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Introduction

In today's life mobile phones are basically everywhere. One cannot walk on the streets without seeing someone using a smartphone. For marketers, the smartphone is a great marketing channel to reach and serve the consumer on an individual level. According to Persaud and Azhar (2012), the smartphone is an ideal platform for marketers to integrate their social media strategy into their mobile marketing strategy. This will be of great value to marketers in understanding the customer's needs. The market of mobile apps is growing rapidly with over 1 million apps since the introduction of the Apple app store in 2008 (MacMillan et al. 2009; Spriensma, 2012).

Not only an enormous amount of mobile apps is available in the app stores, also a vast variety of mobile apps is a couple of clicks away from downloading. Categories such as gaming, communication, finance, lifestyle, music, sports, transport, shopping, and business apps are all available online. However, since these apps differ in their usage frequency and usage period, different business models can have various consequences for the application. Since the app industry is very dynamic and products and services are changing every day, it is crucial for a company to find the right business model for their mobile application. An important aspect is to understand how a business model influences the way in which people download the application. How is a mobile game adoption influenced by different business model choices?

In this thesis, I examine the effect of different business models on the adoption of a mobile gaming app. For companies it is crucial to understand the effect different business models can exert on the behavioral intention of consumers when implementing a mobile application into their business structure. Through a literature review and empirical research this paper tries to find an answer to this question. Besides research about the various business models, this thesis will focus on the adoption process of an innovation. Furthermore, gender and age will be explored as variables that will influence mobile game adoption. Since marketing has shown us the importance of social influence within the adoption process, the 'need for belonging' will also be part of the model as the final variable on mobile game adoption.

The paper is organized as follows. The first chapter explains different literature streams about diffusion and technology adoption models. First the Bass model, furthermore, the technology acceptance model, and their extensions will be introduced. Chapter two will be devoted to the research on business models. Besides, business models used in the mobile market will be explained. In chapter three I will go deeper into the user characteristics, such as gender and age. Furthermore, the social side of the adoption process will be researched upon in the direction of the need for belonging and the effects others have on one's behavior. In chapter four the hypothesis will be formulated. In the subsequent chapter, chapter five, an

overview of the methodology will be introduced. Furthermore, I will analyze the data and the results will be given. Finally, I formulate the implications and I suggest limitations.

1 – Theories on the Adoption and Diffusion of Innovations

Diffusion models

The first part of the thesis will cover the literature about the diffusion models. The Bass model will try to explain how diffusion is related to the introduction of a new product in the market. Using literature about the Bass model, and the TAM model in the next section, this chapter will go deeper into how diffusion models can be used to better understand the effects of different business model choices on consumer adoption of mobile applications. According to Mahajan and Muller (1979), a diffusion model is able to define the extent an innovation is able to reach potential adopters over a certain time period. Besides that, they state that the purpose of a diffusion model is to present the increase/decrease in the number of adopters and to predict the development of further stages in the adoption process.

According to Rogers (1983), the diffusion of an innovation is translated into a process of communication through different channels over time within a social context. Rogers (1983) identifies four elements in the diffusion process: time, innovation, communication channels, and the social system. The communication channels are defined as means of communication about innovation products between and within social groups. The Bass model (Mahajan et al. 1990) assumes that mass media and word of mouth are the two main factors of communication that influence potential customers to buy an innovation. Furthermore, the model assumes the existence of 2 groups of adopters or customers. The first group is only influenced by an external factor; mass media. The second group is only influenced by word of mouth; the internal factor. Therefore, the first group is called innovators, and the second group is called imitators. The Bass model states that buyers, who adopt because of mass media, or external factors, are present at any stage in the adoption process. However, according to Mahajan et al. (1990), these adopters should not be labeled innovators, because innovators can be defined as first adopters of the innovation and are thus only present in the first stage of the adoption process. The distribution curve of the Bass model assumes an initial adoption level at the introduction of a product. Also, the model considers a maximum adoption level T^* when the diffusion process develops. Finally, the Bass model uses three parameters for forecasting the diffusion of an innovation; 1) the coefficient of external influence, 2) the coefficient of internal influence, and 3) the market potential.

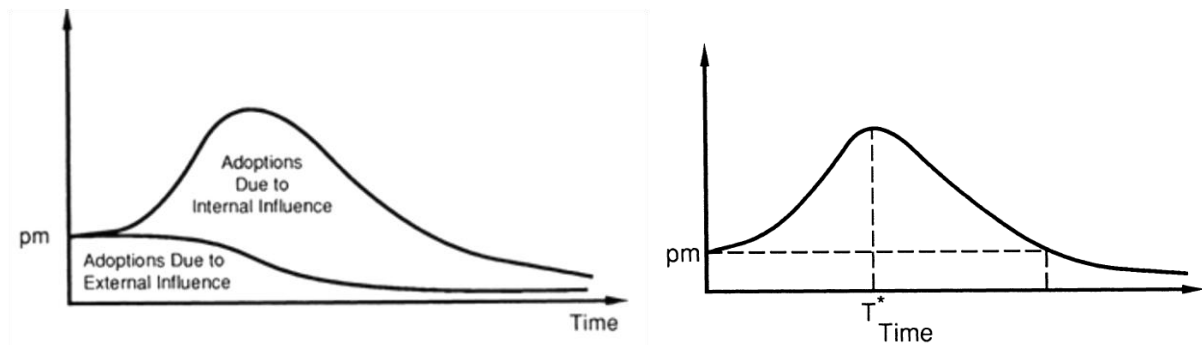


Figure 1 – The Bass New Product Diffusion Model (Mahajan et al. 1990)

Mahajan et al. (1990) state that a diffusion model can be characterized by a point of inflexion and symmetry. The point of inflexion is the maximum of the curve (as in figure 2) where maximum diffusion will be realized at T^* . Symmetry can be characterized if the pattern after the point of inflexion is the mirror image of the pattern before the point of inflexion. In addition, the Bass model assumes that maximum diffusion cannot happen after the product has captured 50% of the total market potential. However, Mahajan et al. (1990) state that in reality the point of inflexion can occur at any time during the adoption process. Mahajan et al. (1990) furthermore state that many diffusion models have the assumption that the impact of word of mouth on potential customers remains constant during the diffusion process. However, Hernes (1976) states that it is more likely for the impact of word of mouth on potential adopters to increase, decrease or stay constant over time.

Mahajan et al (1990) consider nine assumptions of the Bass model.

- 1) The first one assumes that the market potential of the new product remains constant over time. It says that the market potential of the new product is determined at the beginning of the diffusion process and that this market potential will remain constant over the life time of the product. However, Mahajan et al. (1990) state that it is more likely that the potential of the market is expected to fluctuate.
- 2) The second assumption the article of Mahajan et al. (1990) states is that the diffusion of innovations is not related to diffusions of other innovations. This means that the Bass model assumes that an adoption of an innovation does not affect the adoptions of any other innovation in any way. However, Mahajan et al. (1990) argue that an innovation will never appear in a void, especially if products are interrelated, such as hardware and software.
- 3) Thirdly, the Bass model assumes that the nature of an innovation does not change over time. Consecutive product generations are supposed to have improved product

specifications on relevant attributes. Therefore, each new product generation is supposed to cannibalize its own diffusion of antecedents (Mahajan et al. 1990)

- 4) As a fourth assumption, the Bass model states that a social system's geographic boundaries do not change over the diffusion process. Firms introduce their product making use of the neighborhood effect (Brown, 1981). The neighborhood effect states that firms introduce their product one by one market and rely on the word-of-mouth communication to penetrate across different markets which are located next, or close to each other.
- 5) Furthermore, the Bass model assumes that the adoption process is binary (Mahajan et al. 1990). Therefore, the potential adopters do or do not adopt the innovation meaning that as a consequence the Bass model does not assume different stages in the adoption process (awareness, knowledge, liking etc).
- 6) The sixth assumption of the Bass model according to Mahajan et al. (1990) is that marketing strategies have no influence on the diffusion of an innovation. The effect of the four P's marketing mix is already integrated in the three parameters of the Bass model (internal influence, external influence, and the market potential).
- 7) Product attributes and market characteristics do not influence the adoption process. The Bass model states that different product and market characteristics will not explicitly influence the diffusion process in any way. However, according to Rogers (1983), product features and the market environment have a substantial impact on a diffusion pattern.
- 8) The Bass model considers no supply restrictions (Mahajan et al. 1990). Since the Bass model is a demand model, the unmet demand caused by limitations in distribution or mistakes in production will just create a waiting line of potential adopters. Hence, adopters will still adopt the innovations independently whether they have to wait to purchase the innovation. It is rather unlikely that in a complicated world all potential adopters will wait for an innovation without changing to a competitors' substitute.
- 9) The final assumption of the Bass model according to Mahajan et al. (1990), is that there is only one adoption by one adopter. Therefore, this model does not consider repeat buyers. The innovation is thus only adopted once by a consumer and the Bass model only incorporates first time buyers.

In conclusion, the Bass model assumes 2 types of consumers. The first group, the innovators, is influenced by word of mouth (internal) where the second group, the imitators, is influenced by mass media (external). Besides, the Bass model assumes three factors influencing the adoption process; 1) the coefficient of external influence, 2) the coefficient of

internal influence and 3) the market potential. The adoption curve considers maximum adoption at time T^* , which is called maximum inflexion. Furthermore, the Bass model states that maximum adoption cannot occur after 50% of the market potential is captured. Despite that this model is relatively standardized because of the nine assumptions described above, it is an often used model in the adoption literature.

Behavioral Processes Underlying Diffusion: Adoption Models

To address a different literature stream to explain the adoption of innovation products besides the Bass model, the Technology Acceptance Model (TAM) will be used. Venkatesh and Davis (2003) state that figure 2 is the basic conceptual framework of models that explain the individual acceptance of information technology.

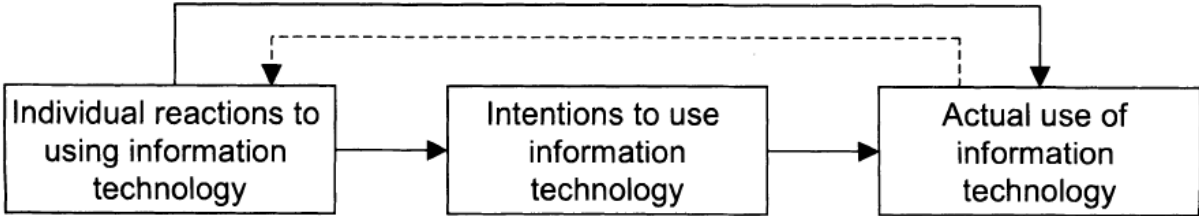


Figure 2 – Basic conceptual framework underlying acceptance model (Venkatesh & Davis, 2003)

The TAM model, an adaptation of the Theory of Reasoned Action (TRA), is a widely accepted model which tries to predict customer’s computer acceptance (Davis et al. 1989; Davis 1989). This is explained in terms of people’s attitudes, subjective norms, perceived usefulness, perceived ease of use and other related variables. According to Davis et al. (1989), TAM tries to explain the determinants of computer acceptance through user behavior. TAM can be explained using the following model (Davis et al. 1989):

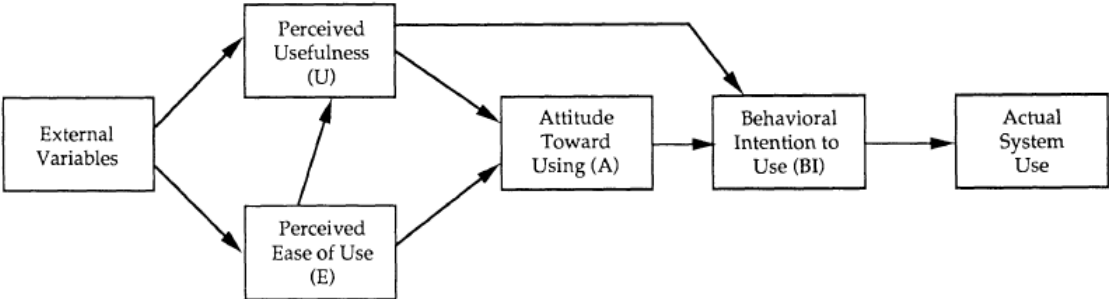


Figure 3 – Technology Acceptance Model (TAM) (Davis et al. 1989)

According to previous research (Davis et al. 1989; Davis, 1989; Venkatesh & Davis, 2000), *perceived usefulness* and *perceived ease of use* are the two main variables that influence people's decision to accept or reject a new technology or innovation. *Perceived usefulness* (U) is defined as 'the degree to which a person believes that using a particular system would enhance his or her job performance' (Davis 1989, p. 320). *Perceived ease of use* (E) is defined as 'the degree to which a person believes that using a particular system would be free of effort' (Davis 1989, p. 320). Perceived usefulness is believed to be affected by external variables and perceived ease of use. If less effort is needed to end in the same result then a person can accomplish more work for less effort.

In their paper, Davis et al. (1989) found that *behavioral intention to use* (BI) is the determinant which has most impact on usage behavior. However, BI is in itself influenced by other factors. Hence, according to Davis et al. (1989), BI has a direct effect on usage behavior where the other factors (external variables, perceived usefulness, perceived ease of use, attitude toward using) in the model have an indirect effect on adoption usage behavior through influencing BI. Furthermore, the usefulness of a system is more important than the ease of use of an innovation. Consumers are more willing to tolerate a more difficult user interface, when the innovation actually is functional in order to achieve needed performance. Therefore, they are willing to compensate for a more difficult to use system that can be used to fulfill its purpose rather than an innovation that is easy, though is not as useful (Davis, 1989; Davis et al. 1989).

Technology Acceptance Model 2

In 2000, Venkatesh and Davis introduced an extension of the technology acceptance model, the TAM2. The extended model shows three social aspects that can influence an individual in adopting or rejecting new technology: *subjective norm*, *image* and *voluntariness* (figure 4).

Subjective norm represents one's perception about whether people important to him or her think he or she should perform specific behavior. Subjective norm has a direct effect on intention to use. This direct effect indicates that people may choose to perform some specific behavior, even if they are not intrinsically willing to act, when they believe that important individuals to him believe he or she should perform this behavior, just to conform to the referent's opinion (Venkatesh & Davis, 2000). This can be specified as peer pressure. Experience of using a system moderates the relationship between subjective norm and perceived usefulness and intention to use. According to Hartwick and Barki (1994), users of a new system have very limited knowledge about the innovation and therefore have to rely on others' opinions. Therefore, the direct effect on subjective norm on perceived usefulness

and intention to use will be stronger in the initial phase of system use and will weaken over time when experience with the system will increase.

