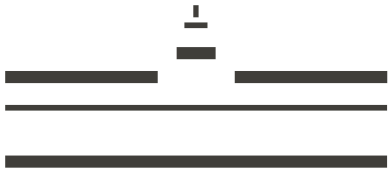

Westfälische
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Success factors of video game consoles

Seminar Paper
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Contents

List of Abbreviations

B	billion(s)
e.g.	exemplia gratia (for exampe)
et al.	et alia (and others)
etc.	et cetera (and so on)
f., ff.	following page(s)
Ed.	Editor
i.e.	id est (that is)
M	million(s)
no.	number
p.	page
Vol.	Volume

Declaration of Brand Name Usage

List of Figures

1 Introduction

"Video games are the future. From education and business, to art and entertainment, our industry brings together the most innovative and creative minds to create the most engaging, immersive and breathtaking experiences we've ever seen." - *Michael D. Gallager (President and CEO of the Entertainment Software Association)*

The video games market is regarded as being the fastest growing segment of the entertainment branch [Hennig-Thurau and Marchand, 2013] and current numbers heavily back this assessment: The yearly revenue for the global games market is estimated to be around 99 billion US$ in 2016 [NewZoo, 2016], while digital games alone made over 35 billion € last year. The compound annual growth rate is estimated to be around 7%, breaking the 50 billion € barrier in 2020. [Statista, 2016] Mobile games alone are generating nearly 37 billion US$ in 2016 and are on their way to overtake the film industry as [PWC, 2015] reports a yearly global box office revenue for 2015 sneaking up to 40 billion € while growing at just 5.7%. The gamer community consists of more than 2.1 billion people worldwide nowadays. [NewZoo, 2016]

Entertainment company Sony has sold more than 40 million Playstation 4 video game consoles since launching it in November 2013 [Sony, 2016], including the most successful gaming console launch of all times with selling more than one million devices in the first 24 hours [Shuhei Yoshida, 2013]. Those are impressive numbers but they seem pretty lackluster compared to the most successful launch of an entertainment product ever, the release of Rockstar's smash hit Grand Theft Auto V. It reached more than one billion US$ in revenues during its first three days, 800 million US$ alone on launch day. In comparison, it took The Avengers movie 19 days to achieve the same numbers. [Gamespot, 2013]

This massive success has turned the video games industry into playing a pivotal role in everyones daily life [ESA, 2016] and inspired researchers all around the world to dig into it. [Sun et al., 2016] investigate the effects of consumer heterogeneity on the video games market, [Binken and Stremersch, 2009] look into the role of high quality software for hardware sales, while [Shankar and Bayus, 2002] and [Clements and Ohashi, 2005] concentrate on indirect network effects(i.e. hardware-software interdependencies), furthermore do [Aoyama and Izushi, 2003] approach gaming from a socio-cultural perspective. In their article [Hennig-Thurau and Marchand, 2013] introduce a conceptual framework for value creation in the video game industry and do place the gaming platform in the center of gravity, but there is no major focus on the determination of success factors for the gaming platforms themselves.

This seminar paper aims to fill this gap and provide a comprehensive, conceptual framework to answer the question: "Which ingredients turn a video game console into a successful platform for a specific target group?" To create this framework I will first lay out the foundations by introducing the gaming industry's main characteristics, i.e. that it is a two-sided, hedonic market catering to different gamer personae as its tar-

get audience and experiences a regular soft reset every five to seven years with the introduction of a new console generation.[Gallagher and Park, 2002]

I will then use the framework provided by [Hennig-Thurau and Marchand, 2013] as a starting point and expand it to establish a holistic picture of a video game platform (see figure 3) using the current state of scientific research. To conclude this paper I will apply the framework onto the the "console war" of the seventh console generation and discuss its limitations and highlight necessary future research.

2 Foundations

Researching success factors is a common scientific practice[Leidecker and Bruno, 1984] in other branches like the film industry [Hennig-Thurau et al., 2001], supply chain management [Power et al., 2001] or software development [Reel, 1999], but not as common in video games research thus opening interesting research opportunities.

As a precondition for investigating the success factors of video game platforms we have to establish the characteristics of the video games industry. Video games and in consequence video game platforms are by definition hedonic products like movies as they deliver a multisensoric experience on an emotional level. The relevant criterion in the buyer's decision process is to evaluate if the video game platform delivers a desirable experience. [Hirschman and Holbrook, 1982]

There is an inherent need to categorize the potential buyers of video game consoles into targettable segments according to their individual and shared desired experiences. [Kuittinen et al., 2007] and [IGDA, 2006] identify casual gamers, core gamers and hardcore gamers, without those segments being mutually exclusive. The hardcore gamer is a highly competetive personality that prefers games requiring a high degree of skill (i.e. hand-eye-coordination, low reaction times, tactics) and a steep learning curve. The casual gamer on the opposite side of the spectrum prefers low-involvement games, that can be, but not always are, played with a lower time investment. There happen to be a lot of casual gamers playing "casual games" with a "hardcore" time investment. [Kuittinen et al., 2007] The core gamer hovers between those extremes. [Scharkow et al., 2015] (see figure 1) But all gamer personae have a common denominator in terms of what they expect from their gaming platform of choice: an enjoyable experience.

[Katz and Shapiro, 1994] describe in detail the indirect network effects that exist in system markets like the video games industry. A bigger installed base, i.e. more consoles sold to gamers, leads to a greater variety in software, i.e. more games available for said gamers, a higher software quality, better games, and by this increasing the value of the gaming platform for the consumer. Additional direct network effects are the foundation of [Marchand, 2016] where the approach is taken from the opposite direction, i.e. how to use the software to counter lifecycle decline. So the software-hardware interdependency

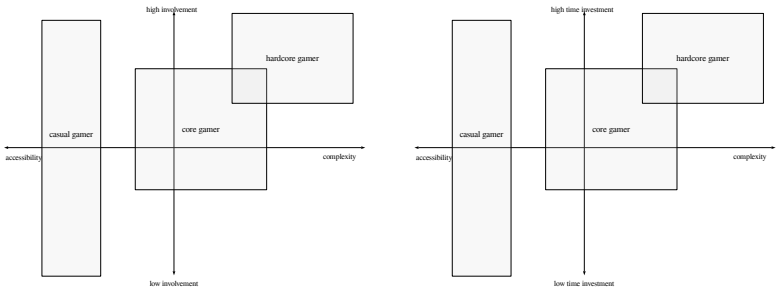

Figure 1: Matrix of different gamer personae/Source: Own design based on [Kuittinen et al., 2007], [IGDA, 2006], [Juul, 2009]

is a given fact in the video games industry.[Clements and Ohashi, 2005]

Another key feature defining the video game console market is the existence of the "console generations", that effectively lead to a soft reset when the main players introduce their new platforms in a timeframe of about 12 to 24 months. This "soft reset" is fueled by technological innovation [Orland, 2013](following "Moore's law" [Moore, 1965]). Until this day there have been eight console generations (see figure 2) entering the market and being part of the "console wars" in which they battle for market domination during their lifecycles. [EncyclopediaGamia, 2016] As the definition of a console generation is nothing that adheres to scientific criteria, I accept and use the common timeframes like they are stated on [Wikipedia, 2016b] and shown in figure 2.

Generation	Timespan	Main Competitors
1	1972-1980	Magnavox Odyssey, Coleco Vision
2	1976-1992	Atari 2600, Mattel Intellivision
3	1983-2003	Nintendo Famicom/NES, Sega Master System, Atari 7800
4	1987-2004	Super Famicom/SNES, Sega Genesis, PC Engine, Neo Geo
5	1993-2005	N64, Sony Playstation, Sega Saturn, Atari Jaguar
6	1998-2013	Dreamcast, PlayStation 2, Gamecube, Microsoft XBox
7	2005-2016	Wii, PlayStation 3, XBox 360
8	2012-today	Wii U, PlayStation 4, XBox One

Figure 2: The eight console generations and their main competitors/Source: Own design based on [Wikipedia, 2016b]

[Hennig-Thurau and Marchand, 2013] propose a framework of value creation in the video game industry in which the gaming platform is the center of gravity and part of the vertical path of the so called "gaming environment". I will now zoom in to develop a conceptual framework for the determination of the needed ingredients to turn a video game console into a successful gaming platform.

