Fuzzy-Set Analysis to Understand User Experience in Mobile Applications

Full Paper

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Abstract

This paper examines how price value, game content quality, positive and negative emotions, gender, and gameplay time interact with each other to explain high intention to download mobile applications, and specifically mobile games. Based on complexity theory and theory of configuration, a conceptual model is drawn along with research propositions. To test our propositions, we employ fuzzy-set qualitative comparative analysis (fsQCA) on 531 users of mobile games. Findings identify ten solutions that explain high intention to download mobile games. Alternative paths are identified depending on the gender and the time users spend playing mobiles games in a day. We highlight the importance of price value and game content quality, as well as that of positive emotions which are always core factors when present. The study contributes to theory and practice (1) by offering new insights into the interrelationships among the predictors of user intention to download mobile games, and (2) by advancing the theoretical and methodological foundation of how price value, game content quality, positive and negative emotions, gender, and gameplay time combine to lead to high intention to download mobile games.

Keywords (Required)

User experience, mobile gaming, emotions, price value, content quality, gender, fsQCA.

Introduction

Mobile applications have seen an enormous growth the past ten years, and the majority of consumption is now within mobile applications, with application usage making up for 52% of the total digital media engagement (Lella and Lipsman 2014). Video game industry, including games for mobile devices (e.g., smartphone, tablet) has grown significantly in revenues leading to increased value creation for both the industry and the users (Marchand and Hennig-Thurau 2013). In 2016, 19.2B downloads were made on Apple's "App Store" and Google's "Google Play" (SensorTower 2017a). Also, in 2016 iPhone users spent on average $40 per device on premium applications, more than they did in 2015, with mobile games dominating consumer spending (SensorTower 2017b). Inspired by games, the term "gamification" was coined by management researchers, referring to the application of gaming design principles to influence employees and consumers (Zichermann and Cunningham 2011). It is thus important to understand how to better design mobile games to satisfy the target users, and increase value creation.

Recent studies examine how companies may provide increased value to gain a competitive advantage, as well as what factors may predict adoption of online and mobile games (Chang et al. 2013; Davis and Lang 2012; Wang et al. 2016). Value consists of price value, quality value, emotional value, and social value (Sweeney and Soutar 2001). To better understand how value perceptions relate with behavior in mobile gaming, further work is needed (Rezaei and Ghodsi 2014; Zhou 2013). Perceived value, content quality, emotions, and various demographics are important antecedents of intention to download or use mobile

applications and games (Hsiao and Chen 2016; Su et al. 2016; Zhou 2013). Nonetheless, different findings exist on how these factors influence users' behavioral intentions, suggesting that these factors are most likely interrelated or dependent with each other. Indeed, they may interact with each other in various ways, however more work is needed to understand how such interplays may offer a deeper understanding on adoption of mobile applications, and how they may lead to high intention to download mobile games. Most studies in the area focus on main effects among the various antecedents and employs symmetric tests, [e.g., structural equation modelling (SEM) and multiple regression analysis (MRA)] to measure their effect on behavior. Instead, two variables are more likely to have asymmetrical relations (Ragin 2008; Woodside 2014); thus, further work is needed towards this direction.

We theorize that an interplay exists among price value, game content quality, positive and negative emotions, gender, and gameplay time, creating synergies that may explain intention to download mobile games. Indeed, there is not one optimal configuration of these factors, but, multiple configurations exist, including different combinations of mobile game adoption antecedents. We add to the literature by exploring mobile game adoption through the lens of users' sense of price value, game content quality, positive and negative emotions, taking into account gender and the time spent playing games. Drawing on complexity theory and theory of configuration we employ fuzzy-set qualitative comparative analysis (fsQCA) (Ragin 2008) to identify specific configurations leading to high intentions to download mobile games. FsQCA has received increased attention during the last years in various fields as it allows researchers to gain a deeper understanding of the phenomenon under scrutiny (Woodside 2014).

Background and research propositions

Price value and content quality of mobile games

The increasing amount of mobile applications has lead research in the area towards identifying factors that explain user behavior and adoption of mobile applications. In the field of Information Systems, different theories have been used successfully, for example the Unified Theory of Acceptance and Use of Technology (UTAUT) is one of most popular ones. In mobile gaming applications, research has identified different antecedents of users' behavioral intentions and adoption rates, including perceived value, content quality, flow experience, hedonic motivations, emotions, and various demographics (Hsiao and Chen 2016; Su et al. 2016; Zhou 2013). Perceived value has been examined widely in economic, strategic and marketing literature, and is defined as "the consumer's total assessment and evaluation of the total utility of a product which is based on perceptions of what is received and what is given" (Zeithaml 1988). Value is a multidimensional construct consisting of price value, quality value, emotional value, and social value (Sweeney and Soutar 2001). Every product, including mobile games, has a value and a price and these two characteristics always come together (Rezaei and Ghodsi 2014). Here, price value refers to users' perceptions that mobile games have a good value for money and are reasonably priced. Price value has a significant effect on users' behavioral intentions in the context of mobile applications (Venkatesh et al. 2012), as well as that of online gaming (Rezaei and Ghodsi 2014). Considering the increased usage of mobile applications and the advancement of smartphones, it is critical to examine the role of price value in explaining users' intention to download mobile games in their smartphones and tablets.