Image represents the extent to which the use of the innovation is perceived to increase one's position or status within their social environment (Moore & Benbasat, 1991). Image is positively influenced by subjective norm, because when important members of a social group believe that the individual should use the new technology, actually using this technology will increase his image or position in his social group (Venkatesh & Davis, 2000). Besides, image will have a positive impact on perceived usefulness, since his improved image in the eyes of his social group by using the new technology will give the individual higher power and influence which provides a basis for increased productivity. Hence, a better image will contribute to a greater usefulness in performing the job when using the innovation, meaning a higher perceived usefulness (Venkatesh & Davis, 2000).

Voluntariness signifies whether the innovation is used in a voluntary or mandatory setting. It moderates the relationship between subjective norm and intention to use. Venkatesh and Davis (2000) explain that subjective norm has a significant effect on intention whenever the individual perceives that the social 'judge', the referent, wants the individual to perform the behavior and that the referent has the ability to punish or reward the individual's behavior. Hence, the moderating effect will only occur in mandatory, involuntary, settings

Besides social influence processes, there are four cognitive instrumental processes according to TAM2 relevant to influence perceived usefulness and intention to use: job relevance, output quality, result demonstrability and perceived ease of use (Venkatesh & Davis, 2000). According to Venkatesh and Davis (2000) and Davis et al. (1989), perceived ease of use is also a direct determinant of perceived usefulness. The papers note that the easier a system is to use, the more useful it can be to increase job performance. The relationship is therefore positive. For a detailed view on voluntariness, job relevance, output quality and result demonstrability see the paper of Venkatesh and Davis (2000).

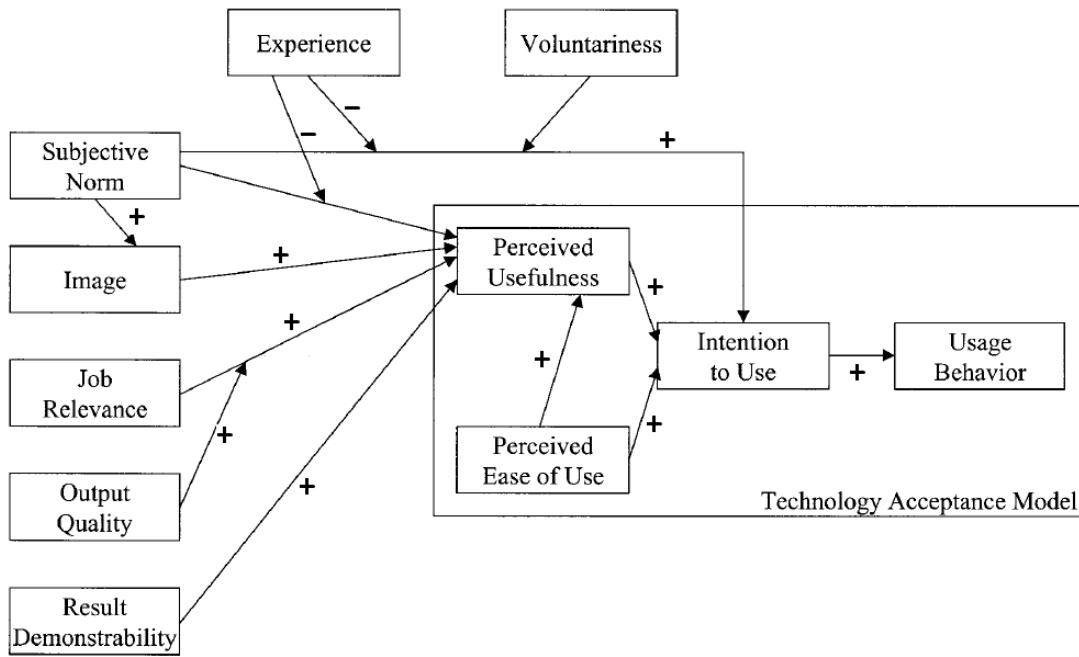


Figure 4 - TAM2 extension of the technology acceptance model (Venkatesh & Davis, 2000)

Unified Theory of Acceptance and Use of Technology

In 2003, Venkatesh and Davis introduced the unified theory of acceptance and use of technology (UTAUT). With this model, the writers integrated eight acceptance models and theories and constructed one technology acceptance model that offers an overarching theory of consumer adoption of new technologies, the UTAUT (figure 5). The UTAUT is designed to provide managers with a tool to assess the likelihood of acceptance of new technology and help them to understand the drivers of acceptance and user behavior. For a detailed view about the eight different acceptance models see the paper of Venkatesh and Davis (2003).

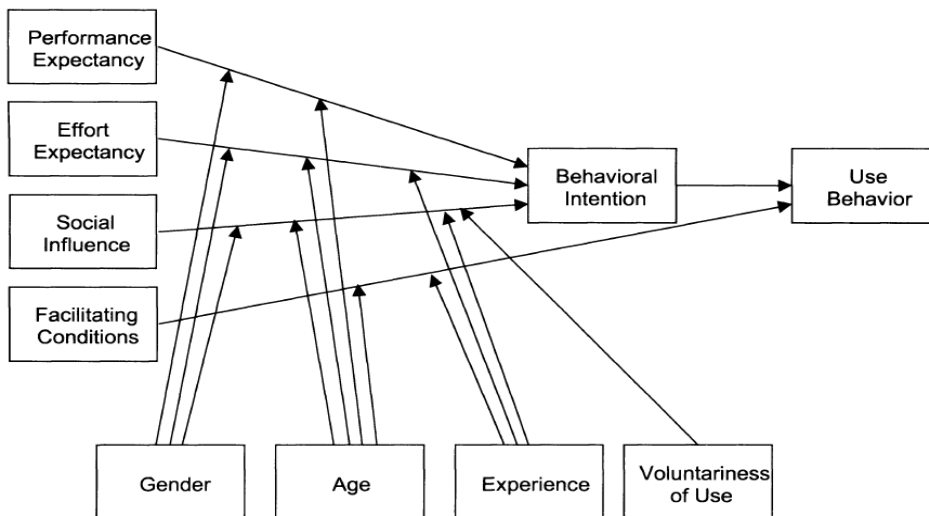


Figure 5 – Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh & Davis, 2003)

Three constructs have a direct effect on behavioral intention (*performance expectancy*, *effort expectancy* and *social influence*), moderated by four variables (gender, age, experience, and voluntariness of use). *Facilitating conditions* don't have direct effect on BI, however, this affects use behavior directly. *Facilitating conditions* can be defined as the perception an individual has that organizational and technical infrastructures exist to support the usage of the new technology (Venkatesh & Davis, 2003).

Performance expectancy is explained by the degree an individual believes that the new system actually will improve his or her job performance (Venkatesh & Davis, 2003). This can be compared with the concept of perceived usefulness in the technology acceptance model and the link between the two models is clearly visible. Performance expectancy is moderated by gender and age. Milton and Schneider (1980) indicate that men tend to be more task-oriented than women, hence performance expectancy is likely to have more influence on men. Besides, younger men place more importance on extrinsic rewards which is related to performance expectancy. *Effort expectancy* is very much related to the TAM concept perceived ease of use. It is explained by Venkatesh and Davis (2003) as "the degree of ease associated with the use of the system". They state that effort expectancy is more crucial for women than for men. Effort expectancy is moderated by gender, age and experience. Increased age is associated with more difficulty in adapting to new systems and processing complex situations and relating them to the job (Plude & Hoyer, 1985). Effort expectancy will be most important for older women with relatively little experience with the system (Venkatesh & Davis, 2003).

The third concept influencing behavior intention according to the UTAUT is social influence. *Social influence* can be defined as the way that usage of a new system will be judged positively or negatively by important others perceived by the individual (Venkatesh & Davis, 2003). This concept of UTAUT can be linked to TAM2's subjective norm. Both constructs are related to the implicit and explicit belief that one's behavior is influenced by the way he or she perceives others will think about him or her when using the new technology. Social influence is moderated by gender, age, experience and voluntariness of use. The pressure of important referents will decrease over time, since the increasing experience will influence the individual's opinion to provide him with more complete information to make a well informed decision. Hence, experience will provide a more rational basis for the individual to use the system. Especially women are more prudent to other's opinions and therefore they find social influence more salient when forming an intention to use the new system. This effect will, as well, decline with increasing experience of using the system (Venkatesh & Davis, 2003). Furthermore, older people are more likely to rely on others' opinions when using a new system. This reliance will decrease with experience.

Concluding the section about the unified theory of acceptance and use of technology we can state that performance expectancy is moderated by gender and age, in the way that the effect will be stronger for men and in particular for younger men. The relationship between effort expectancy on behavioral intention is moderated by gender, age, and experience. The effect will be stronger for younger women, especially younger women at the early stages of experience with the new system. Furthermore, gender, age, experience, and voluntariness moderate the effect social influence has on behavioral intention. This relationship will be stronger for older women, taking place in mandatory settings and at the early stages of experience with the system.

Concluding the theory about adoption models, the TAM model (Davis, 1989; Davis et al. 1989) is explained in terms of people's attitudes, subjective norms, perceived usefulness, and other related variables. The underlining conclusion about the TAM is that consumers are willing to tolerate a more difficult user interface when the innovation is actually functional in order to achieve the needed performance. In 2000, the TAM2 model was introduced by Venkatesh and Davis. The extended model shows three social aspects that can influence an individual in adoption or rejecting new technology; subjective norm, image, and voluntariness. Besides the social aspects, three cognitive instrumental processes are new in the TAM2; job relevance, output quality, and result demonstrability. Finally, in 2003, Venkatesh et al. introduced the unified theory of acceptance and use of technology, the UTAUT. This model is derived from eight different acceptance models, under which the TAM. In the UTAUT, three constructs have a direct effect on behavioral intentions. These are performance expectancy, effort expectancy, and social influence. These relationships are moderated by four variables; gender, age, experience, and voluntariness. The concept of performance expectancy can be related to TAM's perceived usefulness. Effort expectancy is related to TAM's concept of perceived ease of use. Finally, social influence is very much related to TAM2's concept of subjective norm.

As I want to research the effect of different business models have on behavioral intention, the conceptual framework of the UTAUT will be extended (figure 6). Since the need for belonging is an extensive research topic in recent academic literature, it will be included in the model and explained in chapter 3. In the UTAUT, use behavior is as well included into the model. However, since this research focuses on the adoption of a mobile gaming application (behavioral intention) and not on the use behavior of a mobile gaming application, use behavior is excluded from the model.

Chapter 2 will discuss the meaning of a business model through different academic literature and will explain the several business models possible when introducing gaming applications on mobile devices in the different app stores.

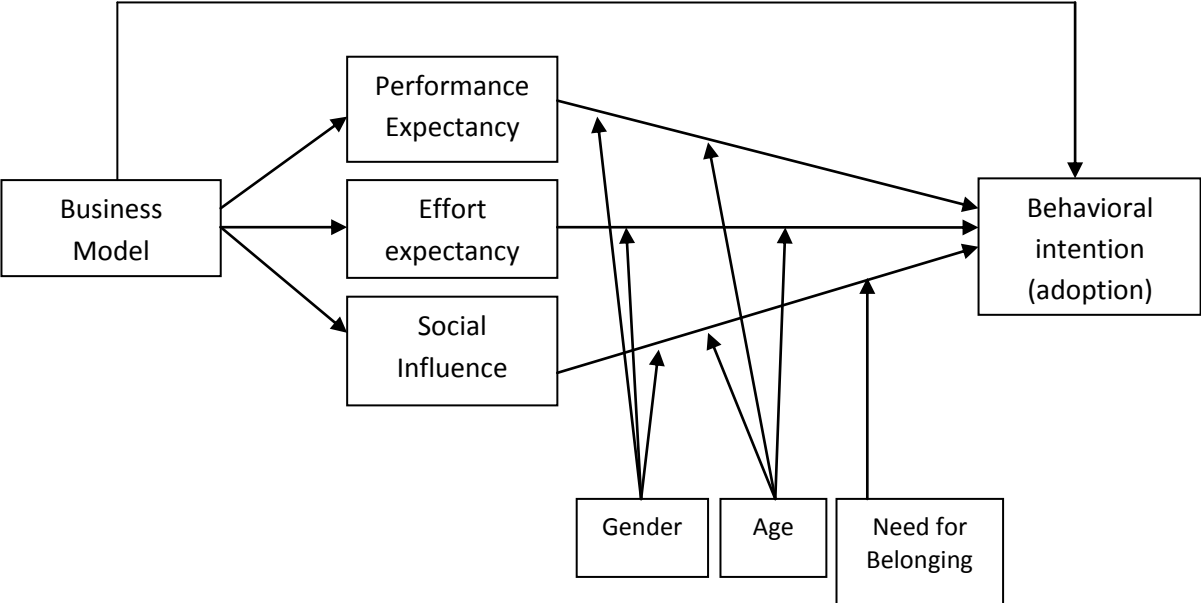


Figure 6 – Extended Unified Theory of Acceptance and Use of Technology

2 - Business models

It is clear that the rise of the Internet in the 1980s has caused companies to change their way of conducting their business. It is much easier to set up a company nowadays and, according to Osterwalder (2004), more companies work in partnerships, offer joint value propositions, set up their own distribution networks and earn profit through diversified and shared revenue streams. The concept of the business model has become increasingly popular to today’s managers. Managers have much more choice in defining their value propositions, selecting their partners, modifying their networks and searching for different methods to reach the consumer. The rise of e-commerce and e-business has changed the environment where and how firms do business. This has influenced the variety of choices managers have and therefore, the way companies form their business model has changed too (Osterwalder, 2004).

Many companies now conduct business online. This is called e-business. According to Forrester research, US firms were estimated to have sold \$109 billion of goods online in 1999, and by the end of the year 2000 this amount already reached \$251 billion. This is

course is an enormous increase, but things just started. According to Yu (2007), e-commerce by businesses in the United States in 2003 exceeded the staggering amount of \$1.6 trillion. As one can conclude, the online market exploded creating immense opportunities. However, as the market is growing rapidly, the competition is fierce. Business opportunities, therefore, will arise quickly and will become quickly saturated if not responded accordingly. This new market where firms conduct business created new ways in the dynamics between buyers and sellers, and changed the market mechanisms. Several characteristics of virtual markets, especially when considered together, have an altering effect on how virtual transactions are structured (Amit & Zott, 2001). In virtual markets it is more convenient to extend your product range, to display complementary products or services, to collaborate with other firms and to have customizability of your products and services (Amit & Zott, 2001). According to Amit & Zott (2001), the characteristics of e-businesses or virtual markets together with the immensely reduced cost of information transportation and information processing forces companies to adapt their operating structures according to these rapidly changing environments.