3 Developing a conceptual framework

3.1 Overview

Piling on the foundational characteristics of the video games industry and the framework of [Hennig-Thurau and Marchand, 2013] I constitute the basic building blocks for a conceptual framework to determine success factors for video game consoles: The hardware-software interdependency according [Katz and Shapiro, 1994] and [Clements and Ohashi, 2005] provides the first two entities: hardware and software, heavily depending on and influencing each other.

This paper introduces a third column, value added digital services. As [C. Garcia, F. Alvarez Tabio, D. Bonnet, 2015] state, the digital transformation of the business world is "a fact of life and a sweeping force for business change". Ignorance bears the potential of being victim to the "innovator's dilemma". [Christensen, 2003] The positive influence of value added services in other markets like cell networks [Kuo and Yen, 2009], messaging apps as [Line, 2016] and digital music distribution [Bockstedt et al., 2006] has been demonstrated as well as scientifically explored and leads to the conclusion that they will also play a vital role in the success of gaming platforms. These digital services depend on the console hardware as a basic layer and on the available software which they expand upon.

The value proposition of the video game platform as a hedonic product is to provide the gamer with a highly desirable joyful experience. Enjoyment in the gamer's perspective stems from the ability of the gaming system (hardware, software and value added services) to provide an immersive flow experience. The concept of immersion is still not fully explored, but can be understood as a lack of awareness of time and space of the real world and being higly involved in the gaming environment. [Jennett et al., 2008] Immersion is also a key component in enabling the player to experience the feeling of "flow".[Sweetser and Wyeth, 2005]

The three entities hardware, software and value added digital services are the ingredients of the video games platform that has to be positioned by the producer in a way that the brand image and its value proposition, the enjoyable experience, are highly congruent with the subjective expectations of the targeted gamer/consumer segment in order to be highly relevant for the consumer's behavior. The process of positioning will not be discussed in detail in this paper as it is out of its scope and sufficiently covered in literature. [Aaker and Shansby, 1982] [Feddersen, 2010]

The combination of the before mentioned items including the positioning process and the desired experience leads to the conceptual framework as shown in figure 3. The ingredients will be individually explored in detail in the following chapters.

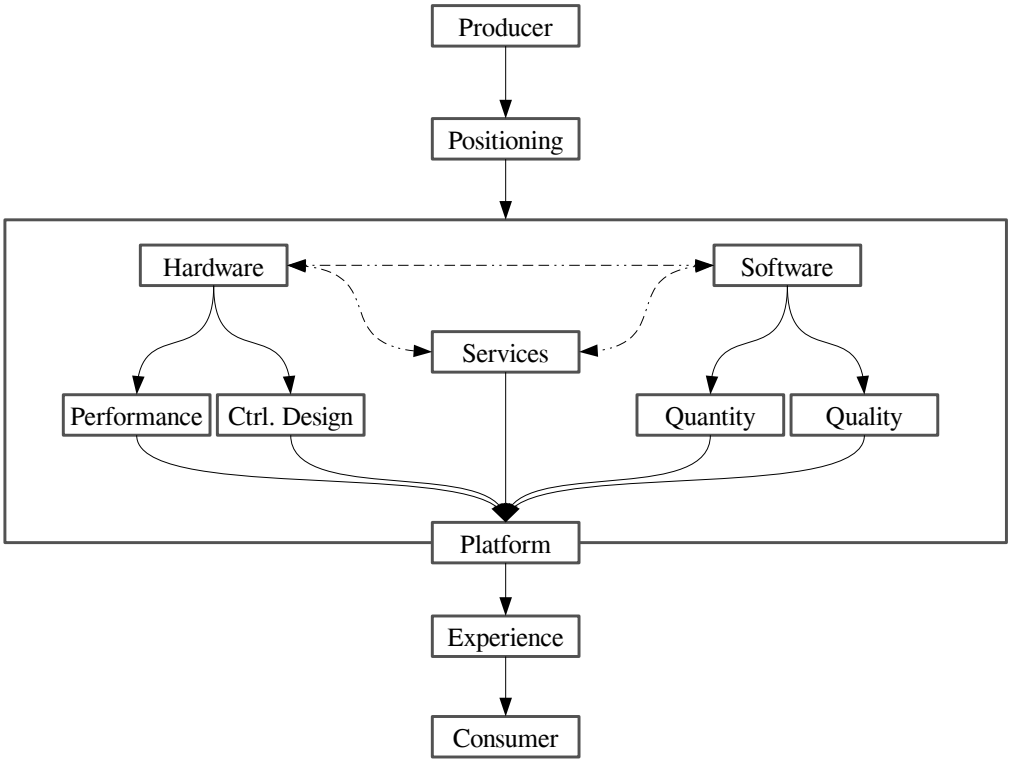

Figure 3: Conceptual comprehensive framework for the determination of success factors for video game platforms/Source: Own design

3.2 Hardware

As immersion is one of the main components of games enjoyment, it constitutes the need to identify a way to create the feeling of immersion for the gamer. [Steuer, 1992] uses the term "telepresence" to describe the experience of the player of being timely and spatially present in a mediated environment, i.e. the "game space", and losing awareness of the real environment, i.e. the "player space". Additionally to get into a state of flow during the gaming experience the player must be able to feel in full control of the action on the screen. [Sweetser and Wyeth, 2005] So the video game platform has to equip him with an effective and efficient control interface to enable a high degree of interactivity. [Skalski et al., 2011]

3.2.1 Immersion powered by high-performance hardware

One way to support the feeling of being present in a simulated environment, i.e. the game world, is the use of realistic three-dimensional gamescapes powered by modern hardware that make it possible to seamlessly switch between gameplay and storytelling and by this creating the necessary suspension of disbelief that pulls the player into the game space. [Kuo et al., 2016] In the first six console generations improving the quality of graphics and sound to facilitate a more immersive gameplay by providing a way of experiencing spatial presence [Weibel and Wissmath, 2011] has been a main driver

for technological innovations in gaming platforms and also enables new challengers to successfully enter the market when a console generation change takes place, as Sony demonstrated with the first Playstation.[Gallagher and Park, 2002]

The player's expectations are strongly interlinked with his gamer persona and define the amount of performance needed. Core and hardcore gamers expecting highly involving and complex games are the right target segment for high fidelity graphics and bombastic sound. Casual gamers require gaming experiences that are highly accessible. Accessibility can be achieved by using less complex graphics leading to an easier visual acquisition of relevant game information. Immersion and accessibility through simplicity are not mutually exclusiv as the game Tetris demonstrates. The clear design is easy to understand and does not require a powerful platform. Nevertheless, a lot of Tetris players are "sucked into" the game, lose their awareness of time and space in the real word and are immersed in the game space. [Jennett et al., 2008] This leads to the conclusion that high graphic and sound standards can play an important role in providing immersive game experiences on video game platforms, but they are not required, as shown in figure 4 which compares the graphics quality of Tetris with the major success title GTA V, that was developed with the core gamer in mind. I assess that hardware capabilities can only offer the foundation for such experiences but without the matching games this offer will be in vain. It is required to correlate the targeted gamer segment with the hardware used to construct the gaming platform. Targetting the casual gamer

Figure 4: Screenshots of Tetris and GTA V/ Source: Nintendo/Rockstar Games

segment with gaming platforms not conforming to the traditional "race of arms" is a strategy that evolved in the last two generations, mainly driven by the Nintendo Wii. [Juul, 2009] Having a look how the amount of system memory, one of the main factors defining graphical complexity, increased over the last console generations shows Nintendo breaking away in Generation Seven, after more than two decades of being on par with the competition. (See figure 5) This development correlates with shifting the focus away from the core gamer segment towards the casual segment as described in [Juul, 2009].

