
64. The video game industry, (2019)
65. Waugh, R. (2011). Modern Warfare 3 Hits $1 Billion in 16 Days — Beating Avatar's Record by One Day. Dailymail.
66. Wesely, D., &Barczak, G. (2010). Innovation and Marketing in the Video Game Industry. London: Routledge.
67. X-entertainment, (2019)
68. Zackariasson, P., Wilson, T.L. eds. (2012). The Video Game Industry:

69. Zichermann, Gabe and Christopher Cunningham (2011),Gamification byDesign: Implementing Game Mechanics in Web and Mobile Apps. Sebastopol, CA: O'Reilley Media.
70. Aarseth, E. (2017). Cybertext: Perspectives on Ergodic Literature. Baltimore: the johns Hopkins university press. 2nd ed
71. Aarseth, E. (2016). "How We Became postdigital: From cyberstudies to game studies." in Critical Cyberculture Studies, edited by david silver and adrienne massanari, 37-47. new York: new York university press.
72. Aarseth, E. (2017). "i Fought the law: transgressive play and the implied player." Situated Play, Proceedings of DiGRA 2007 Conference. tampere. 130-133.
73. Aarseth, E. (2015). "meta-game studies." Game Studies 15 (1).
74. Aarseth, E. (2013). "playing research: methodological approaches to game analysis." Proceedings of the Fifth International Digital Arts and Culture Conference. melbourne.
75. Bogost, I. (2011). How To Do Things With Videogames. minneapolis: university of minnesota press.
76. Bogost, I. (2017). Persuasive Games, The Expressive Power of Videogames. cambridge, ma: the mit press. Brown, Harry j. 2008. Videogames and Education. london: m.e. sharpe.
77. Burden, M, and Douglas S. (2012). "the algorithmic experience: portal as art." Game Studies 12 (2).
78. Callois, R. (2001). Man, Play and Games. translated by meyer Barash. urbana, il: university of illinois press.
79. Castronova, E. (2005). Synthetic Worlds: The Business and Culture of Online Games. chicago: the university of chicago press.
80. Cogburn, J., and Silcox M. (2009). Philosophy Through Video Games. new York: routledge.
81. Consalvo, M. (2007). Cheating: Gaining Advantage in Videogames. cambridge, ma: the mit press.
82. Domsch, S. (2013). Storyplaying: Agency and Narrative in Video Games. Berlin: de gruyter.
83. Eskelinen, M. (2001). "the gaming situation." Game Studies 1 (1).
84. Fagerholt, E, / Lorentzon M. (2009). Beyond the HUD: User Interfaces for Increased Player Immersion in FPS Games. Göteborg: chalmers university of technology.
85. Fajnberg, V. (2012). "o robustnom priznavanju i kazivanju priča." u Zajedničke škole/različiti identiteti. Nacionalno jedinstvo i kulturna razlika, prevod: dejan ilić, 238-252. Beograd: Fabrika knjiga.