As mentioned before, virtual markets are highly dynamic. Businesses introduce new products or services each day, creating opportunities that will last for just a short period of time before becoming saturated. Competition is fierce, since setting up an e-business, in many cases, does not require enormous investments. Consequently, being first to the market is crucial to being successful in environments that are illustrated by these characteristics. First movers in virtual markets have the benefit of receiving feedback, in order to, in the end reach a greater audience (Amit & Zott, 2001). Since there is hardly any possibility for failure, especially in virtual markets it is crucial to have the right business model in the initiating phase. According to Chesbrough (2010), developing an innovative business model has at least as much value for a company as developing an innovative technology. Besides, in their research on e-business, Amit and Zott (2001) observe that new value in e-businesses can be created in the way transactions are conducted. They identify 4 dimensions that affect value creation in virtual markets: 1) efficiency, 2) complementarities, 3) lock-in and 4) novelty. For a detailed view on these dimensions consult the paper of Amit and Zott (2001). Similar as Chesbrough (2010) concluded, Amit and Zott (2001) state that a firm's business model is an important part of a firm's innovation process and it will determine the value creation for the firm, its suppliers, partners and customers. Hence, it is vitally important to continuously innovate a business model. Similar to the changing environmental conditions, business models must also change (Chesbrough, 2010). Furthermore, Chesbrough (2010) states that the transition stage into the new business model should be done gradually. The company should maintain the effectiveness of the old business model until the new model is completely ready for use.

In this way the business model innovation can help the company progress into their business and continue growth of profits and revenue.

An example of a recent business model innovation is the change in the music industry. The traditional business model was selling CDs. When CD sales were dropping and revenues and profits were declining, heavily alternative distribution methods, such as iTunes, started to grow to a proportion where they become leading for the industry. In this case it was clear that something new had to be thought of. However, what this new business model in the end would become was not as clear. Therefore, companies needed to experiment with different business models to, eventually, introduce the current business model of selling music through the Internet. A new market introduced itself with the rise of the mobile phones, and later with the rise of the mobile app industry, which has shown to be a serious player in the online markets for many different categories. Millions of start-ups and mature companies have introduced themselves into this promising market, each wanting to get their piece of the pie. This market is very dynamic and competition is fierce. Hence, it is crucial to be a first mover and take advantage of this situation. To grab this first mover advantage it is vital to have the right business model, and keep innovating to stay ahead of the competition.

Before we go deeper into the literature of business models, it is essential to define what a business model is and to clarify the means of a business model. Literature shows that many different definitions have been defined over the years (e.g. Zott et al. 2011). However, this thesis will follow the work of Osterwalder (2004), since it is well aligned with most of the theoretical constructs (Zott et al. 2011) and it is very popular among practitioners both in emerging startups and in larger companies looking for new ways to conduct business. Osterwalder (2004) integrates the two separate terms 'business' and 'model' into one; a business model represents the way companies buy and sell goods and earn money. A business model helps them to understand *how* the company buys and sells products and services and *how* it earns money. Furthermore, he states that a business model is an 'abstract representation' of a company's business logic. The terms business logic in this setting means what the company offers, to whom it offers the product or service and how it accomplishes this. Osterwalder (2004) illustrates many factors that influence a business model. He starts with the business model triangle, consisting of a business strategy, a business organization, and ICT (figure 7). This relationship is influenced by different external factors such as the social environment, the legal environment, competitive forces, customer demand, and technological change. All these variables will define the way a business model is finalized.

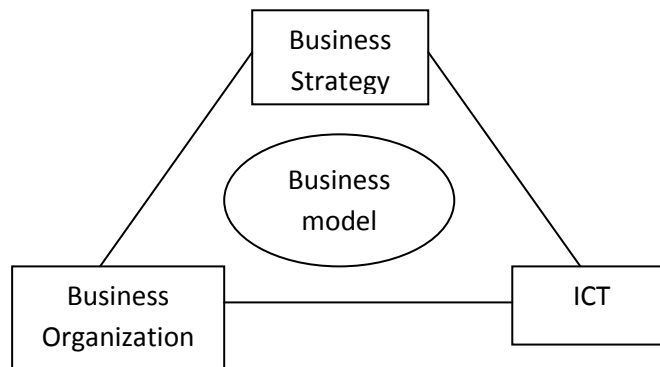


Figure 7 – The business model environment (Osterwalder, 2004)

Finally, Osterwalder (2004) concludes that a business model is a holistic concept consisting of different elements such as customer relationships, pricing mechanisms and revenue sharing. This holistic concept is aligned with the prevailing view by business model theorists, such as Amit and Zott (2007; 2008; 2012). The business model is finalized by the process of performing multiple steps (figure 8).

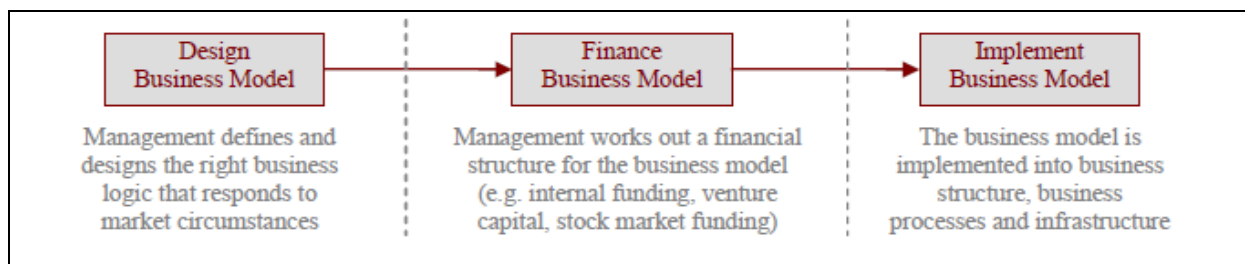


Figure 8 – Steps to define a business model (Osterwalder, 2004)

Timmers (1998) states that a business model is the ‘architecture of a product, service and information flows’. Furthermore, a business model describes the roles of actors involved in the process, defines the potential benefits of the product or service and presents the various sources of revenue. Hawkins (2001) describes a business model as the commercial link between a business and its products or services it offers to the marketplace. Margretta (2002) defines a business model as a story that explains how businesses work. It tells you who the customer is, what the customer values, and how substantial value can be delivered to this customer. Johnson et al. (2008) note that a business model contains four elements that can create and deliver value. These elements are customer value proposition, key resources, a profit formula, and key processes. Finally, Amit and Zott (2001) describe a business model as ‘the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities’.

As can be seen, the existing definitions are quite different from each other. There is no clear consensus between them. The different definitions have only partial overlap with each other. Summarizing Zott et al. (2010), they state that the literature on business models concludes that a business model is a combination of the revenue model, a value proposition, and a network of relationships between people and companies. Therefore, this paper continues on the theoretically sound and robust definition of a business model as described in text box 1.

A business model describes the process of buying and selling goods, how a company earns money, the different actors within the process, and the creation of customer value.

Text Box 1

Institutional Context: Online/Mobile Business Models

In today's online economy, many different business models exist for companies to generate revenue from mobile applications. According to Laurs (CEO and founder of GetJar, world's largest open mobile app store, listed as a technology pioneer by the World Economic Forum in 2011, and quoted by BBC, CNBC, and Forbes), Marktl (2011) and Rakestraw et al. (2013), there are four major business models to implement for an application on a mobile device.

1) Premium

The application will be sold at a predetermined price, such as €0.99, €1.99 or €2.99. The application will be sold through an app store, like Apple's App store or Google's Play Store. The application will be free of advertisements.

2) Ad supported

The app will be distributed for free, however, the app will contain certain advertisements. Hence, the application will generate revenue by placing advertisements in the user interface. The more clicks, the more users will see the ad and therefore the more revenue generated.

3) Freemium

This is a synergy between a free and a premium business model. The company will distribute a free copy of the app, however, some content of the application will be available by making in-app purchases. Besides, the application will contain certain advertisements. However, the user has the opportunity to go ad-free by paying a certain fee, for example €1.

4) Subscriptions

The users subscribe to a service (the application) and pay a fee regularly to keep using the system. The application will be free of advertisements.

All business models require the company to pay the platform owner an amount per year (around \$99 for Apple and \$25 for Google) to get the app in one of the app stores. Besides, 30% of the revenue goes to the App Store (Apple) or the Play Store (Google) where the app developer receives 70% of the revenue generated by the application. This seems a lot, however, millions of customers can be reached quickly through these app stores.

These four prototypical business models fit well with existing taxonomies in existing business model literature (Tapscott et al. 2000; Timmers, 1998; Applegate, 2001; Weill & Vitale, 2001; Rappa, 2001; Linder & Cantrell, 2000). A business model taxonomy classifies different characteristics of a business model in different categories. The business model taxonomy that is most related to the four different business models stated above, is the taxonomy introduced by Rappa (2001). Rappa (2001) states that a business model defines where a company is positioned in the value chain. Hence, the business model defines how a company generates revenue. He defines eight different business model types: The brokerage model, the advertising model, the infomediary model (or merchant model), the manufacturer model, the affiliate model, the community model, the subscription model, and the utility model. Comparing the academic literature with the business articles, one can clearly identify two similarities between them. The ad supported business model is related to the advertising model of Rappa (2001). Furthermore, the subscriptions business model is related to the subscription model of Rappa (2001).

Advertising model – “The broadcaster, in this case a mobile application, provides content (usually for free) and services (email, chat, forums) mixed with advertising messages in the form of banner ads. The banner ads may be the major or sole source of revenue for the broadcaster. The broadcaster may be a content creator or a distributor of content created elsewhere.” (Rappa, 2001)

Subscription model – “Users are charged a periodic, daily/monthly/annual, fee to subscribe to a service.” (Rappa, 2001)

The other six business models do not have much comparison with the four stated business models for mobile applications. One can argue that the utility model is related to the premium business model. The utility model of Rappa (2001) it is based on “metering usage, or pay-as-you-go approach. Unlike subscriber services, metered services are based on actual usage rates. Hence, only if one pays for the application one can use it. Revenue will be collected

only from payment as consumers use the app. However, the utility model calculates revenue by each usage, and the premium business model calculated revenue at the payment upfront, and is free of use after the first payment.

In their paper *Moving from free to fee: How online firms market to successfully change their business model*, Pauwels & Weiss (2008) examine the effects when firms are moving from a 'free' business model to a business model where a fee is required to be able to access the service. Furthermore, they research how the firm's marketing actions affect their revenue streams since the firm needs to attract paid subscribers. According to Pauwels & Weiss (2008), consumers like getting products and services for free. It is a great incentive for consumers to try something new, without having monetary or psychological costs. After the burst of the internet bubble, online content was free and revenue was generated through consumers paying for online content and advertisement income, companies were trying to generate revenue by charging fees for the online content. This caused some problems, since consumers were used to get the online content for free and now they had to pay for it. In the online markets people have become accustomed to free content and they have a zero reference price. Hence, any price consumers have to pay for online content is perceived as too much. In a study conducted by Gedenk and Neslin (1999), various results were found when distributing free samples. First of all, the probability of buying the brand in the future would increase when consumers received a free sample. Secondly, the rate of retention is higher with a free trial and the purchase probability would increase for the ones that would otherwise not have tried the brand. However, a free sample could cause cannibalization of paid purchases (Pauwels & Weiss, 2008).

Often, when moving from free to fee the website is still free for users who do not want to pay, however, some part of the content is only available for paid users. Therefore, the website remains available for paid and non-paid subscribers. According to Pauwels & Weiss (2008), the website of the content provider becomes less attractive to free users when moving from free to fee. They acknowledge two reasons for this. First of all, some content of the website becomes unavailable for free users, and therefore the perceived benefit will decrease. Secondly, the customers of the website have been used to free online content, therefore, when a price is charged, the customers are likely to reject this. On the other hand, Zeithaml (1988), states that a (higher) price represents quality, therefore signaling that the content that is only visible to paying customer is of higher quality.

The move from free to fee will result in revenue loss in the initial phase of the transformation, therefore it is crucial for a company to generate paid subscriptions. A company has the freedom to choose for a long-term or short-term subscription period. Short contracts will give

the consumer to use the content with minimal commitment. When the subscriber does not like the service he paid for, the financial loss he faces is much less for short term contracts. Regret is less for short term contracts, since consumers can switch more easily between different content providers (Pauwels & Weiss, 2008).

Concluding this part, it is clear that many definitions of a business model are available in academic literature. A business model consists of many different variables. It describes the process of buying and selling goods, how a company earns money, the process of creating customer value, and the different players active within this process. The four major business models applicable for the mobile app industry are premium, ad supported, freemium, and subscriptions. The four different models have their own advantages and disadvantages. Since many firms are introducing a mobile application nowadays, or changing the old apps, the effects occurring from this new communication model is crucial to understand. Charging customers when the service was used to be free can confuse people. Submitting free samples to customers increased the probability of consumers buying the brand in the future. All in all, a conclusion can be made that moving from free to fee will affect a firm's advertising revenue from free users. Furthermore, the move slows down the growth of free users, since the content will be less attractive to them. Users still have the belief that online content should be free of charge. However, more and more companies are trying to persuade consumers to pay for online content (Pauwels & Weiss, 2008). Besides, since users are more prone to risk due to the fee system, a tool to get information about the quality of the content provider would be helpful to increase company's, and the application's credibility. A rating system, for example. In the different app stores this sort of system is already in use where users can give their opinion by giving apps, when downloaded, a star rating (0-5) and give feedback which will be visible to other potential users.