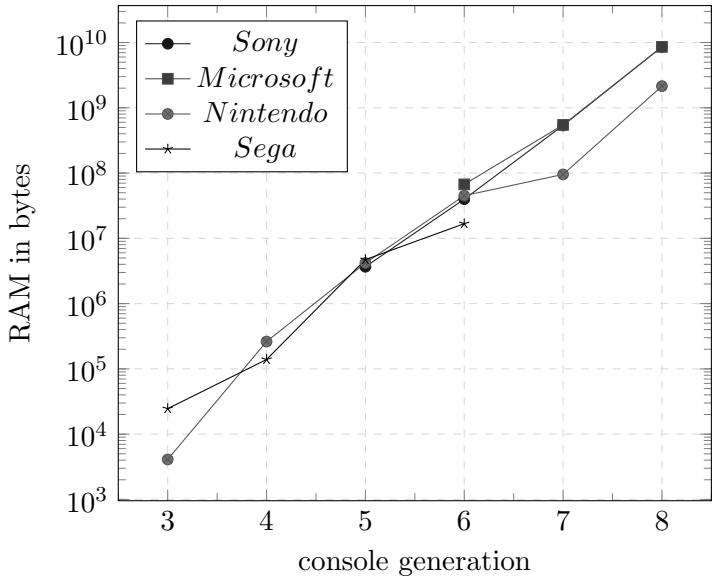

Figure 5: System memory of video game platforms/Source: Own design based on [Wikipedia, 2016b]

3.2.2 Game Flow enabling control interface design

The control interface, usually a gamepad or joystick, is the defining element of the interaction between the gamer and the game itself. [Kelechava, 2015] Sony rated the importance of this interface so high that during the Playstation 4 launch event they did not bother to show the console itself, but just introduced the gamepad. [Stuart, 2016]

Over time the control interfaces evolved from the simple digital, one button joystick of the Atari 2600 into complex devices like the Xbox 360 Gamepad with its 11 buttons and 6 analogously controlled axis of maneuver or the Wii U Gamepad that incorporates an additional touch display. (See figure 18 in appendix A and figure 6 below) [Brunner, 2013] In order to gain the ability to target a specific gamer segment with the according controller design, there has to be a way of correlating properties of controllers to the desired experience of the targeted gamer persona. To solve this issue I propose the classification of control devices according figure 7. The table in figure 9 applies the classification to some exemplary controllers and identifies the focussed gamer personae.

For ease of understanding figure 8 provides the definitions and the according references in literature. As an example one can imagine playing a golf simulation with either a) classic gamepad or b) the Wiimote. The classic gamepad is artificially mapped and imitating the actions on screen via button presses, i.e. press button “A” to start the swing, press it again to determine the amount of power, press a third time to finally swing the bat and use one of the analog sticks to control the golf ball’s spin. In contrast the Wiimote offers an intuitive imitation approach, as the player’s actual movement resembles the on screen action as closely as possible. It is also a showcase for natural mapping because the use of the controller correlates with a high degree to the real life movements performed while playing golf. Natural mapping has been shown to increase

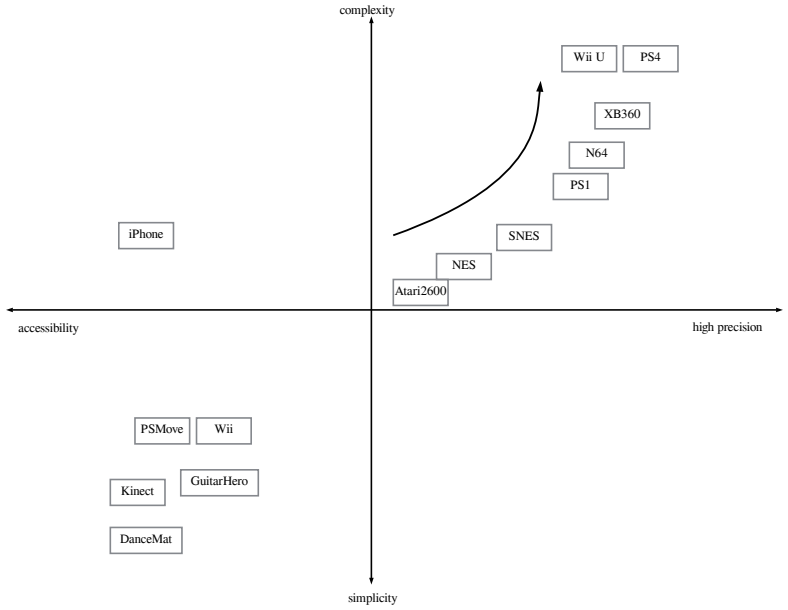

Figure 6: Rising complexity of video game control interfaces/Source: Own design

the feeling of spatial presence in the game environment, thus facilitating immersion effects, and leading to a high enjoyment factor. [McGloin et al., 2011]

While [Kelechava, 2015] rates controller design evolution as not being significantly improved from one generation to the next, I consider it as a vital component of modern video game platform design, especially in the process of positioning the platform for a specific target audience by offering the right mixture of complexity/accesibility, type of control and mapping to increase gamer enjoyment and immersion.

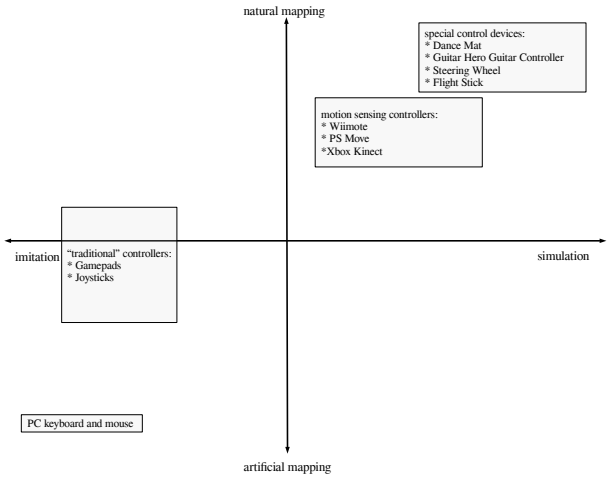

Figure 7: Classification matrix for control devices/Source: Own design based on [Jenson and de Castell, 2008], [Skalski et al., 2011] and [McGloin et al., 2011]

[1]Only when natural mapping is used by the game, otherwise the Wiimote is used with an artifical mapping.

Term	Definition	Reference
Mapping	how are the performed actions of the gamer connected to corresponding changes in the game space?	[Steuer, 1992]
Natural Mapping	matching the action performed by the gamer and the natural action as closely as possible	[Skalski et al., 2011], [McGloin et al., 2011], [Steuer, 1992]
Artificical Mapping	arbitrary and completely unrelated mapping of gamer action to the function performed	[Skalski et al., 2011], [McGloin et al., 2011], [Steuer, 1992]
Simulation	translation of the player's input into a (character) action on screen	[Jenson and de Castell, 2008]
Imitation	the players imitative action corresponds to the action on screen	[Jenson and de Castell, 2008]

Figure 8: Control device classification terms in literature/Source: Own design

Controller	Type of Control	Mapping	Complexity	Precision	Focus
NES Gamepad	Imitation	artificial	low	medium	Core
XBox 360 Gamepad	Imitation	artificial	high	high	Core
Wii U Gamepad	Imitation	artificial	high	medium	Core
Wiimote	Simulation	natural[1]	medium	low/medium	Casual
DanceMat	Simulation	natural	low	high	Casual
FlightStick	Simulation	natural	high	high	Hardcore
GuitarHero Controller	Simulation	natural	low	medium/high	Casual

Figure 9: Classification of exemplary controllers/Source: Own design

3.3 Software

3.3.1 Software variety and network effects

Network effects are an established topic in scientific literature and describe how an increased usage of a product leads to an increased value for all consumers or users of that product. [Katz and Shapiro, 1985] The classic example for this kind of pattern, a direct network effect, is a telephone network. The value for each network member, who owns a telephone that is connected to the network, increases with each new member, who adds his telephone. [Rohlfs, 1974]

Additionally [Economides and Salop, 1992] introduced the concept of indirect network effects, that describes how increased usage leads to additional products that indirectly increase the value of the original product, i.e. the more games become available for one platform the more value it offers to the consumer.