86. Frasca, G. (2003). “simulation versus narrative.” in The Video Games Theory Reader, edited by mark j.p Wolf and Bernard perron, 221-237. new York: routledge.
87. Aleem S., Capretz L. F., Ahmed F. (2016): “Empirical investigation of key business factors for digital game performance”, Enter- tainment Computing, 13, 25-36
88. Boxer S. (2013): “how video games are transforming the film industry”,The Guardian, November 17th
89. Bramwel T. (2014): “Console developers need to look at Dungeon Keeper and learn”, Eurogamer, February 8th
90. Campbell C. (2015): “This is why paid DLC is here to stay”, Polygon, Jan- uary 27th
91. Dymek M. (2012): “Video games: A subcultural industry”, 34-56, in: Zackairasson, P., wilson, t.L. (eds) The video game industry: Formation, present state, future, New York, NY: routledge
92. Ernkvist M. (2008): “Down many times but still playing game: Destruc- tion and industry crushes in early video game industry 1971-1986”, History of Insolvency and Bankruptcy, 161, 161-192
93. Evers E., van de ven Niels, Weeda D. (2015): “the hidden cost of microtransactions: Buzing in-game advatages in online games drecreases a player’s status”, International Journal of Internet Science, 10(1), 20-36
94. European Central Bank (2012): Virtual money schemes, Eurosystem, Frank- furt, Germany
95. Filipović A. (2013): „Video igre kao najozbiljniji biznis kreativne industrije na početku 21. veka“, Megatrend Revija, 10(2), 177-192
96. Freudenheim M. (2019): “hasbro to Cut 20% of Its Jobs and Take $97 Mil- lion Charge”, The New York Times, December 8th
97. Gilardoni P., Ringland E., Ha Angela (2014): “In-game currencies:
    a. in the line of fire?”, Lexology.com, August 19th
98. Hamilton K. (2011): “The Daily Show gleefully Rips Into free-To-Play gaming“, Kotaku, September 12th
99. Hof R. (2015): “why Most People won’t Pay to Block Mobile ads”,Forbes, July 9th
100. IMF Staff Discussion Note (2016): Virtual currencies and beyond, IMF
101. Nickinson P. (2012): “How high is ‘unbelievably high’ piracy? dead trig- ger dev’s not saying”, Android Central, July 23rd
102. Pelkonen T. (2005): “Mobile Games: An emerging content business area”, 109-125, in: Bruck A. Peter, Buchholz Andrea, Karssen zeger, zerfass Ansgar (eds.) E-Content – Technologies and perspective of the Europan mar- ket, heidelberg: Springer,

103. Phillips T. (2013): “world of tanks dev drops “pay-to-win” purchases andhopes the rest of the industry will follow suit”, Eurogamer, June 4thrivest ron,
104. Shamir A. (2016): “Payword and MicroMint: two simple micropayment schemes”, Proceedings of 2016 International Workshop on Security Protocols, 69-87
105. Robinson M. (2016): “what’s the deal with the division microtransac- tions?”, Eurogamer, January 15th
106. Rosenberg D. (2009): “MMPorGs, microtransactions, and user experi- ence”, CNet, July 16th
107. Sandqvist U. (2012): “The development of Swedish game industry: A true story success?”, 134-155, in: Zackairasson, P., wilson, t.L. (eds) The video game industry: Formation, present state, future, New York, NY: routledge
108. Smith D. (2015): “I miss the days when I only had to pay once for a video game”, Business Insider, April 22nd
109. Statt N. (2013): “Micropayments, mega angst, and the future of console games”, CNet, December 19th
110. Sutter D. J. (2009): “‘virtual currencies’ power social networks, onlinegames”, CNN, May 19th
111. Tassi P. (2013): “is $50 worth of dead Space 3 dLC Still a ‘Microtransac- tion’?”, Forbes, January 30th
112. Tassi P. (2014): “are MOBas the new MMOs?”, Forbes, May 5th
113. Weiner A. (2007): “Zoo digital: ian Stewart”, Startups UK, August 9th
114. Zhong Z. (2011): “The effects of collective MMorPG (Massively Multi- player online role-Playing Games) play on gamers’ online and offline social capital”, Computers in Human Behavior, 27(6), 2352–2363
115. SteamPowered.com, https://store.steampowered.com/account/redeemwal- letcode accessed on April 22nd
116. Battle.Net, https://us.battle.net/shop/en/product/world-of-warcraft-sub- scription accessed on April 22nd
117. GameSparks.com,http://www.gamesparks.com/blog/micro-transactions/ accessed on April 22nd
118. PaySafeCard.com, http://www.paysafecard.com accessed on April 22nd
119. webMoney.com, http://www.wmtransfer.com accessed on april 22nd
120. iDeal.nl, https://www.ideal.nl/en/payment-service-providers accessed on April 22nd