Video Games

Games and video games are a long existing and interesting topic for researchers. Many will know the games such as Monopoly, Tetris, Pac-Man, and in later stages, for example, World of Warcraft. Every year new game releases will get the attention of many. Furthermore, the games receive much attention from the media in many expos around the world. What is it that video games become so popular and many people cannot wait for the release of their favorite game? According to the literature available on video games (e.g. Holbrook et al. 1984; Neulinger, 1981; Przybylski et al. 2012; Gentile, 2009), video games are a form of entertainment that allows individuals to adopt virtual identities. Video games give players the opportunity to explore different aspects of themselves by trying on ideal characteristics, which is possible when playing video games (Przybylski et al. 2012). The authors call the

characteristics that a person actually has the *actual self*, where the characteristics a person wishes to have is called the *ideal self*. The closer the actual self becomes to the ideal self, the more self esteem, psychological well being, and feeling of joy an individual receives. Playing video games presents individuals the opportunity to try on different identities (Przybylski et al. 2012). The essence of playing video games is the experience of satisfaction, fun, and enjoyment. Hence, playing games is mostly directed to one's emotional condition (Neulinger, 1981). Video games are played for entertainment, since they can exhibit positive, however also negative, emotions (Gentile, 2009). According to Griffiths (2003), people play video games to relax, to experience aptitude and independence, and to escape the daily thoughts and troubles. Besides, players may lose sense of time and experience an increased sense of control. The rise of mobile phones and applications has not stayed unnoticed to video game developers. Many games that were available for PC, PlayStation or XBOX are now also available in the different app stores, since that is where marketers will find their target group. Besides, the innovation of mobile games has resulted in quality games available on mobile phones, meaning that the gap between video games and mobile games is becoming smaller.

Video games and mobile games give players the opportunity to explore different aspects of themselves by trying on different characteristics or by adopting virtual identities. Playing games can give several advantages to a person, such as joy, increase of self-esteem, and satisfaction. Besides the benefits, playing games can also result in negative emotions, such as frustration.

The next chapter will go deeper into the different user characteristics of gamers, and in particular online gamers. This section will elaborate on gender, age and the effects that occur from social influence. Since the social aspect in the diffusion process in massive, and the need for belonging is a well researched topic, the need for belonging is expected to have substantial influence on the results. All these factors will be treated as moderators of the extended unified theory of acceptance and use of technology, as can be seen in figure 6.

3 – User Characteristics and need for Belonging

The Need for Belonging

From a very young age, (most) human beings want to be part of a group or a community. From the moment we go to our first kindergarten we have a tendency to join a group of friends. Besides, others expect one another to be social. This does not stop after preschool.

By getting older, people join sports associations, music schools, study groups, sororities and fraternities. Obviously, people become a member of these organizations to improve their skills in, for example, athletics and music. However, an important reason, as well, is to socialize with others and feel the identification of being part of a group of people who share the same interests and beliefs; the need for belonging. Since the introduction of the Internet, people are also able to socialize not only face to face, but as well online. A significant example is the social network Facebook, introduced in 2004. By 2012, Facebook presented the staggering amount of 1 billion active people on this social network. In recent times, especially for adolescents and young adults, it is seen as odd when one is not active on Facebook. When is asked why teenagers are on these social websites, the answer is: "Because that is where my friends are" (Boyd, 2007).

The need for belonging stems from people's nature to feel secure and feel connected with others. As a consequence, people will experience love and respect (Osterman, 2000). In the same paper, Osterman states that the need to belong is related to cognitive processes, behavior, health and well being and emotional patterns. The sense of belonging directly affects the way people think of others, which can lead to friendships. When one is accepted into a group or community, it can lead to positive emotions, such as happiness, peace and joy. When one is rejected, it can lead to negative emotions, such as anxiety, depression and loneliness. It can even lead to very serious behavioral problems ranging from criminality to suicide.

Dholakia et al. (2004) note the motives for individuals to participate in a virtual community. They identify six motives. The first one is information value. That means that individuals receive and share information with other members in the community. Secondly, instrumental value reflects the self esteem one receives from accomplishing specific tasks, generating ideas and influencing others' opinions through online interactions. The third motive is self-discovery. Self discovery can occur through social interactions and relates to obtaining knowledge about oneself and forming new preferences, tastes and values. The next motive for participating in a virtual community is to maintain interpersonal connectivity, reflecting social benefits, such as friendship, intimacy and social support. The fifth motive is social enhancement. Social enhancement is obtained by, for example, answering others' questions, providing information. Hereby, individuals gain acceptance and approval of other members and receive recognition within the community. Finally, the sixth motive is entertainment value. This is derived by playing and interacting with others and will be reflected in relaxation and joy.

Considering the use of an innovation, the social influence of peers and communities is an important variable (Frambach & Schillewaert, 2002). Positive network externalities can increase the value of an innovation. The telephone is a good example of a typical innovation benefiting from network externalities. The more people use a phone, the more value it will reflect.

The need for belonging reflects the behavior of many people around the world. In the academic literature much is written about the need for belonging and how this psychological effect might influence how consumers make decisions about which products they buy, even more specific, which brands they buy. According to Frambach and Schillewaert (2002), the acceptance of an innovation by one's social referents, such as colleagues, friends, peers, and superiors, may increase the importance of the innovation and motivate the individual to imitate their behavior. It even gets to a point where not using an innovation, when one's social environment is using the focal innovation, the opportunity cost becomes too high and negative effects will arise (Frambach & Schillewaert, 2002). Childers and Rao (1992), state that spokespeople or endorsers can exercise significant influence the attitude and purchasing behavior of individuals. Furthermore, they note that there exist two types of reference groups individuals relate to. First, comparative reference groups; used to compare themselves with for self appraisal (for example, parents, teachers, and friends). Second, normative reference groups; used as a source of personal norms, beliefs, values, and attitudes individuals want to relate to (for example, sports figures, actors). Normative reference groups exert their influence through directly interaction with the individual, where comparative reference group exert their influence through being observed by the individual and not directly interaction with him or her (Childers & Rao, 1992). The two type of reference groups exercise their influence through different constructs. Information based influence can be exercised when referents have high credibility and expertise, especially for uninformed or uncertain consumers. Secondly, utilitarian based influence is power individuals have when using an innovation can exhibit rewards or when not complying to an innovation reflects a punishment. Finally, value expressive influence will be reflected when consumers search for the need for psychological connection with their referents (Childers & Rao, 2002). Hence, one is based on expertise, one is based on the rewards/punishment, and one is based on the psychological effect of a reference group.

Gender

Much research has been performed on behavioral differences between men and women; gender differences. Shown is that women indeed act differently than men (e.g. Feng et al. 2007). In early research, Hofstede (1984) found that men are more focused on earning

power and development and are more risk-takers, whereas women are more focused on interpersonal relationships and a physical environment. Gardner and Steinberg (2005) found evidence that males, specifically at younger ages, are more likely to weigh the benefits of risky behavior over the cost or consequences of this behavior. In 1990, Tannen stated that men communicate by means of hierarchy. Female communication is much more network oriented and the purpose of conversation is more focused towards creating intimacy, where men are seeking respect and independence (Gefen & Straub, 1997). Hence women are more oriented in creating group intimacy, which can be described as being social. Men are much more oriented towards independence. This is related to Tannen's research about problem solving (1990) where is stated that men tend to focus on solving a problem, whereas women are showing their empathy for one's problem.

In a study about the role of gender in technology acceptance decisions, Venkatesh et al. (2000) note that men are more focused on impersonal and individualistic tasks and goals; men are more task oriented than women. They conclude that women, since women are more concerned in pleasing others, comply more with others, and are more sensitive to others' opinion and feedback, and are more likely to be influenced by social norms than men.

Video game studies (e.g. Brown et al. 1997; Norris, 2004), describe that men play video games more frequently than women. This is since women tend to like to play video games less since they are not as good in playing them as men are (Feng et al. 2007). This can be extended by the fact that video games are aggressive (Feng et al. 2007) and women tend to be by nature not as aggressive as men. Besides, since many video games are extremely violent, and men are by nature postulated to have the aggressive characteristic (Venkatesh et al. 2000), women are underrepresented in the world of video games. Therefore, women are less able to identify themselves with characters inside a video games, since the majority of characters inside a video game is male.

Age

Age is concerned to be a factor in human behavior when it comes to decision making, adopting new technology, and technology usage. However, relatively little research has been done on the influence of age on technology adoption decisions, when compared to gender differences. According to Morris & Venkatesh (2000), the increasing of age has a negative influence on the ability to process and perform complex tasks. Therefore, the likelihood that people will adopt new systems will decrease with coming of age. Besides, in the same paper, Morris and Venkatesh (2000) state that older people will be more concerned with pleasing others, and will be more likely to be influenced by others' opinion. Furthermore, research has shown that the ability to process closely occurring visual stimuli will decrease with age

(Rayner, 1998). Therefore, playing video games will be more difficult for older people. In a study about online gaming (Griffiths et al. 2003), 72% (of 11,457 players) on the game *Everlore* were between the age of 14 and 29. A different online game *Allakhazam*, showed similar results with 71% (of 12,538 players) aged between 10 and 30 years. Furthermore, 85% of both online games were played by men. One can conclude, therefore, that online gaming is more popular for younger people, especially men.

Research has shown that adolescents are more likely to perform risky behavior than adults (e.g. Gardner & Steinberg, 2005). For example, adolescents are more likely to drive recklessly, have unsafe sex, and are more likely to seek adrenaline. This risky behavior may arise from the fact that adolescents are more vulnerable to the influence of others (friends, family etc.). When confronted with risky situations, adolescents or even young adults, may be less resistant to others. This may seem contradictory to the research of Morris and Venkatesh (2000), however the influence of others is there related to the fact that older people have less knowledge about the new technology than younger people since they are less skilled in regard to computer technology than their younger counterparts. Whereas the research of Gardner and Steinberg (2005) is more concerned about the peer pressure between adolescents. Their article concludes that people act more risky when they are with their peers. Especially when these people are adolescents. Furthermore, research suggests that those who pay more attention to benefits and less attention to costs are more likely to engage in risky behavior (e.g. Fromme et al. 1993). Therefore, this view suggest that adolescents are more inclined towards the benefits of a product or service and less concerned about the costs. Finally, a study showed that adolescents play video games less frequently as they grow older, however, the time per session increased (Gentile, 2009).

Looking at different characteristics of potential gamers it is clear that there are differences that can arise from being of different gender or age. Men are seen as more individualists, risk takers, and are focused towards power, whereas women are seen to be more concerned with others, sensitive, and focused on creating intimacy. Considering age, the likelihood of adopting new technology will decrease with age, since the ability to solve complex tasks will decrease with age as well. Furthermore, older people are more concerned with others' feelings and are also more likely to be influenced by others. Women are also more vulnerable to their social environment than man are. Besides, playing video games will become more difficult for the elderly, since processing closely occurring stimuli will be harder. Besides from the social side, men are more seen as risk takers. Adolescents are, furthermore, more likely to perform risky behavior, especially under the influence of peer pressure. Besides, adolescents are more focused on the benefits of a potential product rather than being worried about the costs. The need for belonging is a crucial factor in one's

social life. Belonging to someone or something can elicit various emotions. Positive emotions like happiness and joy or negative emotions, such as loneliness or depression. In a group member can have significant influence on others' behavior. Occasionally, the influence can be of substantial size and members will then imitate one's behavior.

The next chapter will focus on the formulation of several hypothesis, regarding how the various business models will influence the adoption decision of mobile gaming application. The variables, gender, age, and the need for belonging, will be seen as moderating variables within the conceptual framework.

4 – Hypothesis Development on the Extended Unified Theory of Acceptance and Use of Technology

The hypothesis will be formulated through the use of the extended unified theory of acceptance and use of technology (figure 6). This extended model is derived from the original UTAUT in figure 5. Voluntariness of use and experience are excluded from the model since I assume that downloading and using a mobile gaming application happen in a voluntary setting and that nobody is forced to. Besides, I assume that no one has had previous experience with the game used for the survey. Facilitating conditions will be excluded from research since it is assumed that every mobile device is able to support the mobile application. Furthermore, the concept is related to constructs different from TAM or TAM2 and therefore not taken into account. Besides, it is not directly related to behavioral intention.

As explained by Davis et al. (1989) and Davis (1989), the performance expectancy of an innovation is more salient than effort expectancy. Consumers are willing to tolerate a more complex system when the innovation is expected to better suffice their needs. Hence, I propose that:

H1: Performance expectancy will have a stronger positive effect on consumers' intention to adopt mobile gaming applications than effort expectancy.

Performance expectancy, effort expectancy and social influence are three crucial variables in this research, each are expected to determine certain relationships. As the theory explained, performance expectancy is believed to be influenced by gender and age. Effort expectancy is affected also by gender and age. Finally, social influence is influenced by gender, age and need for belonging. Since I am exploring the different effects of the four business models

inside the theoretical framework, the effect of different business models on performance expectancy, effort expectancy, and social influence is salient to understand. However, there are no clear a priori predictions on how the different business models will affect these three variables, moreover, what influence they exert on the consumers' behavioral intention. Since little research on the effect of business models on decision making in the mobile application industry is available, part of this research will be exploratory to find whether clear relationships exist between business models and behavioral intention.

Performance expectancy and perceived usefulness are two closely related concepts. It can be explained as the degree that one believes that the innovation actually will improve his or her job performance. In the above sections it is stated that men are much more task oriented than women. Men are also seen as risk-takers, especially when they are young. Besides, performance expectancy is related to extrinsic rewards. Adolescents place more importance on extrinsic rewards than older people, and look more at the benefits the new systems produces than at the costs, especially males. Hence I propose that:

H2A: The effect of performance expectancy on behavioral intention is greater for men, especially younger men.

H2B: Men will have higher behavioral intention for mobile applications than women, especially younger men.

Furthermore, effort expectancy and perceived ease of use are two strongly related concepts. Both explain the degree that one believes that the use of the innovation is free of effort. Venkatesh and Davis (2003) state that perceived ease of use is more critical for women. Men play video games more frequently than women. Therefore, it can be expected that men are more skilled in playing video games through the experience they gained. Hence, the perceived ease of use is more crucial for women. Besides, Morris and Venkatesh (2000), explain that the increase of age has a negative influence on processing complex tasks, and therefore, effort expectancy is believed to be more important for older people.

H3: The effect of effort expectancy on behavioral intention is greater for women, especially older women.