Indirect network effects are also the basis for the fact that the video games (platform) market is a two-sided market. [Rochet and Industrielle, 2003] Figure 10 shows

the relationships that exist between the players of the video games market under the assumption that there is only one platform. A large installed number of platforms attracts software developers that offer an increasing number of games to the consumers. A huge variety of available software is attractive for gamers that currently are not owning the games platform and so become new customers for the platform owner and the game developers at the same time.

[Rochet and Industrielle, 2003] explain the business model of the video games platform producer/owner by establishing two segments: The *loss-leader/break-even segment* consists of the platform buyers. Video game consoles usually are sold at such a retail price that losses are taken into account with the intention to quickly increase the installed base. This method is called penetration pricing. [Liu, 2010] To achieve his economical goals the platform owner needs the *subsidizing segment* to generate positive cash flows. This segment consists of the game developing studios and/or the game publishers. They have to pay a royalty fee for every sold game. [Rochet and Industrielle, 2003] On the other hand, for the developers the subsidizing segment are the consumers that buy the games and by that subsidize the loss-leader segment consisting of the platform owner.

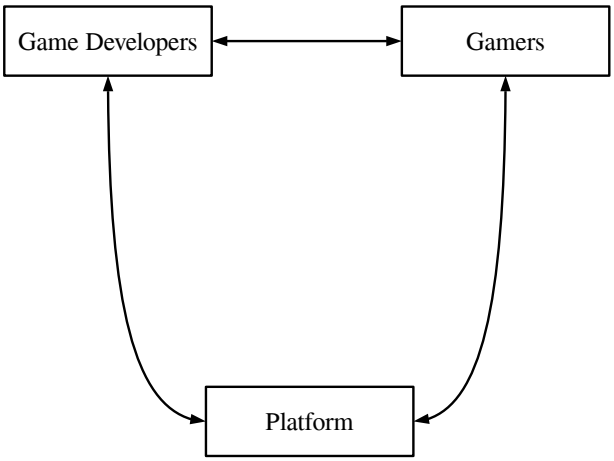

Figure 10: Network effects in the video games console market/Source: Own design

Having a look at the launch lineups of the current generation's video game consoles, the Sony Playstation 4, the Microsoft XBox One and the Nintendo Wii U in figure 11 reflects and confirms the influence of network effects as described above, with the Playstation 4 leading the field by a large margin concerning the number of available games and the number of units sold.

	Playstation 4	Xbox One	Wii U
Titles availabe	771	462	366
Units sold	45.3M	23.5M	13.5M

Figure 11: Correlation of software availability and consoles soldin Generation Eight/-Source: Own design based on [Vgchartz.com, 2016b]

Concluding the topic of network effects I determine the need for a high number of available games offering a certain amount of variety and choice to the gamers in order

to make a video games platform successful. Simultaneously there is an inherent need for a particularly sized installed base before it becomes attractive for a game developer to commit himself to a gaming platform.

3.3.2 Looking for the system sellers - The need for high quality software

Besides indirect and direct network effects as discussed above, a video game platform does not only need a certain amount of variety regarding the available software, but the perceived software quality also plays an important role in its success. [Binken and Stremersch, 2009] showcase that "superstar games" are system sellers, as 1 in 5 buyers (in the six month period after the game launched) of a superstar game also purchases the hardware necessary to play that game, effectively making it a system seller. Following this argumentation there should be an obvious correlation between the success of a video games platform and the amount of high quality software available.

The current, eighth, generation of video games consoles consisting of the Sony Playstation 4, the Microsoft XBox One and Nintendo's Wii U, is an excellent example that high quality games lead to high sales numbers of the platform starting with the average quality of their respective launch lineups to the number of currently available superstar titles with an average rating of more than 85%. Figure 13 depicts the lineup qualities and shows that the Playstation 4 launch lineup offered the highest median rating and also the highest number of games rated 85% and higher. This trend continues as figure 12 clearly displays the domination of the Sony platform qualitywise. This comparison

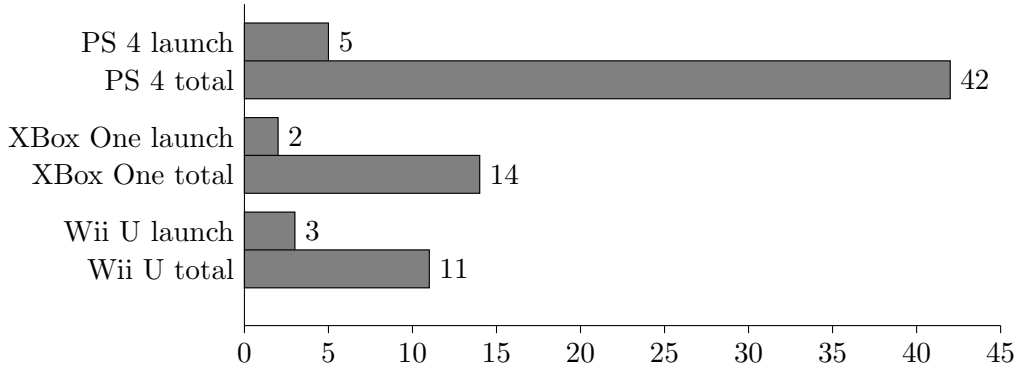

Figure 12: Launch and overall numbers of superstar games on the Generation 8 platforms/Source: Own design based on data from [Gamerankings, 2016], see figures 19 - 22 in Appendix A

of the Wii U, the XBox One and the Playstation 4 regarding the number of superstar games confirms one more of the findings of [Binken and Stremersch, 2009]. Consumers have to have the perception that the introduction of those highly desirable top notch games is not a fluke but that there will be a steady supply of them because otherwise the platform will be considered as dried out. This leads to the conclusion that a platform producer should invest in a continuous supply of high quality games to a) assure the consumer, that the platform will be successful and b) by this to increase hardware

	Playstation 4	Xbox One	Wii U
Titles	25	22	26
Median	75.96	74.59	71.21
Mean	74.24	68.76	63.36
>85	5	2	3
>80	5	2	6
<65	3	4	4
<50	2	2	7

Figure 13: Launch lineup quality of the eighth console generation/ Source: Own design based on data from [Gamerankings, 2016], see figure 19 in Appendix A

sales.

Another aspect to focus on is the way superstar games target different audiences as they are compiled with different gamer personae in mind. Sony obivously positions the Playstation 4 as a platform for core and hardcore gamers by using high-performance hardware, a complex controller and a games library set up to satisfy those gamer types. Nearly all of the superstar games listed in figure 20 are from genres that appeal to core gamers: fast paced action games (GTA, Uncharted), time-consuming RPGs (The Witcher 3, Dark Souls 3) or competitive online shooter games (Titanfall, Overwatch) reflecting Sonys excellent positioning strategy. On the other hand the Nintendo Wii U, see figure 21, offers far less superstar games and those do not show a clear positioning strategy software-wise.

Consolidating the matter of superstar software means to acknowledge the fact that a successful video games platform depends on its superstar games as system sellers. Gaining exclusivity of superstar games is a favorable situation and not only increases the producer's own hardware sales but also denies the competitors to increase their sales numbers with these titles. [Shapiro, 1999], [Binken and Stremersch, 2009]

3.4 Value added digital services

Today all video game console producers act as digital service providers, offering their customers a wide range of digital services including, but not limited to: digital software stores, social networks, multiplayer gaming, achievement systems, cloud savegames and player communication via chat and voice. The services can be differentiated in free and paid ones. Nintendo gives free access to all digital services within its Nintendo Network [Nintendo, 2016a], while Sony, Playstation Plus, and Microsoft, XBox Live Gold, require the gamer to subscribe to the premium version of their networks to gain the possibility to use all services while at the same time offering "real value" by making a certain amount of games available for free to their subscribers. [PlaystationPlus, 2016], [XBoxLiveGold, 2016] These games are only playable while maintaining an active subscription, adding another incentive for continuous membership.