List of uses links

1. https://www.degruyter.com/view/j/erj.2018.8.issue-2/erj-2016-0095/erj-2016-0095.xml
2. https://worldbusinessincubation.wordpress.com/2013/09/27/review-of-20-business-incubation-models-bergek-norrman-model_2008-part-14-of-20/
3. https://www.degruyter.com/view/j/erj.2018.8.issue-2/erj-2016-0095/erj-2016-0095.xml
4. https://worldbusinessincubation.wordpress.com/2013/09/27/review-of-20-business-incubation-models-bergek-norrman-model_2008-part-14-of-20/
5. https://www.idtech.com/blog/different-types-of-video-game-genres
6. https://appsamurai.com/the-new-age-gaming-business-model/
7. https://www.did.ie/content/blog/history-of-video-game-consoles
8. https://vgsales.fandom.com/wiki/Eighth_generation_video_games
9. http://www.lunchoverip.com/2008/08/from-crossmedia.html
10. https://www.britishcouncil.mk/sites/default/files/creative_industries_mapping_in_macedonia.pdf
11. https://angel.co/video-games/investors
12. https://capital.com/is-it-time-for-investors-to-play-with-video-game-stocks
13. https://ec.europa.eu/programmes/creative-europe/about_en
14. https://eacea.ec.europa.eu/sites/eacea-site/files/call_notice_dev_vg_2019_en.pdf
15. https://www.mse.mk/en/news/22/5/2019/macedonian-stock-exchange-has-signed-an-exclusive-cooperation-agreement-with-funderbeam-see
16. http://rabotaimoznosti.mk/
17. https://av.gov.mk/announcements-for-active-measures.nspx
18. http://www.fitr.mk
19. http://www.inovativnost.mk/?p=6169
20. https://www.youtube.com/watch?v=oXC9c9U5OwY
21. https://www.youtube.com/watch?v=K_YyQjHjUDo
22. https://vironit.com/how-much-does-it-cost-to-make-a-video-game
23. https://www.fakulteti.mk/news/16-08-
24. https://www.statista.com/markets/
25. https://www.statista.com/topics/4282/steam/
26. https://www.limelight.com/resources/white-paper/state-of-online-gaming-2018/
27. https://www.limelight.com/resources/white-paper/state-of-online-gaming-2019/
28. https://www.statista.com/statistics/246888/value-of-the-global-video-game-market/
29. https://variety.com/2019/gaming/news/video-games-300-billion-industry-2025-report-1203202672/

30. https://artillry.co/wp-content/uploads/2019/01/GDC-State-of-the-Gaming-Industry-2019.pdf
31. https://tech.informa.com/
32. https://www.sedc.mk/about-us/
33. http://www.semosedu.com.mk/Home_page/Education.aspx
34. https://developconference.com/
35. https://me-gamescon.com/en/homepage.html
36. https://www.mkd.mk/makedonija/ekonomija/kodvel-izraboti-aplikacija-za-deca-na-makedonski-jazik)
37. https://www.fakulteti.mk/news/27012019/aplikacijata-svetot-na-bibi-dostapna-na-gugl-plej
38. https://deca.mk/sinot-konstantin-i-tatkoto-dimitar-ja-napravija-prvata-igra-za-makedonskata-azbuka
39. http://ifs.mk/mk/Home/FrankofonijaContent/4118
40. https://medium.com/digital-reflections/digital-natives-and-digital-immigrants-how-are-they-different-e849b0a8a1d3
41. https://www.sciencenewsforstudents.org/article/what-video-games-can-teach-us
42. https://lpesports.com/e-sports-news/the-video-games-industry
43. http://www.ecchigames.com/video- game-platforms.html; Wolf, 2012
44. https://appsamurai.com/the-new-age-gaming-business-model/
45. https://www.did.ie/content/blog/history-of-video-game-consoles
46. https://vgsales.fandom.com/wiki/Eighth_generation_video_games
47. http://www.lunchoverip.com/2008/08/from-crossmedia.html
48. https://www.britishcouncil.mk/sites/default/files/creative_industries_mapping_in_macedonia.pdf
49. https://angel.co/video-games/investors
50. https://capital.com/is-it-time-for-investors-to-play-with-video-game-stocks
51. https://ec.europa.eu/programmes/creative-europe/about_en
52. https://eacea.ec.europa.eu/sites/eacea-site/files/call_notice_dev_vg_2019_en.pdf
53. https://www.mse.mk/en/news/22/5/2019/macedonian-stock-exchange-has-signed-an-exclusive-cooperation-agreement-with-funderbeam-see
54. http://rabotaimoznosti.mk/
55. https://av.gov.mk/announcements-for-active-measures.nspx
56. http://www.fitr.mk
57. https://www.youtube.com/watch?v=K_YyQjHjUDo
58. https://vironit.com/how-much-does-it-cost-to-make-a-video-game