Finally, social influence and subjective norm can be seen as two concepts that can be used interchangeably within this thesis. The concepts are related to the explicit and implicit beliefs that one's behavior is influenced by others (friends, peer, colleagues). Referents can use their influence to alter one's behavior. Research found that especially women are susceptible for others' opinion (Venkatesh & Davis, 2003). People rely on other's opinion when using a new system and therefore the social pressure of the adoption process is a well believed

influence in the process. Besides, research found that women are more focused on interpersonal relationships, and that female communication is used for creating intimacy and talking about one's feelings. Men are more focused on seeking respect and independence (Gefen & Straub, 1997). In risky situations, adolescents are more influenced by their peers' behavior, and be less resistant to others (Gardner & Steinberg, 2005). In general, people are more vulnerable for risky behavior when others are involved. Adolescents also place more value to the benefits of a product or service rather than the costs (Fromme et al. 1993). Therefore, the need for belonging can be of more importance to adolescents, since they have the need to feel connected to their friends behavior. Finally, adolescents are more vulnerable to others behavior, with a greater chance of imitation.

H4: The need for belonging is positively related to behavioral intention.

H5A: The effect of social influence on intention to adopt mobile applications is greater for younger women, when compared with men or older women.

H5B: The effect of social influence on intention to adopt mobile applications is higher for consumers with high need for belonging.

The Business Model as an Antecedent of Adoption of Mobile Application: An Exploratory Analysis

Besides these seven hypotheses, I am looking to find relationships between a business model and behavioral intention. However, since there is little prior knowledge, I will be exploring these potential relationships by implementing the business models is the analysis. The four different business models have different effects considering the adoption of the application. A premium and a subscriptions business model require consumers to make online payments before using the application. According to Forsythe and Shi (2003), consumers' buying behavior is affected by perceived risk. *Perceived risk* can be explained by the fact that consumers are uncertain about the outcomes of their purchase. Therefore, consumers are likely to be more reluctant to spend money on a mobile application rather than downloading it for free, i.e. financial risk (Sweeny et al. 1999). Furthermore, financial risk includes the anxiety of misuse of one's financial data, such as credit card information. Therefore, one can expect that the premium and subscriptions business model will result in less likelihood to adopt a mobile application than an ad supported or freemium business model, that provided the opportunity to download the application without financial risk. A subscriptions business model can result in even more financial risk, since the consumer is paying for a product that he or she can only use for a specific time period (one year).

Therefore, I expect that the subscriptions business model will result in the least behavioral intention for all four business models.

A freemium business model is expected to have a higher rate of adoption compared to a premium business model, since the freemium model provides consumers the possibility to remove the advertisements for a specific price. Clearly, the problems of financial risk can occur, however the consumer has had the opportunity to experience the application in advance. Therefore, when the consumer wants to pay to remove the advertisement within the application, he or she can make a much more rational decision. Hence, I expect that the freemium business model is expected to be most beneficial for the consumer and therefore will result in the highest behavioral intention.

5 – Methodology

Design and participants

The methodology will consist of a between-subjects experiment administered through a questionnaire. The experiment is designed according to an independent measures design. Besides, the experiment is designed to investigate the relationship between a business model and the adoption of a mobile gaming application. The relationship is hypothesized to be affected by age, gender, and need for belonging. These will serve as moderators of the conceptual framework. As theorized by Venkatesh et al. (2003), the adoption is, furthermore, affected by performance expectancy, effort expectancy, and social influence. These variables will be included in the experiment. The survey does incorporate the different business models which are suitable for the mobile apps. In particular, there are five treatment conditions in this experiment, one for each of the business models discussed above plus a control group, i.e.: (1) premium, (2) ad supported, (3) freemium, (4) subscriptions and (5) control group. Besides the four business models presented to the respondents, a fifth, control situation, is created and provided without any information on how to download the application. This control group serves as a baseline to compare the results with, after all data is collected. See appendix B for an overview of the different treatments shown to the participants. 323 Individuals participated in this survey by filling out the questionnaire between April 23 and May 19 2014. Before starting the full analysis of the model, I intensively studied the data. I found that 148 of the respondents had missing data, presumably since they ended the survey directly after starting it. When potential participant started the questionnaire, received through Facebook, on their mobile phones, the questionnaire program Qualtrics measured this as a started survey. However, since the survey is not

compatible on a mobile phone, the survey could not be finished meaning that all data of the respondent is missing. Unfortunately, the survey program Qualtrics takes record of all the started surveys, regardless whether the survey is finished or not. The program closes that particular survey for respondent after one week and records the survey as completed. All of the data for these respondents was 'empty', therefore I removed the data from further analysis.

Procedure

The respondents received a link of the survey through Facebook or email. Each participant was asked to complete an online questionnaire with instructions and questions in English. In the first part the respondents were randomly divided into one of the five treatment conditions as discussed above. According to Holland (1986), due to randomly assigning respondents to the different treatment conditions, I can ensure causality, which means that the experiment affords high internal validity. Internal validity satisfies the conditions of temporal precedence, covariation, and nonspuriousness. Each respondent read his or her situations without obtaining any information about the other situations. Besides, the respondent did not have knowledge about the existence of the other four situations. Each respondent read a situation about the mobile gaming application Angry Birds. In addition, the respondents were shown visual images from the gaming app Angry Birds, downloaded from a mobile device, linked to the specific situations they were presented with. The visual imagery was presented to simulate the game play as similar as possible as the actual game. Above each image was described whether the image was a game play screenshot, the pause menu, or whether the game was loading before or after play. Angry Birds is a popular gaming app downloaded more than 100 million times already in Google's Play Store. The game is developed by a Finnish computer game developer Rovio Entertainment. It has been in the different App stores since December 2009. According to Worhtam (2010), Angry Birds was the best-selling iPhone app of 2010. After the introduction about the gaming application, each participant was asked to rate statements about the performance expectancy (four questions), effort expectancy (four questions) and social influence (two questions) using a 7-point Likert-scale where 1 represented 'strongly disagree' and 7 represented 'strongly agree'. Following this section, each respondent was asked to state their age, gender, to rate statements about the need for belonging using a 7-point Likert-scale, where 1 represented 'strongly disagree' and 7 represented 'strongly agree'. Finally, the last section is focused on the likelihood of downloading (behavioral intention) the gaming application. The respondents were asked to rate their likelihood of downloading the gaming application, using a 7-point Likert-scale where 1 represented 'very unlikely' and 7 represented 'very likely' The respondents were not given

any rewards for their cooperation. The theoretical constructs are aligned with Venkatesh et al. (2003). Theoretical constructs can be found in Appendix A.

Results

First, I performed a multivariate outlier analysis to detect various unusual combinations of values within the data. According to Penny (1996), the Mahalanobis Distance is suggested as a method to detect outliers in multivariate data. The Mahalanobis D^2 is calculated using a regression analysis, with dependent variable behavioral intention, using a probability associated with its D^2 of 0.001 or less. Consequently, the probability scores were computed using a CDF.CHISQ function. The multivariate outlier analysis showed that exactly 2 respondents had a probability associated with D^2 of less than 0.001. Consequently, these respondents were removed from the data meaning that 173 respondent were available for analysis of the model (for age, $M = 29.94$; $SD = 10.86$; $Min = 18$; $Max = 71$; 96 males). The outliers can be explained by fatigue of the respondent, meaning that throughout the questionnaire, respondent became tired or annoyed and quitted the questionnaire resulting in more unusual data.

For all participants, the performance expectancy, effort expectancy, social influence, need for belonging, and behavioral intention scores were averaged to form five separate indexes.

The treatment groups were randomly divided by means that the premium treatment was shown to 42 respondents, the advertisement conditions was shown to 27 respondents, 32 respondents were shown the freemium treatment, the subscriptions treatment and the control group were each shown to 36 respondents (see appendix B for pie-chart). Figure 9 shows that the mean of behavioral intention is highest for the control group and lowest for the subscriptions model (with standard deviations $SD_{Premium} = 1.47$; $SD_{Ads} = 1.43$; $SD_{Freemium} = 1.53$; $SD_{Subs} = 1.59$; $SD_{Control} = 1.53$). This suggests already that, without regarding significance and without controlling for other drivers of adoption, that a freemium business model will result in highest behavioral intention for the consumer. As expected, this can be explained by the financial risk, which is limited in a freemium business model, nevertheless gives the consumer the possibility to remove in-app advertisements. Moreover, the control group shows that information about pricing or possible irritation from advertisements decreases the behavioral intention substantially.

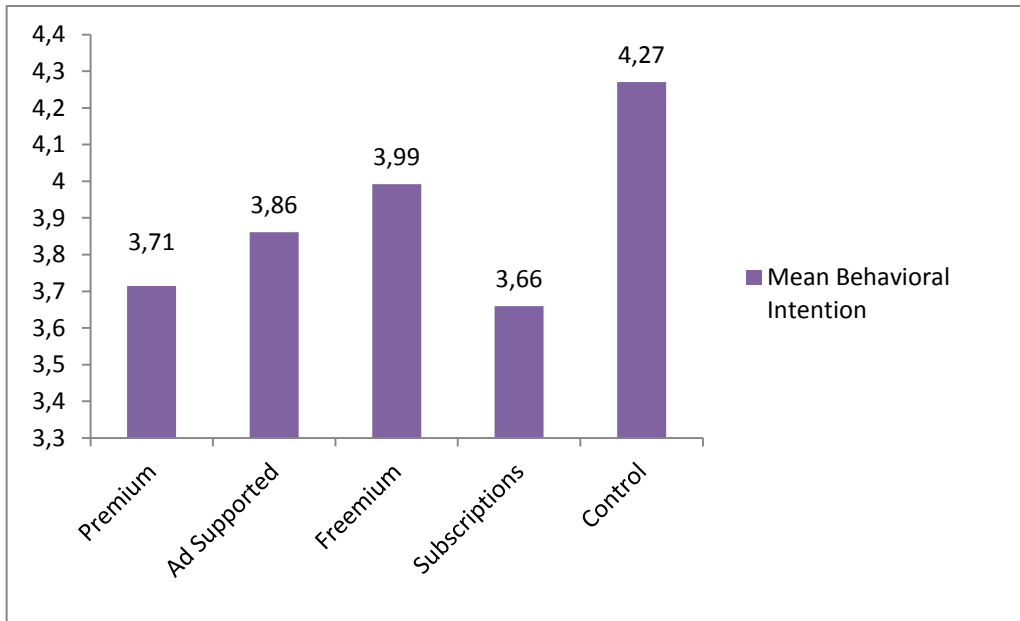


Figure 9-Mean Behavioral Intention for different business models

Figure 10 shows the means for performance expectancy, effort expectancy, and social influence in the model. It shows that the performance expectancy is highest for the control group, effort expectancy is highest for a freemium business model, and the social influence is highest for the control group. See appendix B for the standard deviations of the variables for each treatment condition.

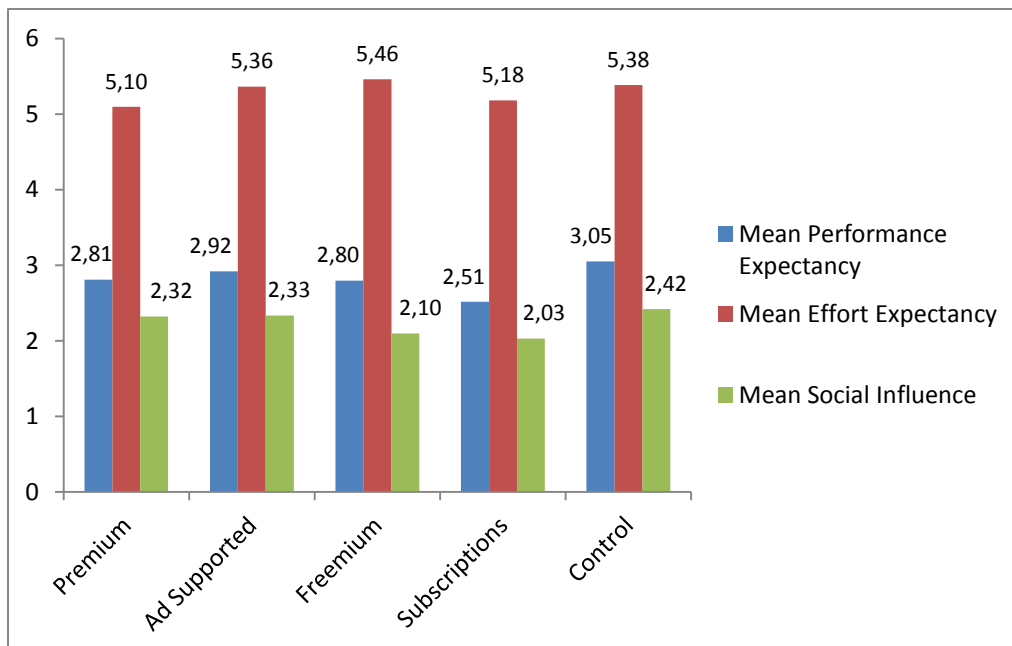


Figure 10 – Means Key Variables

The analysis is performed using five different models, each model capturing different effects. Table 1 shows the results of models 1 – 4.

Model 1 (appendix B-one) tries to capture the effects of performance expectancy, effort expectancy, and social influence on the behavioral intention using a hierarchical multiple regression analysis. The equation for this model is as follows:

$$\text{Behavioral Intention}_i = \beta_0 + \beta_1 \text{Performance Expectancy}_i + \beta_2 \text{Effort Expectancy}_i + \beta_3 \text{Social Influence} + \epsilon_i$$

There is no multicollinearity within the data since there are no correlations above .9, which is the cutoff point according to Field (2009). The R^2 of the model is .556 meaning that almost 56% of the variance of the behavioral intention is explained by the three predictors. The ANOVA gives significant values for all three models ($F(1, 171) = 2.73, p < .10$; $F(2, 170) = 2.33, p < .10$; $F(3, 169) = 2.12, p < .10$ for model 1, 2, and 3 respectively).