Especially the possibility to play games competitively or cooperatively with other players via the internet is a huge value for many gamers as it offers another option to

experience flow and immersion as well as social interaction. [Hsu and Lu, 2004] The social interaction itself is an important tie between the virtual and the real world, as friendships can form online and transfer into the real world or vice versa as shown by [Domahidi et al., 2014] and [Trepte et al., 2012]. This way social value is added to the value proposition of the games platform. From the platform producer's perspective multiplayer gaming offers the benefit of direct network effects, especially in the later phases of a platforms lifecycle. A high installed base of a mature platform can stimulate high sales numbers of online multiplayer games which generate profit in the form of royalties for the platform owner [Marchand, 2016] and additionally generating further revenues if, like Sony and Microsoft, the platform owner/service provider requires a subscription to access these online multiplayer functions.

Another element that is a part of social gaming is player engagement by using achievement systems. Achievements are a virtual reward-system for in-game feats of the player collected in a trans-game service provided by the platform owner. [Jakobsson, 2011] and [Hamari, 2011] These achievements can serve different purposes for the gamers: comparing themselves with and competing against their friends, using them as a kind of gaming history or by playing a kind of meta-game by trying to collect a maximum amount of achievements and expressing themself by demonstrating their high gaming skills. [Jakobsson, 2011] By providing these different benefits to the customer, achievement systems are an important part in the platform owner's services portfolio.

A major element of the digital services networks the platform producers operate is digital content distribution. All three players offer non-game content like video streaming, which will not be discussed in this paper, but also can be of high value to the customers. Digital games distribution is comparable to digital distribution of software and movies and offers benefits to the platform providers and the gamers. The provider is able to use digital distribution to fend off software piracy to some extent. [Danaher et al., 2010] found out, that the non-availability of digitally distributed media is a possible driver for piracy in the movie market and it seems sensible to apply this result to games as well. At the same digital games distribution is a mean to minimize media production and logistics costs, as well as retailer listing fees and so raising the economic benefits for the content provider. This does as well apply to third party game developers that have to share their income with the games platform owner providing the sales channel.

There are some requirements, mainly on the technical-functional side, that are prerequisites for a successful value added digital service network that generates real value to the gamers. First and foremost reliability and stability have to be ensured as [Kuo et al., 2009] demonstrates for value added services in mobile networks and these findings seem adoptable for value added services in gaming platforms. Recent developments show that these requirements cannot always be met due to technical failures, see [Jones, 2016] and [Grubb, 2016], or due to coordinated attacks, so called DDoS attacks [Walton, 2015] against which appropriate counter measures are hard to develop.

For the technical standards that have to be met in multiplayer games

[Pinelle et al., 2009] developed a set of heuristics that describe in detail the problems occuring in networked multiplayer games and how to avoid them. In figure 14 those heuristics are listed that can be allocated to the area of responsibility of the platform owner. The factor of game-based delay is only partly manageable by the service provider as the internet connection of the gamer plays an important role as well as the routing of the network packets to the gaming infrastructure. Nevertheless delays should be minimized as lag can lead to a disruption of flow and immersion, see [Chen et al., 2006] and [Ries et al., 2008], two of the main factors that make up a good and desirable gaming experience.

1.	simple session management
2.	flexible matchmaking
3.	appropriate communication tools
4.	support social interaction
5.	reduce game-based delay
6.	manage bad behaviour

Figure 14: Networked Game Heuristics allocated to the platform owner/Source: based on [Pinelle et al., 2009]

To close up the topic of digital services I conclude that a successful gaming platform needs a highly reliable digital service network with a wide range of provisioned services catering to the needs of and creating value for its specific target audience. It has to be further investigated which services components are suited to increase the perceived value of the offered services for the different gamer personae.

3.5 Framework summary

The aim of this seminar paper was the development of a conceptual framework for the determination of success factors of video game consoles. In the previous chapters I described the success factors based on current scientific research as far as it was available (see chapter 5 for limiting factors and their implications) as isolated factors. But they are all heavily intertwined. These interdependencies are clearly marked in figure 3 with the vectors connecting the single entities.

The software-hardware interdependency exists on an additional level besides the one described in chapters 3.3.1 and 3.3.2 (direct and indirect network effects in the two-sided market). The hardware of the platform defines, via its technical specifications and the control interface design, for what kind of games, regarding the level of audio-visual ambition and user interface design, it is suitable and to which audience in terms of gamer persona it caters. This should heavily influence the games created for the platform. On the other hand there is a demand for certain types of games that should be identified by the platform producer during the design and positioning process of the next generation console and this insight must be taken very seriously.

The value added digital services, including digital games distribution, multiplayer options and achievement systems, are based on the available hardware and have to be

designed specifically to be used with the control interface of the platform which requires a specialised HMI (human machine interface). The games developed for the platform extend their value by incorporating parts of the service portfolio to enrichen the gaming experience.

All three identified success factors, hardware, software and services, have to be defined during the positioning process to maximise the value proposition for the intended target gamer personae and to create a platform that is attractive for developers from the technical point of view to foster effective and creative game design, with the aim of developing games that will generate high profits, and in terms of the potentially achievable market penetration or installed base as a precondition for high numbers of games sold in the future.

4 Framework Application - The Console War of Generation Seven

The seventh generation of video game consoles lasted from November 2005, beginning with the launch of the Microsoft XBox 360, followed by its competitors Playstation 3 (Sony) and Nintendo Wii one year later, until April 2016 when the XBox 360 was finally discontinued. Nevertheless it effectively ended in November 2013 when the current generation's Playstation 4 and XBox One entered the market one year after Nintendo's Wii U. The seventh generation is considered to be the one with the longest lifespan. The conceptual framework for the determination of success factors for video game consoles will now be applied on this generation to investigate its aptitude in a ex post analysis.

4.1 Positioning of the platforms

To understand the decisions leading to the platforms as we experienced them during their generation a quick and compressed look on the positioning strategies of all three parties is important.
Nintendo's strategy was to appeal to a wide audience of core and casual gamers including all age groups up to the seniors, which was a first in video game history, and aimed especially at former non-gamers to expand their market. [Casey, 2006] According this positioning Nintendo launched the Wii with a low price tag which it could afford by using weaker hardware. (see figure 15) The use of cheaper components enabled Nintendo to earn profits from the first units sold, effectively using a price skimming strategy.
Microsoft positioned their XBox 360 as an innovative entertainment system in addition to it being a high end gaming console and focussed on what they evaluated as their key product advantage: "social gaming", mainly online, for a progressive, inclusive core gamer market. [Hall, 2007] The Playstation 3 was put into the market by Sony as the definitive high end gaming platform, mainly focussing on its advanced technical

features for a target audience consisting of hardcore and core gamers that it had established with the first two Playstation iterations. [Gamesindustry.biz, 2006]
Microsoft and Sony both chose to use a penetration pricing model with their platforms being the loss-leader segment to increase market share and installed base. (see figure 15) Both platforms were priced higher than the Wii by a large margin, especially the Playstation 3, due to the used expensive high performance components.