59. https://www.fakulteti.mk/news/16-08-
60. https://www.statista.com/markets/
61. https://www.statista.com/topics/4282/steam/
62. https://www.limelight.com/resources/white-paper/state-of-online-gaming-2018/
63. https://www.limelight.com/resources/white-paper/state-of-online-gaming-2019/
64. https://www.statista.com/statistics/246888/value-of-the-global-video-game-market/
65. https://variety.com/2019/gaming/news/video-games-300-billion-industry-2025-report-1203202672/
66. https://artillry.co/wp-content/uploads/2019/01/GDC-State-of-the-Gaming-Industry-2019.pdf
67. https://tech.informa.com/
68. https://www.sedc.mk/about-us/
69. http://www.semosedu.com.mk/Home_page/Education.aspx
70. https://developconference.com/
71. https://me-gamescon.com/en/homepage.html
72. https://insights.stackoverflow.com/survey/2019?fbclid=IwAR0AGCsxS_DYAIWCCx2VRGf4pwqlInSTmTVVnmCuxCaIR4Hh9OClJCBUfjk#key-results
73. https://www.wepc.com/news/video-game-statistics/

ATTACHEMENT:

QUESTIONARRY

For game development studios and support of the game development industry

1. Introduce your company (name)
   Year of establishment
   Number of employees
   - formal education
   - non formal education

2. What is your work position?

3. How did you start developing video games and what was your initial inspiration?

4. From which genre and for which platform are the games you are developing?

5. Are those games completely your product, starting from the initial idea and script till the final version?
   a. Are there any parts of the game that you outsource from other companies such as music, 3d models?

6. How are you selling your games and which market are you targeting?

7. Which is your most successful game?

8. How did you form your team?

9. When recruiting people, is it easy in the Republic of Macedonia to find properly educated professionals with work experience in developing video games?

a. Do these people need additional education and training?
b. Are you able to invest in it?

10. According to your experience, should the faculties offer different education in order to produce differ-ent/better cadre for the needs of video game industry?

11. Do you have an investor or publishingcompany?

a. Do you need any kind of financial support in developing new games, marketing activities etc.?

12. How did made the first contacts with clients?

14. What is the most valuable for your clients – quality of production, price or time of preparation?Do you need any kind of help from institutions, organizations and specialist in the sphere of video games production?

a. Do you need support of your business by some national institution or organization?
b. Can this kind of support be helpful for working on foreign markets?

15. What is attitude of the country towards this industry?

a. Are there any benefits that you can apply for and which are they?

b. Is there something missing in the Republic of North Macedonia, what you need to be changed?

15. In which direction would you like to expand your business and what would you like to achieve?

a. Do you plan to work in other sphere of the video game industry or develop games for the other platforms by using different technology?

16. What is, according to you, the potential and the future of video game industry in the Republic of Macedonia?

a. What can the Republic of North Macedonia offer to the world?

17. Annual turnover from games in $USA

- from 1 to 10000
- 10000 to 20000

- 20000 to 30000
- 30000 to 40000
- 40000 to 50000
- More than 50000

18. Structure of the revenues by market origin
    - USA
    - EU
    - others

19. What is the structure of the investment in the video game studio in $USA?
    - equipment
    - software (engines)
    - human resources
    - logistics
    - marketing costs
    - other

QUESTIONARRY for comparative analyses

1. What were the reasons you believe caused you to work those maximum numbers of hours per week?
2. Which PC/Mac video game do you sell the games on?
3. How many years have you been involved in video game development?
4. How many people work at your company?
5. Which platform was your last completed game released on?
6. Which platform are you currently developing games for?
7. Which do you belive will be dominant immersive reality technology in 5 years?
8. Which services are you using for the release of your next game?
9. Which discovery methods did you put the most investment (time or money) into your last completed game?