Dependent Variable	Independent Variables	Beta	F-value	t-value	p-value
Model 1			2.12		.000
Behavioral Intention (BI)	Performance Expectancy	.780		9.450	.000
R Square = .556	Effort Expectancy	.303		4.400	.000
	Social Influence	-.039		-.508	n.s.
Model 2			1.76		.000
Behavioral Intention (BI)	Premium	-.581		-1.785	.076
R Square = .182	Ad Supported	-.501		-1.380	n.s.
	Freemium	-.629		-1.827	.070
	Subscriptions	-1.007		-2.985	.003
	Gender	.405		1.842	.068
	Age	-.020		-1.925	.056
	Need for Belonging	.494		3.280	.001
Model 3A			1.76		.000
Performance Expectancy	Premium	-.116		-.406	n.s.
R Square = .172	Ad Supported	-.092		-.288	n.s.
	Freemium	-.361		-1.197	n.s.
	Subscriptions	-.745		-2.524	.013
	Gender	.607		3.152	.002
	Age	-.004		-.419	n.s.
	Need for Belonging	.430		3.261	.001

Dependent Variable	Independent Variable	Beta	F-value	t-value	p-value
Model 3B			1.76		.000
Effort Expectancy	Premium	-.322		-1.337	n.s
R Square = .225	Ad Supported	-.103		-.381	n.s
	Freemium	-.187		-.732	n.s
	Subscriptions	-.483		-1.931	.055
	Gender	.598		3.668	.000
	Age	-.018		-2.416	.017
	Need for Belonging	.360		3.225	.002
Model 3C			1.76		.002
Social Influence	Premium	.025		.083	n.s.
R Square = .135	Ad Supported	-.085		-.251	n.s.
	Freemium	-.484		-1.518	n.s.
	Subscriptions	.534		-1.709	.090
	Gender	.278		1.364	n.s.
	Age	-.004		-.369	n.s.
	Need for Belonging	.532		3.813	.000
Model 4A			1.89		.000
Behavioral Intention (BI)	Age	-.019		-2.686	.008
R Square = .566	Performance Expectancy	.811		12.798	.000
	Performance Expectancy * Age	.015		2.620	.009
	Gender	-.132		-.795	n.s.
	Performance Expectancy * Gender	-.179		-1.245	n.s.
Model 4B			1.89		.000
Behavioral Intention (BI)	Age	-.018		-1.414	n.s.
R Square = .186	Effort Expectancy	.365		3.258	.001
	Effort Expectancy * Age	.017		1.684	.094
	Gender	.219		.866	n.s.
	Effort Expectancy * Gender	.376		.119	n.s.
Model 4C			1,89		.000
Behavioral Intention (BI)	Age	-.024		- 1.752	.082
R Square = .257	Social Influence	.471		4.263	.000
	Social Influence * Age	-.003		-.196	n.s.
	Gender	.295		1.219	n.s.
	Social Influence * Gender	.014		.074	n.s.
Model 4D			2.12		.000
Behavioral Intention (BI)	Social Influence	.431		4.334	.000
R Square = .221	Need for Belonging	.166		1.014	n.s.
	Social Influence * Need for Belonging	.108		1.090	n.s.

Table 1 – Results for Regressions Model 1-4

Performance expectancy has most effect in predicting behavioral intention in all three models. The regression shows us that performance expectancy and effort expectancy are both significant positive predictors of behavioral intention ($t(169) = 9.45, p < .10$; $t(169) = 4.40, p < .10$ respectively). However, social influence is not significant and therefore it does not influence behavioral intention in this model. Despite that the influence of performance expectancy on behavioral intention decreases slightly when including effort expectancy and social influence in the model, it is the predictor that has greatest influence on behavioral intention.

Model 2 (appendix B-two) tries to capture the effect of different business models, gender, age, and the need for belonging on behavioral intention using a multiple regression analysis. The equation for this model is as follows:

$$\text{Behavioral Intention}_i = \beta_0 + \beta_1 \text{Business Model}_i + \beta_2 \text{Gender}_i + \beta_3 \text{Age}_i + \beta_4 \text{Need for Belonging}_i + \epsilon_i$$

Again, no multicollinearity exists in the model since the correlations have no value above .9. According to the multiple regression on behavioral intention, the R^2 of the model is .182, meaning that more than 18% of the variance of behavioral intention is explained by the predictors. Furthermore, the Durbin-Watson statistic satisfies the assumption of independent errors of regression analysis, since the value is not different enough from 2 (1.877) to be a cause for concern (Field, 2009). Furthermore, the ANOVA tells that the model is significant since $F(7, 151) = 1.76, p < .10$.

The multiple regression shows us that all predictors are significant except for the ad supported business model, since $t(165) = -1.380, p > .10$. Therefore, the ad supported business model does not affect the behavioral intention within the model. A significant effect is found for a premium business model ($t(165) = -1.785, p < .10$), for a freemium business model ($t(165) = -1.827, p < .10$), for a subscriptions business model ($t(165) = 2.985, p < .10$), for gender ($t(165) = 1.842, p < .10$), for age ($t(165) = -1.925, p < .10$), and for need for belonging ($t(165) = 3.280, p < .10$). When focusing on the different business models, we can see from the standardized beta coefficients that subscriptions has the most negative effect on behavioral intention. Furthermore, the premium and freemium business model are both equally affecting the behavioral intention. Therefore, in terms of behavioral intention, the manager can be indifferent in which business model to implement for the company's gaming application. Finally, the need for belonging positively influences behavioral intention, such that when the need for belonging increases, the behavioral intention increases as well.

Model 3A, 3B, and 3C try to find the effect of different business model, age, gender, and the need for belonging on performance expectancy, effort expectancy, and social influence respectively. The equations for the models are as follows:

$$\text{Performance Expectancy}_i = \beta_0 + \beta_1 \text{Business Model}_i + \beta_2 \text{Gender}_i + \beta_3 \text{Age}_i + \beta_4 \text{Need for Belonging}_i + \varepsilon_i$$

$$\text{Effort Expectancy}_i = \beta_0 + \beta_1 \text{Business Model}_i + \beta_2 \text{Gender}_i + \beta_3 \text{Age}_i + \beta_4 \text{Need for Belonging}_i + \varepsilon_i$$

$$\text{Social Influence}_i = \beta_0 + \beta_1 \text{Business Model}_i + \beta_2 \text{Gender}_i + \beta_3 \text{Age}_i + \beta_4 \text{Need for Belonging}_i + \varepsilon_i$$

Model 3A (appendix B-three) uses a multiple regression analysis to find the effects of these variables on performance expectancy. The model is significant since $F(7, 151) = 1.76, p < .10$. Looking at the regression, I found significant negative effect for a subscription business model ($t(165) = -2.524, p < .10$), a significant positive for gender ($t(165) = 3.152, p < .10$), and a significant positive effect for the need for belonging ($t(165) = 3.261, p < .10$). The effects of premium business models ($t(165) = -.406, p > .10$), ad supported business models ($t(165) = .288, p > .10$), freemium business models ($t(165) = -1.197, p > .10$), and age ($t(165) = -.419, p > .10$) are found to be nonsignificant. This means that a subscription business models will have negative effect on consumers perceived usefulness. Furthermore, men will have higher performance expectancy when compared to women. Meaning that gaming applications are expected to have a greater use for men.

Model 3B (appendix B-three) uses a multiple regression analysis to find the effects of these variables on effort expectancy. The model is significant since $F(7, 151) = 1.76, p < .10$. Looking at the regression analysis, I found again a negative significant result for subscription business models ($t(165) = -1.931, p < .10$), a positive significant effect for gender ($t(165) = 3.668, p < .10$), a significant negative effect for age ($t(165) = -2.416, p < .10$), meaning that older consumers will find it more difficult to use the gaming application than younger consumers. Furthermore a significant positive effect for need for belonging ($t(165) = 3.225, p < .10$). Unfortunately, the effects for premium business models ($t(165) = -1.337, p > .10$), for ad supported business models ($t(165) = -.381, p > .10$), and for freemium business models ($t(165) = -.732, p > .10$) are nonsignificant.

Model 3C (appendix B-three) uses a multiple regression analysis to find the effects of these variables on social influence. The model is significant since $F(7, 151) = 1.76, p < .10$. Looking at the multiple regression analysis, I found once again a significant negative effect for a subscription business model ($t(165) = -1.709, p < .10$), and a significant positive result for need for belonging ($t(165) = 3.813$, meaning that when the need for belonging is high, the

social influence their peers will have, will increase even further. Unfortunately, non significant results were found for a premium business model, an ad supported business model, a freemium business model, for gender, and age with values of $t(165) = .083; -.251; -1.518; 1.364; -.369, p > .10$, respectively.

As hypothesized, the relationship between performance expectancy and behavioral intention is moderated by age and gender (model 4A). Using the PROCESS tool (Hayes, 2013), I looked for the interaction effect between these variables. The equation for the model is as follows:

$$\text{Behavioral Intention}_i = \beta_0 + \beta_1 \text{Performance Expectancy}_i + \beta_2 \text{Performance Expectancy}_i * \text{Age}_i + \beta_3 \text{Performance Expectancy}_i * \text{Gender}_i + \varepsilon_i$$

A significant interaction effect is found for Age, $b = .015, 90\% [0.005, 0.238], t = 2.62, p < .10$, indicating that the relationship between performance expectancy and behavioral intention is moderated by age. A nonsignificant effect is found for gender, $b = -.179, 90\% [-0.416, 0.059]$ (i.e. confidence interval), $t = -1.245, p > .10$, meaning that gender has no influence on the relationship between performance expectancy and behavioral intention.

Interpreting the moderation effects, I examined simple sloped regressions. Since gender is nonsignificant in the model I studied the effect for three different levels of age; young (below 23 years old), average (between 23 and 33 years old), old (above 33 years old). The first regression show, when age is low, a significant positive relationship between performance expectancy and behavioral intention, $b = .761, 90\% [0.508, 1.013], t = 4.99, p < .10$. The second regression shows, when age is average, a significant positive relationship between performance expectancy and behavioral intention, $b = .920, 90\% [0.699, 1.139], t = 6.92, p < .10$. The third regression shows, when age is high, a significant positive relationship between performance expectancy and behavioral intention, $b = 1.077, 90\% [0.848, 1.308], t = 7.76, p < .10$. This means that for older consumers, the behavioral intention will be greater when considering the performance expectancy (perceived usefulness) of the mobile gaming app.

I hypothesized that the relationship between effort and behavioral intention is moderated by age and gender (model 4B). Using the PROCESS tool (Hayes, 2013), I looked for the interaction effect between these variables. See Appendix D for an overview of the PROCESS tool by Andrew Hayes. The equation for the model is as follows:

$$\text{Behavioral Intention}_i = \beta_0 + \beta_1 \text{Effort Expectancy}_i + \beta_2 \text{Effort Expectancy}_i * \text{Age}_i + \beta_3 \text{Effort Expectancy}_i * \text{Gender}_i + \varepsilon_i$$

A significant interaction effect is found for Age, $b = .017$, 90% [0.000, 0.033], $t = 1.68$, $p < .10$, indicating that the relationship between effort expectancy and behavioral intention is moderated by age. A nonsignificant effect is found for gender, $b = .376$, 90% [-0.021, 0.774], $t = 1.57$, $p > .10$, meaning that gender has no influence on the relationship between performance expectancy and behavioral intention.

Interpreting the moderation effects, I examined simple sloped regressions. The simple slopes regressions for females in the model are nonsignificant. I examined the effect for three different levels of age; young (below 23 years old), average (between 23 and 33 years old), old (above 33 years old). The first regression shows, when age is low, a significant positive relationship between effort expectancy and behavioral intention, $b = .335$, 90% [0.073, 0.597], $t = 2.12$, $p < .10$. The second regression shows, when age is average, a significant positive relationship between effort expectancy and behavioral intention, $b = 0.514$, 90% [0.306, 0.722], $t = 4.09$, $p < .10$. The third regression shows, when age is high, a significant positive relationship between effort expectancy and behavioral intention, $b = 0.693$, 90% [0.411, 0.976], $t = 4.06$, $p < .10$. This means that the strength of the relationship between effort expectancy and behavioral intentions becomes stronger when consumers get older.

I hypothesized that the relationship between effort and behavioral intention is moderated by age and gender (model 4C). Using the PROCESS tool (Hayes, 2013), I looked for the interaction effect between these variables. However, no significant interaction effects have been found. Model 4D tested for the interaction effect of need for belonging on the relationship between social influence and behavioral intention. Results show no significant effect for this interaction term. Therefore, the variables age, gender, and need for belonging do not have influence on the relationship between social influence and behavioral intention. The equation for the model 4C and 4D are as follows:

$$\text{Behavioral Intention}_i = \beta_0 + \beta_1 \text{Social Influence}_i + \beta_2 \text{Social Influence}_i * \text{Age}_i + \beta_3 \text{Social Influence}_i * \text{Gender}_i + \varepsilon_i$$

$$\text{Behavioral Intention}_i = \beta_0 + \beta_1 \text{Social Influence}_i + \beta_2 \text{Social Influence}_i * \text{Need for Belonging}_i + \varepsilon_i$$

I hypothesized that the relationship between a business model choice and behavioral intention is mediated by performance expectancy, effort expectancy, and social influence (model 5, figure 9). Using the PROCESS tool (Hayes, 2013), I looked for the mediation effect between these variables. However, no significant mediation effect has been found for the model. The direct effect between business model and behavioral intention has been found nonsignificant as well ($p = .248$). The effect between performance expectancy and behavioral

intention have been found positively significant, $b = 0.779$, 90% [0.642, 0.916], $t = 9.39$, $p < .10$. Furthermore, a significant positive effect has been found for effort expectancy on behavioral intention, $b = 0.303$, 90% [0.189, 0.417], $t = 4.39$, $p < .10$. Both positive significant results indicate that when performance and effort expectancy increase, the behavioral intention will increase as well. Meaning that a more useful, as well as an easier gaming application will result in a greater behavioral intention for the consumer.

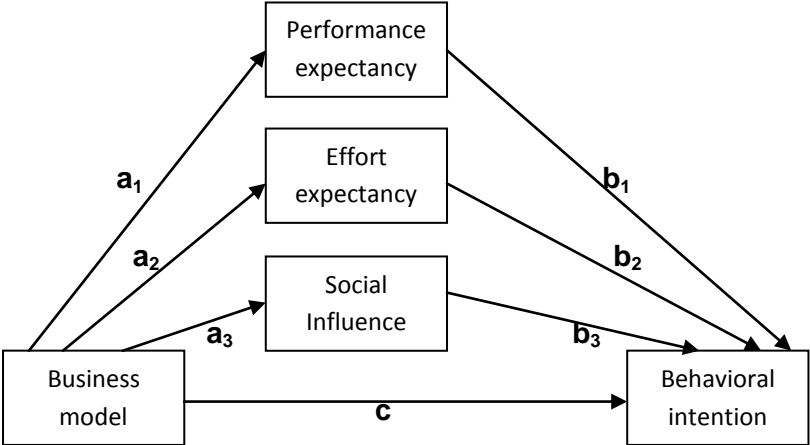


Figure 9 - Mediation Effects

Mediation effect	Parameter Estimates	p-value
a ₁	-.108	.111
a ₂	-.003	.967
a ₃	-.100	.151
b ₁	.779	.000
b ₂	.303	.000
b ₃	-.040	.607
c	-.012	.830

Table 2 - Mediation Effects

6 – Discussion

In this research I try to find evidence for the relationships in the extended UTAUT using different models that try to capture these effects. Model 1 provides results that show that performance expectancy has most influence on behavioral intention when compared to effort expectancy and social influence. Despite the fact that the effect of the relationship diminishes slightly when including effort expectancy and social influence in the model, it shows that consumers prefer a mobile gaming app that indeed is expected to satisfy their needs over the perceived ease of use of the application, supporting H1. As theorized, social influence has a positive effect on behavioral intention. However, since this result is not significant, I cannot make any conclusions about this relationship.