	Wii	PS3	XBox 360
US launch price	249.99 $	599 $	399.99 $
EU launch price	249 €	599 €	399.99 €
Production costs	160 $	800 $	715 $
Δ	89.99 $	-201 $	-315.01 $
Launch date	19. Nov. 2006	11. Nov. 2006	22. Nov. 2005
Discontinued	20. Oct. 2013	29. Sep. 2015	20. Apr. 2016
Lifespan	6y9m	8y10m	10y5m
Consoles sold	101.18M	86.66M	85.61M
Games sold	965.72M	969.01M	1001.76M
Attach Rate	9.54	11.18	11.70
Games avl.	2808	3308	3671
Games >5M sold	21	28	28
1st party bestsellers	66.7%	21.4%	42.9%
For TOP100	1.48M	1.99M	2.20M
Superstars (>85%)	34	160	179
CPU	729 MHz	3.2 GHZ	3.2 GHZ
GPU	243 MHz	550 MHz	500 MHz
RAM	91 MB	512 MB	522 MB
Video Resolution	480p	1080p	1080p
Media capacity	8.5 GB	50 GB	8.5 GB

Figure 15: Generation Seven overview/ Source: Own design based on data from: [Gamerankings, 2016], [Vgchartz.com, 2016b], [Snow, 2005], [Murph, 2006], [Smith, 2006], [Block, 2006], [Nintendo, 2006], [Fingas, 2013], [Sony, 2006], [Wikipedia, 2016a]

Figure 16 visualizes the positioning strategies that have been applied to the three platforms and already indicates why the Nintendo Wii turned out to be the most successful platform of its generation in terms of sold units. Nintendo concentrated on those areas where they had an edge over Sony and Microsoft, who both opted for nearly congruent strategies. This positioning is clearly distinguishable in the success factors that have been developed in the previous chapters.

4.2 Hardware

Nintendo deliberately decided to build the Wii from components with a low amount of offered performance in terms of audio-visual effects capabilites (see figure 15 for the technical specifications). Instead it focussed on the Wiimote as the first main-stream motion-based video games control device offering the possibility to play games with a natural mapping and an imitation based gameplay. [Casey, 2006] By going this route they effectively lowered the entry barrier for casual gamers and former non-gamers by reducing the learning curve.

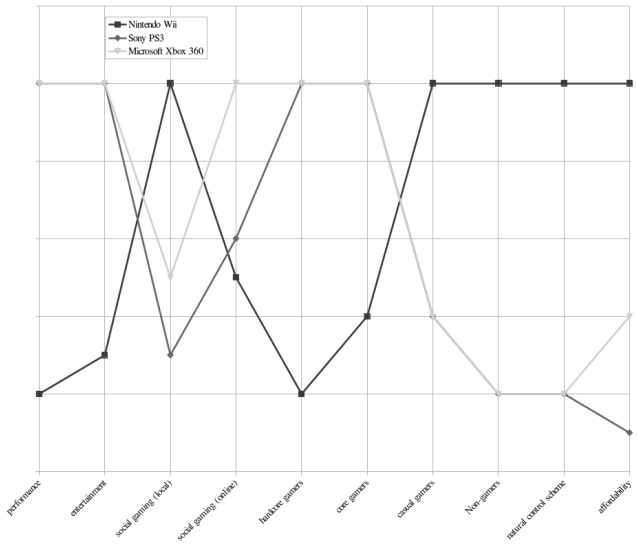

Figure 16: Generation Seven positioning matrix/Source: Own design

In terms of audio-visual performance the Wii offered game developers a good enough base for games with a high fit to the target audience of the platform, i.e. sports games or party games (examples: Wii Sports, Mario Party, Just Dance).

Microsoft and Sony approached the XBox 360 and Playstation 3 with a mindset of creating maximum performance gaming rigs. [Spencer, 2016], [Crossley, 2016] and [Gamesindustry.biz, 2006] Sony included complex and expensive components like the BluRay player and the Cell processor architecture which made the Playstation 3 the most powerful platform of its generation in theory. The consequences of this decision were initially significant negative cash flows (see Δ in figure 15, production issues (blue laser component availability) [EETimes, 2006] and game developers that in the first part of its lifecycle could not max out the platform due to its complexity, making the XBox 360 effectively the common denominator in terms of hardware performance for the two HD platforms. [Nelson, 2009], [Karraker, 2007] and [Reisinger, 2009] The XBox 360 was built from standardized high performance components which made developing for it more approachable and a distinct hardware design feature (shared memory between main processor and the graphics chipset) enabled it to play on par or even outperform the Playstation 3 on multiplatform releases. [Crossley, 2016] and [Anthony, 2013] Microsoft encountered their own major bump in the road with the "Red Ring of Death", a systematic hardware failure of its consoles, that cost more than 1.1 billion US$ to handle the warranty claims. [Takahashi, 2008]

The control interfaces, the XBox 360 gamepad and the Sony Sixaxis controller, which was later on replaced by the Dualshock 3 gamepad [Sony, 2007], appealed both to a core/hardcore gamer persona, as they are complex devices, offering high precision by using artificial mapping for a simuation gameplay.

All three platforms had been successfully designed to match the needs of their target

audiences, but Nintendo was able to expand their market by focussing on a new target audience (non-gamers and casuals) with its platform.

4.3 Software

The factors determined for success regarding software variety and quality are not present as expected in Generation Seven. As figure 15 depicts the XBox 360 was the platform with the highest number of available games and the highest number of superstar games (average rating >85%). This consequently lead to it being the platform with the highest number of games sold and leading in the attach rate (average number of games sold per console sold). The Wii's attach rate trails behind both HD platforms, leading to the assumption that the software part of the framework was not the main determinant for its success.

The software portfolio of all three platforms is representative of its positioning. Looking at the beststeller games with more than five million copies sold, reveals the Wii's best selling games to be part of the miscellaneous and the sports genre, perfectly matching the motion control scheme and the casual gamer target audience. (see figure 23, examples: Wii Sports, Mario Party, Just Dance)
The XBox 360 ist *the* shooter platform, which coincides with its positioning especially for core gamers and online multiplayer gaming via XBox Live. The Playstation 3's smash hits are mostly action titles as well as shooter games, which is in line with a target audience congruent to Microsoft's one and the technical capabilites of the platform.

The amount of superstar games is nearly equal for the HD platforms (PS3: 160, XBox 360: 179, see figure 15) while the Nintendo Wii is beaten in this metric by a large margin (34 titles). (see chapter 4.5 for possible reasons)

4.4 Value added digital services

Looking at the digital service networks the three platforms established in Generation Seven conforms the positioning strategies again. Nintendo introduced the "Nintendo Wi-Fi Connection" for the Wii platform, it was available for the Nintendo DS before, [Nintendo, 2014b] with the motto: "Simple, Safe, Free". [Famitsu, 2006] It included the possibility to play multiplayer sessions, download digitally distributed games (WiiShop Channel[Nintendo, 2016b]) and access social communities (Nintendo Friend Codes [Nintendo, 2014a]) all without requiring a subscription fee.

Sony and Microsoft established service portfolios for their core gamer target audiences including online multiplayer, digital game shops, achievement systems and multimedia channels. As both providers require a paid subscription in order to gain access to all features and services they offer, they started to give their subscribers free games via "XBox Live Gold - Games with Gold" [XBoxLiveGold, 2016] and "Playstation Plus"

[PlaystationPlus, 2016] to create an incentive. (See figure 17 for an overview of the basic services offered on each platform)

	Nintendo Wii	Sony Playstation 3	Microsoft XBox 360
	Wi-Fi Connection	Playstation Network	XBox Live
digital games shop	✓	✓	✓
cloud save games	X	$	✓
achievements	X	✓	✓
voice chat	X	✓	$
multiplayer	✓	✓	$
free games	X	$	$
3rd party apps	✓	✓	✓

Figure 17: Generation Seven value added digital services/Source: Own design based on [Nintendo, 2014b], [PlaystationPlus, 2016] and [XBoxLiveGold, 2016]