Model 2 tells us that three out of four business models have a significant effect on behavioral intention. It can be stated that a premium, freemium, and subscriptions business model have a significant negative influence on behavioral intention compared with the control situation. The standardized beta coefficients tell us that a subscriptions business model most negatively affects behavioral intention, meaning that for this business model the adoption rate would be lowest. Premium and freemium business models have equally negative impact on behavioral intention. These negative relationships can be explained by the fact that when consumers have more information about the price or possible in-app advertisements, which is the case for premium, freemium, and a subscriptions business model, they are less likely to download a gaming application than when no information about the adoption process is given. Presumably, the price and possible presence of advertisements will confuse consumers when just little information is given about the product. The difference in effect between a subscriptions and a premium and freemium business model can be explained by the fact that a subscriptions business model requires multiple payments compared to a single payment for premium and freemium business model. This could also confuse or annoy consumers since they might feel that their financial information is at risk. According to Morimoto and Chang (2006), consumers can experience perceived advertising intrusiveness, which means that unwanted marketing communication is interfering with one's process and tasks. This could annoy customers, since they feel that their privacy is intruded. Besides, Milne and Rohm (2004) state that unwanted commercial information can result in irritations since consumers feel that they do not have control over what they receive or experience.

Furthermore, gender positively influences behavioral intention, meaning that men have a higher intention of adopting. Age is slightly negatively affecting behavioral intention, meaning that with increasing age the behavioral intention will decrease, supporting H2B. The need for

belonging is positively related to behavioral intention. Consumers who are vulnerable to others' behavior are more likely to download or pay for a mobile application, supporting H4.

The full model 3 shows us that merely the subscriptions business model has a significant negative relationship with performance expectancy, effort expectancy and social influence, meaning that these three variables will decrease when a subscriptions business model is used compared to the control variable. Again, more information available to consumers about the buying process of the application has negative effects on the determinants of behavioral intention. The other business models show no significant effect. Gender is positively related to performance expectancy and effort expectancy, meaning that being a male will increase the expectancy of performance and effort, suggesting the support for the higher behavioral intention for males compared to females. This implies that men have greater effort expectancy from a mobile gaming application, supporting the argument that men are believed to be more skillful in video games than women. The need for belonging is positively related to performance expectancy and effort expectancy, meaning that the higher the need for belonging, the joy, relaxation, satisfaction and easiness of an mobile gaming application will increase as well. Hence, the social environment has an impact on how consumers perceive mobile gaming application. Logically, the need for belonging has a positive relation with social influence. Finally, model 3 shows that age has a negative relationship with effort expectancy, meaning that older consumers will have more difficulty in using the application, suggesting support for H3.

Model 4A shows that age moderates the relationship between performance expectancy and behavioral intention. Unfortunately, gender shows to be a nonsignificant moderator in this relationship, and therefore there is no credible proof that gender influences behavioral intention through performance expectancy. The interaction effect tells us that for all ages the moderation effect is significant and that the relationship between performance expectancy and behavioral intention becomes stronger with age, partially contradicting H2A. Model 4B shows a moderating effect between effort expectancy and age on behavioral intention. Again, gender is shown to be a nonsignificant moderator in the model. The simple slopes regressions show that the relationship between effort expectancy and behavior is positively moderated by age, meaning that behavioral intention increases by age, partially supporting H3. Hence older consumers place more importance on effort expectancy than adolescents, since older people will encounter more difficulties with the ability to perform complex tasks and processing closely occurring visuals. Model 4C found no significant interaction effects social influence, gender, age, and need for belonging on behavioral intention and therefore I can conclude that in this model the moderators do not have a significant influence on the relationship between social influence and behavioral intention, not supporting H5A and H5B.

Finally, model 5 shows no significant mediation effects in the model. We can conclude, therefore, that the relationships between the business models and behavioral intention cannot be explained by performance expectancy, effort expectancy, and social influence. Merely significant effect have been found for relationships between performance expectancy, effort expectancy and behavioral intention. However, these relationships were already established by model 1.

Concluding this section, I found corroborating evidence for hypothesis H1, hypothesis H2B and hypothesis H4. I found partial evidence for hypothesis H3. Furthermore, I found no significant results for hypothesis H5A and H5B. Finally, I found partially contradicting proof for hypothesis H2B. Table 2 presents an overview of whether the hypothesis is rejected or supported.

Hypothesis	Supported
<i>H1 Performance expectancy will have a stronger positive effect on consumers' intention to adopt mobile gaming applications than effort expectancy</i>	✓
<i>H2A The effect of performance expectancy on behavioral intention is greater for men, especially younger men</i>	X
<i>H2B Men will have higher behavioral intention for mobile applications than women, especially younger men</i>	✓
<i>H3 The effect of effort expectancy on behavioral intention is greater for women, especially older women</i>	✓
<i>H4 The need for belonging is positively related to behavioral intention</i>	✓
<i>H5A The effect of social influence on intention to adopt mobile applications is greater for younger women, when compared with men or older women</i>	X
<i>H5B The effect of social influence on intention to adopt mobile applications is higher for consumers with high need for belonging.</i>	X

Table 2 – Overview Hypothesis

7 – IMPLICATIONS, LIMITATIONS & FUTURE RESEARCH

According to Emma McDonald (2014), the global mobile games market is calculated to have reached a total of \$12.3 billion. This was a 35% increase compared to 2012, indicating that this market is booming. In the year 2013, the market for smartphones and tablets, the place where apps are sold, has grown past the total consumer electronics market (televisions, audio, cameras) with a revenue of \$354.3 billion compared to the \$344.4 billion revenue for the CE market, says IHS, a leading global information company. Since this market is relatively young, compared to, for example, the video games made for XBOX or PlayStation, it is difficult to understand its specifics yet. It is therefore crucial for managers to get well informed on the changes and innovations of the mobile gaming market, also considering consumer behavior. Research has to be completed to help these managers to increase revenue streams of companies investing in mobile applications.

In general, this study tries to understand the relationship between four different business models (*premium, ad supported, freemium, and subscriptions*) and the behavioral intention of a mobile gaming application. These relationships are found to be moderated by age. No significant results were found for the full mediation effects of performance expectancy, effort expectancy, and social influence, performed by using Hayes' (2013) PROCESS analysis. Although, the full mediation analysis nearly supports the effect of performance expectancy on behavioral intention and nearly supports the effect of a business model on performance expectancy ($p = .11$, nearly significant at the 10% level). The less stricter analysis in models 2 and 3 show significant results for business models on performance expectancy and then on adoption intention. Therefore, I can conclude that business models do influence the adoption intention of consumers, however this study does not incorporate significant effects for full mediation. Despite that some effects did not show any significant results, this study shows some clear directions in this very young field of research. Therefore, future research should delve deeper into the drivers of adoption intention and the behavioral consequences resulting from choosing different business models on the behavioral processes of adoption intention of mobile applications.

This study shows that, first of all, consumers are much more interested in the usefulness of a mobile gaming app than in the level of difficulty of using the application. Therefore, managers must make sure that the game has to bring some high levels of entertainment in order to realize joy, relaxation and satisfaction for the gamer. Hence, in developing games, this should be priority number one. Furthermore, before designing a gaming application, the target audience has to be figured out well, since the effects of demographics have different

implications. A more difficult app will have more effect on women, since they are expected to be more likely to download the game, when the game is easier to use. Besides, age shows positive effects to behavioral intention, meaning that older consumers are more likely to download or pay for a mobile gaming application. Therefore, a manager must realize that different results will happen when designing games targeted at various age groups. A mobile gaming app that is expected to receive highest behavioral intention from consumers, would be an application that is targeted at older men. The analysis show that coming of age will increase behavioral intention. Therefore, I would suggest to target the games at men older than 25, since companies can already benefit from years before the optimum behavioral intention would be reached. Social influence is found to be a nonsignificant mediator in the model. However, we can draw conclusions about the social environment from the need for belonging, since the concept is similar. The need for belonging has positive effects on the behavioral intention of consumers. This can give managers the opportunity to implements social aspects in the game, since this will have significant effects on adoption. For example, managers can implement Facebook within the gaming application, that gives consumers the opportunity to play against or with their friends. The word to mouth advertising could give an application the benefit over other apps that lack this feature. Finally, this study provides insights on the effects of different business models on the behavioral intention of consumers on a mobile gaming application. The study shows that a subscriptions business model will be least favored by consumers. Therefore, managers should avoid this option. Results show indifferent effects for a premium and freemium. Depending on the application, a manager should choose which of these two business models to implement, since the different business models will result in different revenue streams for the firm. The premium business models collects revenue from direct investments from the consumer, where a freemium business model receives revenue from placing in app advertisements and possible financial support from the consumer when he decides to remove the ads.

The limitations of this study should be clearly stated, to give future research the opportunity to learn from this research and improve future exploring on this relevant topic. First of all, the 'missing data' resulted in a relatively low amount of respondents providing quality data used for this study. Hence, it is possible that results will differ when using a pool of significantly more respondents. Secondly, the study uses the mobile gaming app Angry Birds, a typical gaming application. An crucial aspect of Angry Birds are the visuals and features within the game. Therefore, generalizing the results to other games where visuals and features play a less crucial role, such as Candy Crush, is complicated, since the main features of these games differ in their origin. Angry Birds is more focused on storytelling, where other games are purely focused on game play. Furthermore, the analysis does not show significant results

for social influence, despite it is theorized as a crucial variable within the model. It could be that the questions in the survey about social influence and need for belonging were too much alike. Hence, respondents became annoyed resulting in a response bias, meaning that the answers to the questions are too closely related and do not refer to difference. The conclusions to the model are therefore limited. Third, previous experience with Angry Birds was not measured within the survey. Nevertheless, respondents could have had prior knowledge about the game. Clearly, this can affect the way consumers see the game and how they act upon it, in the buying process. Fourth, the survey used non moving images from the gaming application. Supposedly, different results could be found when confronting respondents with actual moving visuals from the game, since they will experience, for example, how long the advertisement will pop up inside the game, and how this will affect the game play. Fifth, the research captures the different effects of a business model choice on behavioral intention, and the relationship of age and gender on behavioral intention separately. However, the analysis did not capture the influence of age and gender on this relationship directly. Such effects should be explored in future research. Sixth, the freemium business model in the survey gives respondents the possibility to pay to remove the advertisements within the game. However, in most freemium games, there is also a possibility to purchase extra features or extra levels. Therefore, this could affect the behavioral intention towards the gaming application, since consumers are given extra opportunities for their download.

Since the topic of mobile applications is still a vastly unknown area in research, scholars should explore this area more extensively in the coming years. The opportunities for companies are expanding in this market and therefore it is crucial to understand certain relationships. First of all, results show that consumers prefer the performance expectancy of a mobile gaming application over the ease of use. I believe that future research should focus on the relationship between performance expectancy and effort expectancy, in a way that maximum behavioral intention can be reached for gaming applications. Secondly, more research should be done on the effects of different business models on behavioral intention. For companies it is crucial to have first mover advantage, and therefore decide to implement the correct business model for their app. Third, this research focuses on the behavioral intention of consumers, however, future research should investigate the impact of business models on the revenue streams corresponding with the models. A premium business model receives revenue by different means than a freemium gaming application. Therefore, research should focus on the profitability of the models.

I hope to have made a meaningful contribution to research on mobile gaming applications and their business model choice consequences, as illustrated by consumer demographics,

usefulness and ease of use of the application and the influence of the social environment the adoption of mobile gaming applications. Future research should implement the results and elaborate on the findings.

Davis 1989 – Aside from their theoretical value, better measures for predicting and explaining system use would have great practical value, both for vendors who would like to assess user demand for new design ideas, and for information systems managers within user organizations who would like to evaluate these vendor offerings.'

APPENDIX A

Theoretical constructs

For performance expectancy I used the following statements

- *Playing Angry Birds would improve my happiness in life*
- *Playing Angry Birds would increase my sense of relaxation*
- *Using Angry Birds would enhance my sense of positive emotions in life*
- *I would find Angry Birds useful in achieving satisfaction in life*

For effort expectancy I used the following statements

- *Learning to play Angry Birds would be easy for me*
- *I would find it easy to get Angry Birds to do what I want it to do*
- *It would be easy for me to become skillful at playing Angry Birds*
- *I would find Angry Birds easy to play/use*

For social influence I used the following statements

- *People who influence my behavior think that I should play Angry Birds*
- *People who are important to me think that I should play Angry Birds*

For need for belonging I used the following statements

- *I feel socially accepted by the people who are close to me*
- *I am always looking to get accepted by others*
- *How I feel about myself is more important than others' opinions of me*
- *It's important to me to be liked by everyone I meet*
- *I take great importance in others' opinion*
- *When I make new friends, I feel happy*
- *I am afraid of being rejected by my friends*
- *Before making any decision, I ask other people if I'm doing the right thing*

For behavior intention I used the following statements

- *Assuming that I have access to Angry Birds, I intend to download it*
- *Given that I have access to Angry Birds on my mobile phone, I predict I would play it*
- *How satisfied would you be with this game?*
- *How likely would you be to recommend this game to others?*

APPENDIX B

Treatment Conditions as shown within the Survey

The Premium Business Model

You will have the opportunity to **purchase** the Angry Birds app for a price of **€0.89**. The app will be installed after your payment (credit card) and **you can play Angry Birds whenever you want to on your mobile phone**. The game will be **free of advertisements**.