4.5 Conclusions

In terms of consoles sold the winner of Generation Seven is the Nintendo Wii, especially when the pricing model is taken into account, which led Nintendo to create a positive cash flow from the first unit sold. Playstation 3 and XBox 360 share the second place with nearly equal hardware sales numbers. As all sales numbers used in this paper are extrapolated estimates from [Vgchartz.com, 2016a] they can be considered to be equal for the purpose of evaluating their economic performance. Microsoft took the first place when it comes to software copies sold during their platform's lifetime, which was the longest of the three platforms in Generation Seven with more than ten years, and has the highest attach rates. Consequentally it seems like a solid conclusion to assume positive cash flows via licensing royalties. The same applies for Sony according [Crossley, 2016]. Depending on the metric used, e.g. console sold vs. total games sold vs attach rate, either platform can possibly be some kind of winner in this generation. (see [Bishop, 2013])

The framework establishes a solid positioning strategy as the base for all further determinants, which all three platforms accomplished successfully. Nintendo's strategy to embrace a new target audience to expand its market was the key to winning the Console War in the end. [Casey, 2006], [Carless, 2006] This strategy was adopted coherently in the three success factors software, hardware and value added digital services according to the positioning matrix in figure 16, with a focus on excelling in the key parts that are important for the targeted audience (low entry barriers with natural controls and budget friendly pricing model) while being "just good enough" in the remaining elements (hardware performance, software variety, amount of superstar games and value added digital services). A possible explanation that would have to be confirmed with further research could be different buying behaviorial patterns between the gamer personae, which could also illuminate the lower attach rate. In order to be "good enough" in the software branch of the framework Nintendo invested heavily into first party games to maintain a steady software supply for its platform. (66% of the bestselling games for

the Wii are first party ones, see figure 15)

The two HD consoles also have to be quantified as successful, but each has to be individually looked upon. Microsoft had just taken foot in the video game console market with the first XBox and could nearly quadruplicate its sales, while Sony took a fall from 150M sold PS2. [Vgchartz.com, 2016b] Microsoft had to fight the "Red Ring of Death", which may be one reason why they were not able to leave at least Sony, battling with production issues and the complex system architecture, behind. [Takahashi, 2008]
But still both platforms were very successful in a generation with no real losing party as each was aligned to a special target audience.

5 Discussion, limitations and future research

The conceptual framework developed through this seminar paper is suitable to determine the basic success factors for video game consoles, nevertheless there are some serious limitations to it, mainly inherent limitations for conceptual work in general. The significance of the success factors has to determined in detail by applying empirical methods, as they seem to have different degrees of influence in different generations. (See application on Generation Seven in chapter 4) Additional success factors are very likely to exist and should be added to the framework to expand its practicality. This applies to the necessity to focus on the positioning processes in the video game consoles market, which was only covered very briefly. Quality management could be another factor that should be taken into account, as unreliable hardware could be a reason for Microsoft not being the winner in Generation Seven. (See chapter 4 for the "Red Ring of Death")

Scientific literature investigating the different gamer personae and their behavioral patterns is very scarce, so this paper works on basic differentiations that are commonly used in the gamer communities. Future research could be to illuminate their needs in regards to the digital services or behavioral patterns.

The framework and its application are limited in their validity due to the restricted availability of highly reliable sales data and scientific literature as the video games industry is not yet getting the amount of interest it deserves due its economic significance.

Another interesting research option is offered by the rise of mobile gaming, i.e. gaming on smartphones and tablets. The next step in the development of the conceptual framework for the determination of success factors for video games consoles would be to investigate its adaptability to the mobile gaming market and researching the success factors for smartphones as gaming platforms.

Nevertheless, this paper offers a solid foundation for future research with the developed conceptual framework, creating the possibility to deepen the knowledge about success factor research in the video games markets.

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A Additional figures and tables

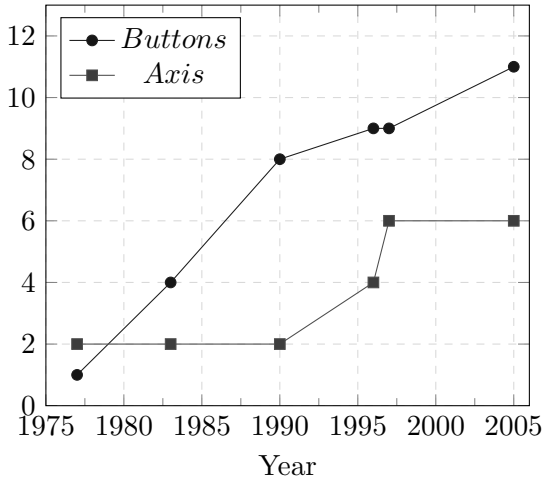

Figure 18: Rising complexity shown with the number of buttons and axis on control interfaces - Source: Own design based on photos provided by [Brunner, 2013]

PS4		XBox One		Wii U	
Title	Score	Title	Score	Title	Score
Angry Birds Star Wars	48.33	Angry Birds Star Wars	55	007 Legends	40.67
Assassin's Creed IV: Black Flag	85.31	Assassin's Creed IV: Black Flag	81	Assassin's Creed III	83
Battlefield 4	85	Battlefield 4	75	Batman: Arkham City - Armored Edition	84.87
Call of Duty: Ghosts	78.31	Call of Duty: Ghosts	77.4	Ben 10: Omniverse	30
Contrast	58.5	Crimson Dragon	56.11	Call of Duty: Black Ops II	86.07
DC Universe Online	72.5	Dead Rising 3	78.45	Chasing Aurora	65.38
Escape Plan	69.25	FIFA 14	89.92	Darksiders II	84.96
FIFA 14	87.92	Fighter Within	24.68	Epic Mickey 2: The Power of Two	55.42
Flower	93.57	Forza Motorsport 5	79.49	Family Party: 30 Great Games Obstacle Arcade	16.2
Injustice: Gods Among Us - Ultimate Edition	83.21	Just Dance 2014	63.33	FIFA 13	76.12
Just Dance 2014	75	Killer Instinct	74.5	Funky Barn	50.38
Killzone Shadow Fall	73.41	Lego Marvel Super Heroes	70.68	Game Party Champions	16.4
Knack	58.09	LocoCycle	51.38	Just Dance 4	67.64
Lego Marvel Super Heroes	83.24	Madden NFL 25	79.73	Little Inferno	81.8
Madden NFL 25	75.96	NBA 2K14	87.12	Mass Effect 3: Special Edition	86.22
NBA 2K14	84.18	NBA Live 14	35	Nano Assault Neo	71.83
NBA Live 14	46.8	Need for Speed Rivals	79.08	New Super Mario Bros. U	84.48
Need for Speed Rivals	80.59	Powerstar Golf	65.8	Nintendo Land	77.98
Putty Squad	53	Ryse: Son of Rome	64.3	Puddle	70.58
Resogun	85.45	Skylanders: Swap Force	80	Rabbids Land	52.4
Sound Shapes	82.67	Zoo Tycoon	70.1	Rise of the Guardians: The Video Game	47.5
Super Motherload	68.17	Zumba Fitness: World Party	74.67	Skylanders: Giants	78.17
The Playroom				Sonic - All-Stars Racing Transformed	77.64
Trine 2: Complete Story	86.33			Sports Connection	29.29
Warframe	66.97			Tank! Tank! Tank!	49.31
War Thunder	74.3			Tekken Tag Tournament 2: Wii U Edition	83.15
				Transformers: Prime – The Game	57.12
				Trine 2: Director's Cut	86.33
				Warriors Orochi 3 Hyper	66.54
				Your Shape: Fitness Evolved 2013	77.14
				ZombiU	77.25

Figure 19: Launch lineups of the 8th console generation/ Source: Own design based on [Gamerankings, 2016]

Title	Ranking
Grand Theft Auto V	96.33
The Last of Us Remastered	95.70
Journey	94.80
Uncharted 4: A Thief's End	92.71
The Witcher 3: Wild Hunt	92.23
Metal Gear Solid V: The Phantom Pain	91.59
The Witcher 3: Wild Hunt - Hearts of Stone	91.19
Diablo III: Ultimate Evil Edition	91.25
Overwatch	90.68
Bloodborne	90.66
The Witcher 3: Wild Hunt - Blood and Wine	90.00
Guacamelee! Super Turbo Championship Edition	89.79
Dragon Age: Inquisition	89.68
Titanfall 2	89.23
Dark Souls III	88.93
Fallout 4	88.60
Rise of the Tomb Raider: 20 Year Celebration	88.58
Batman: Arkham Knight	88.45
The Talos Principle	88.06
Divinity: Original Sin Enhanced Edition	87.86
Velocity 2X	87.50
Dark Souls II: Scholar of the First Sin	87.23
Rocket League	87.16
Odin Sphere Leifthrasir	86.78
Bloodborne: The Old Hunters	86.75
Uncharted: The Nathan Drake Collection	86.66
Valkyria Chronicles Remastered	86.61
Rogue Legacy	86.60
Pro Evolution Soccer 2016	86.58
Middle-earth: Shadow of Mordor	86.55
OlliOlli2: Welcome to Olliwood	86.46
Ratchet & Clank	86.27
MLB The Show 16	86.19
Final Fantasy XIV Online: A Realm Reborn	86.08
Destiny: The Taken King	86.04
DOOM	85.82
Tomb Raider: Definitive Edition	85.76
Resogun	85.45
The Witness	85.31
Thumper	85.26
Pro Evolution Soccer 2017	85.18
Guilty Gear Xrd -SIGN-	85.13

Figure 20: Superstar titles in generation 8 on PS4 (Rating over 85%)/ Source: Own design based on [Gamerankings, 2016]

Title	Ranking
Super Mario 3D World	92.56
Super Smash Bros. for Wii U	92.39
Bayonetta 2	91.38
The Legend of Zelda: The Wind Waker HD	91.08
Shovel Knight	89.98
Super Mario Maker	89.41
Deus Ex: Human Revolution - Directors Cut	89.30
Mario Kart 8	88.40
Pikmin 3	86.46
Call of Duty: Black Ops II	86.07
The Legend of Zelda: Twilight Princess HD	85.98

Figure 21: Superstar titles in generation 8 on Wii U (Rating over 85%)/ Source: Own design based on [Gamerankings, 2016]

Title	Ranking
INSIDE	92.81
Forza Horizon 3	92.30
Fallout 4	89.79
DOOM	89.04
Forza Motorsport 6	88.63
Ori and the Blind Forest	88.52
Rise of the Tomb Raider	87.04
Titanfall	86.71
Battlefield 1	86.61
Forza Horizon 2	86.32
Rare Replay	86.06
Gears of War 4	85.98
Halo: The Master Chief Collection	85.23
Halo 5: Guardians	84.21

Figure 22: Superstar titles in generation 8 on XBox One (Rating over 85%)/ Source: Own design based on [Gamerankings, 2016]

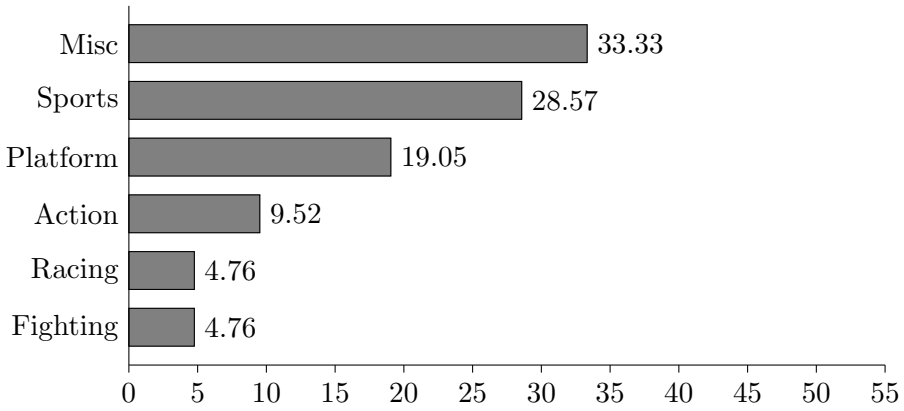

Figure 23: Wii beststeller games genre distribution (in % of games with more than 5M copies sold)/Source: Own design based on [Vgchartz.com, 2016b]

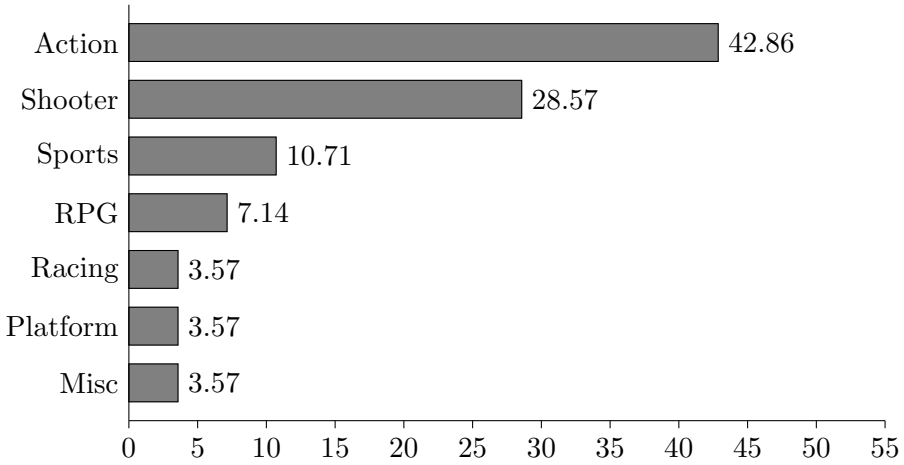

Figure 24: PS3 beststeller games genre distribution (in % of games with more than 5M copies sold)/Source: Own design based on [Vgchartz.com, 2016b]

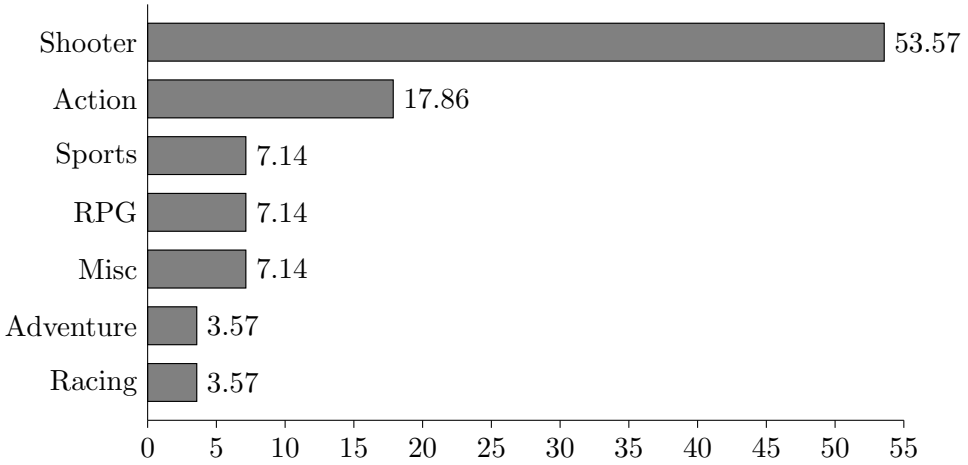

Figure 25: XBox 360 beststeller games genre distribution (in % of games with more than 5M copies sold)/Source: Own design based on [Vgchartz.com, 2016b]

B Declaration of Academic Integrity

I certify that this seminar paper

“ Success factors of video game consoles ”

is entirely my own work, except where I have stated full references to the work of others, and that the material contained in this seminar paper has not previously been submitted for assessment in any other course of study.

Ich erkläre hiermit, dass ich meine Seminararbeit mit dem Titel

“ Success factors of video game consoles ”

selbstständig und ohne fremde Hilfe angefertigt habe, und dass ich alle von anderen Autoren wörtliche übernommenen Stellen wie auch die sich an die Gedankengänge anderer Autoren eng anlehnenden Ausführungen meiner Arbeit besonders gekennzeichnet und die Quellen zitiert habe.

Münster, den 28.11.2016