The Ad Supported Business Model

You will have the opportunity to **download** the Angry Birds app for **free**. The app will be installed after you have downloaded the app on your mobile phone, and will be ready for play. When playing the application you will see, once in a while, **advertisements popping up in the upper right of your screen**. Besides, every time when you press pause within the game, the pause screen will arise including an **advertisement** that tells you that you can download other games. Finally, every time when completing a level or failing a level, you will see an **advertisement popping up full-screen** with the possibility to click away the advertisement and continue with the game. **The app will remain installed after the free download and you can play Angry Birds whenever you want to on you mobile phone.**



The Freemium Business Model

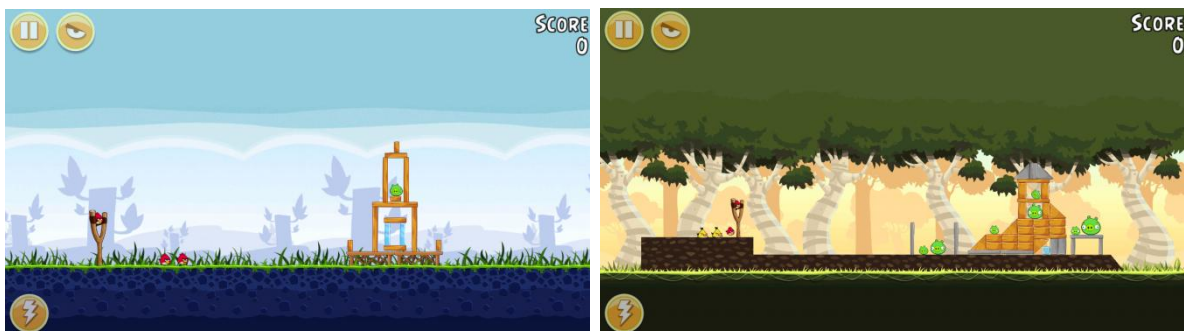
You will have the opportunity to **download** the Angry Birds app **for free**. The app will be installed after you have downloaded the app on your mobile phone, and it will be ready for play. When playing the application you will see, once in a while, **advertisements popping up in the upper right of your screen**. Besides, every time when you press pause within the game, the pause screen will arise including an **advertisement** that tells you that you can download other games. Finally, every time when you complete or failing a level, you will see an **advertisement popping up full-screen** with the possibility to click away the advertisement and continue with the game. **The app will remain installed after the free download and you can play Angry Birds whenever you want to on you mobile phone.**

There is an opportunity to **get rid of all the advertisements within the app by paying a one-time €0.89 fee** (credit card). This means that advertisements never will pop up anymore in the entire game, forever.



The Subscriptions Business Model

You will have the opportunity to **purchase** the Angry Birds app **for a price of €0.89**. The app will be installed after your payment (credit card) and **you can play Angry Birds for 12 months. After this 12-month period the game will be non-accessible**. However, you will again have the opportunity to purchase the app for €0.89. You will always have this opportunity of paying €0.89 for a 12-month period. The game will be **free of advertisements**.



The Control Group

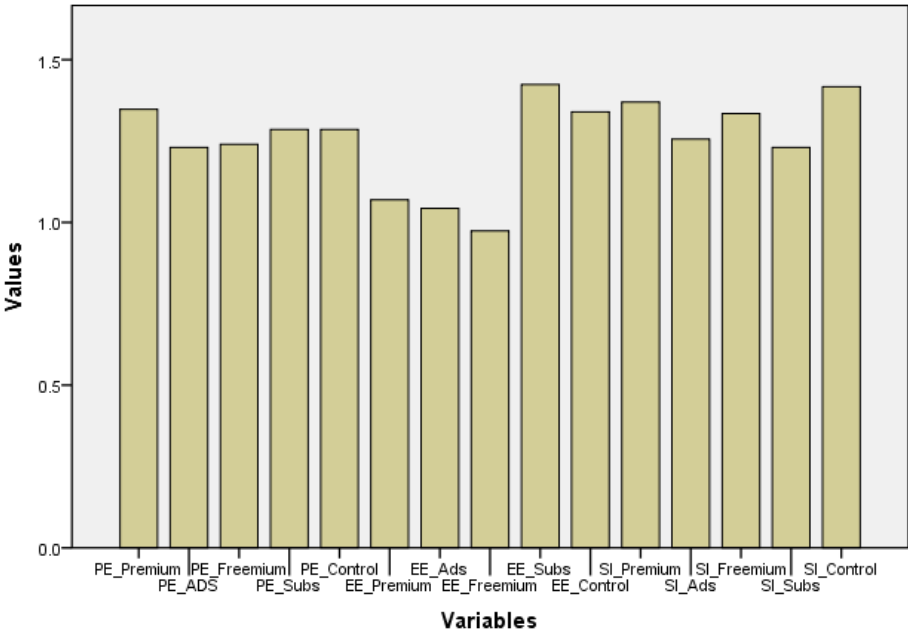
Angry Birds is a popular gaming application downloaded by millions of people in the last couple of years. The goal in each level is to get rid of the pigs. Eliminating all the pigs is your ticket to clear a level in Angry Birds. The levels are constructed different from each other, in a way that you have to use your skills to eliminate the pigs, each time using a different tactic. The pigs are usually blocked by wood, glass, stone or another material arranged into creative structures. You can get rid of the pigs by firing the 'angry birds' towards them. The birds are located in a slingshot, which you can pull back to aim and fire the birds at the pigs, in order to hit the bird or damage the obstacles that can also damage the bird when it falls down on them. You can repeat this procedure until all of the pigs are gone or when you have used up all of your birds.



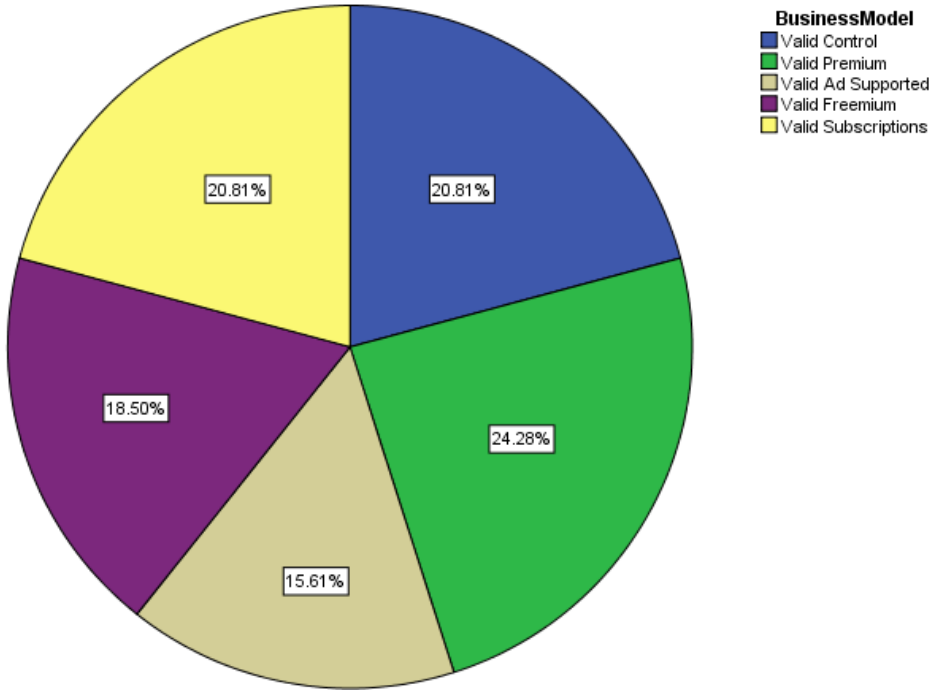
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other
treatment

Descriptive Statistics

Descriptive Statistics
Std. Deviation



BusinessModel
Frequency



APPENDIX C

ONE

Model 1 – SPSS Output

Correlations

		BI	PerfExp	EffExp	SocInfl
Pearson Correlation	Behavioral intention	1,000	,709	,430	,427
	Performance expectancy	,709	1,000	,299	,647
	Effort expectancy	,430	,299	1,000	,145
	Social Influence	,427	,647	,145	1,000
N	Behavioral intention	173	173	173	173
	Performance expectancy	173	173	173	173
	Effort expectancy	173	173	173	173
	Social Influence	173	173	173	173

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,709 ^a	,503	,500	1,07001
2	,745 ^b	,555	,550	1,01547
3	,746 ^c	,556	,548	1,01769

a. Predictors: (Constant), PerfExp

b. Predictors: (Constant), PerfExp, EffExp

c. Predictors: (Constant), PerfExp, EffExp, SocInfl

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,538	,197		7,823	,000
	PerfExp	,838	,064	,709	13,163	,000
2	(Constant)	,164	,360		,454	,650
	PerfExp	,753	,063	,638	11,901	,000
	EffExp	,305	,068	,239	4,457	,000
3	(Constant)	,189	,364		,518	,605
	PerfExp	,780	,083	,661	9,454	,000
	EffExp	,303	,069	,237	4,403	,000
	SocInfl	-,039	,077	-,034	-,508	,612

a. Dependent Variable: BI_overall

TWO

Model 2 – SPSS Output

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,427 ^a	,182	,145	1,34722	1,877

a. Predictors: (Constant), NFB, Control vs. Subscriptions, Gender, Control vs. Ad Supported, AGE, Control vs. Freemium, Control vs. Premium

b. Dependent Variable: Behavioral_Intention

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	2,585	,865		2,990	,003
Control vs. Premium	-,581	,325	-,172	-1,785	,076
Control vs. Ad Supported	-,501	,363	-,126	-1,380	,169
Control vs. Freemium	-,629	,344	-,172	-1,827	,070
Control vs. Subscriptions	-1,007	,337	-,281	-2,985	,003
Gender	,405	,220	,136	1,842	,068
AGE	-,020	,010	-,148	-1,925	,056
NFB	,494	,151	,253	3,280	,001

a. Dependent Variable: Behavioral_Intention

ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	61,146	7	8,735	4,813	,000 ^b
Residual	274,065	151	1,815		
Total	335,211	158			

a. Dependent Variable: Behavioral_Intention

b. Predictors: (Constant), NFB, Control vs. Subscriptions, Gender, Control vs. Ad Supported, AGE, Control vs. Freemium, Control vs. Premium

Correlations

	Behavioral_ Intention	Control vs. Premium	Control vs. Ad Supported	Control vs. Freemium	Control vs. Subscriptions	Gender	AGE	NFB	
Pearson Correlation	Behavioral_ Intention	1,000	-,044	-,013	,020	-,158	,164	-,230	,300
	Control vs. Premium	-,044	1,000	-,246	-,281	-,292	,014	,050	-,108
	Control vs. Ad Supported	-,013	-,246	1,000	-,213	-,221	-,039	,057	-,056
	Control vs. Freemium	,020	-,281	-,213	1,000	-,252	-,056	-,121	,141
	Control vs. Subscriptions	-,158	-,292	-,221	-,252	1,000	,034	,036	,011
	Gender	,164	,014	-,039	-,056	,034	1,000	-,067	,059
	AGE	-,230	,050	,057	-,121	,036	-,067	1,000	-,269
	NFB	,300	-,108	-,056	,141	,011	,059	-,269	1,000

THREE

Model 3A – SPSS Output

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	,903	,757		1,193	,235
Control vs. Premium	-,116	,285	-,039	-,406	,685
Control vs. Ad Supported	-,092	,318	-,026	-,288	,774
Control vs. Freemium	-,361	,302	-,113	-1,197	,233
Control vs. Subscriptions	-,745	,295	-,239	-2,524	,013
Gender	,607	,193	,235	3,152	,002
AGE	-,004	,009	-,032	-,419	,676
NFB	,430	,132	,254	3,261	,001

a. Dependent Variable: PerfExp

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,415 ^a	,172	,133	1,17995	,172	4,477	7	151	,000

a. Predictors: (Constant), NFB, Control vs. Subscriptions, Gender, Control vs. Ad Supported, AGE, Control vs. Freemium, Control vs. Premium

Model 3B – SPSS Output

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	4,122	,641		6,427	,000
Control vs. Premium	-,322	,241	-,125	-1,337	,183
Control vs. Ad Supported	-,103	,269	-,034	-,381	,704
Control vs. Freemium	-,187	,256	-,067	-,732	,465
Control vs. Subscriptions	-,483	,250	-,177	-1,931	,055
Gender	,598	,163	,265	3,668	,000
AGE	-,018	,008	-,181	-2,416	,017
NFB	,360	,112	,243	3,225	,002

a. Dependent Variable: EffExp

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,475 ^a	,225	,189	,99932	,225	6,273	7	151	,000

a. Predictors: (Constant), NFB, Control vs. Subscriptions, Gender, Control vs. Ad Supported, AGE, Control vs. Freemium, Control vs. Premium

Model 3C – SPSS Output

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-,012	,801		-,015	,988
Control vs. Premium	,025	,301	,008	,083	,934
Control vs. Ad Supported	-,085	,337	-,024	-,251	,802
Control vs. Freemium	-,484	,319	-,147	-1,518	,131
Control vs. Subscriptions	-,534	,312	-,166	-1,709	,090
Gender	,278	,204	,104	1,364	,174
AGE	-,004	,010	-,029	-,369	,713
NFB	,532	,140	,303	3,813	,000

a. Dependent Variable: SocInfl

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,367 ^a	,135	,095	1,24823	,135	3,360	7	151	,002

a. Predictors: (Constant), NFB, Control vs. Subscriptions, Gender, Control vs. Ad Supported, AGE, Control vs. Freemium, Control vs. Premium

APPENDIX D

The PROCESS tool, by Andrew F. Hayes, uses an ordinary least squares regression or a logistic regression analytical framework to estimate the direct and indirect effects in simple and multiple moderator and mediator models. The tool gives users the ability to test upon 76 different models, consisting of mediators, moderators, and combinations of them. The model presents, along with the interaction effects, a simple slopes regression and regions of significance for inquiring interactions, conditional indirect effects in moderated mediation models. Furthermore, it presents indirect effects of interactions in mediated moderation models. Besides, bootstrap methods are implemented for inference about indirect effects in both mediated moderation or moderated mediation. The PROCESS tool is an extension of already existing macros, by Hayes, such as SOBEL, INDIRECT, MODMED, MODPROME, and MEDTHREE). Using this extension gives users the ability to implement much more complex models in SPSS which could not be performed by using his earlier tools. More information about this tool can be found in the book *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*, by Hayes (2008). The tool can be downloaded from <http://www.afhayes.com/> and installed in SPSS.

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