Similarly, quality value here refers to users' perception towards attractiveness, timeliness and personalization of mobile game content, that is game content quality. Increased quality is likely to lead to higher satisfaction as it will make users feel good about using a certain service or application (Zhao et al. 2012). Furthermore, quality has been found to have a positive influence on behavioural intentions in the context of online games (Rezaei and Ghodsi 2014), since a game that is well made and performs consistently will increase users' intention to play it. Game content quality plays a significant role in the users' overall flow experience when playing mobile games (Zhou 2013). The existence of numerous mobile games at different prices, creates many opportunities and options for the users to find the best game, based on their personal preferences and characteristics. Thus, it is critical to examine how game content quality combines with price value, and other factors examined here, to better explain users' intention to download mobile games. Drawing on the emotional value as part of perceived value, it is important to examine the role of emotions in mobile gaming adoption, as they may have equivocal effects on users' intention to download mobile games. Previous studies highlight the importance of examining emotions, which have been found to significantly influence users' online behavior (Pappas et al. 2014).

The role of emotions on mobile games

As with all services, the use and adoption of mobile applications and mobile games, creates experiences to their users that might either be positive or negative for them. Emotions play an important role in influencing user behavior, and previous studies have examined one or more types of emotions as antecedents of behavioral intentions in different fields [e.g., (Kuo and Wu 2012; Pappas et al. 2016b)], including mobile applications (Sutanto et al. 2013) and online gaming (Rezaei and Ghodsi 2014). Users may start or continue playing a game because it arouses feelings or affect, creating emotions, which might be either positive or negative depending on the game itself and the overall experience they have (Rezaei and Ghodsi 2014). Also, emotions are related with the perceptions of value when it comes adoption of mobile applications (Liu et al. 2015) and online games (Rezaei and Ghodsi 2014), thus it is critical to investigate their interrelation with price value and game content value in mobile gaming applications.

Earlier studies have investigated the role of specific types of emotions as antecedents of user behavior in different contexts (Koo and Ju 2010; Pappas et al. 2016a; Pappas et al. 2014). Emotions are divided into two dominant categories, that is positive and negative emotions, which are independent, universal and may exist at the same time (Bagozzi et al. 2016; Pappas et al. 2016b). Studying positive and negative emotions together will lead to better explanation of user behavior, due to their interrelation and the different effect they may have on behavior (Barclay and Kiefer 2014). Indeed, studies show that, in the context of online services, positive and negative emotions may influence users' intentions in different ways and in some cases they may neutralize each other (Pappas et al. 2016b). Here, positive emotions refer to the level that users feels happy, valued, and have a warm feeling when playing mobile games, and negative emotions refer to the level that users feel irritated, in a bad mood, and upset when playing mobile games (Pappas et al. 2014). One may feel both types of emotions together, for example when playing a new game users may feel happy by their choice or because they found it at a good price, but also feel irritated or upset if the game is difficult and they are not able to win or progress as much as they expected. Emotions are correlated their interrelation is asymmetric (Pappas et al. 2016b), but the presence of one does not guarantee or exclude the presence of the other. Thus, it is essential to identify these asymmetric relations and what are the different combinations that explain users' behavior in mobile gaming.

Research propositions

Building on previous studies, as discussed in the background section, there is a need to examine the adoption of mobile applications and especially of mobile games, by identifying the interrelations and combinations among price value, game content value, and emotions. Furthermore, we include gender and the time spent playing mobile games, to better explain users' intention to download a mobile game. Gender differences have been examined widely in the area, however different results exist in the context of mobile applications and services. Although a study in the context of mobile entertainment found no gender differences regarding adoption of mobile services (Leong et al. 2013), this was not verified more recently, when it was identified that different motivation exists between male and female users of mobile applications (Liu and Guo 2017). This increases the need to examine the role of gender in formulating behavioral intentions and how it combines with price value, game content value, and emotions. Furthermore, we examine the gameplay time (i.e., time that users spend each day playing mobile games), as literature on online gaming has identified different motivations and different behavior for users, depending on the amount of time they spend playing online games (Neys et al. 2014).

We propose that price value, game content value, emotions, gender and gameplay time, interact together, and combine in different ways, which are able to explain intention to download mobile games. In detail, we posit that a synergetic nature exists among the antecedents of intention to download mobile games, leading to a complex multidimensional phenomenon, where the combinations of the antecedents are more important than the antecedents themselves are independently. We build on complexity theory and theory of configuration, and propose a conceptual model to explain and better understand users' intention to download mobile games. Figure 1 presents the proposed model. The overlapped areas represent possible combinations among factors, that is areas that one factor may exist together with the rest (e.g., combinations that explain high intention to download are included within the outcome of interest area).

Complexity theory and theory of configuration build on the principle of equifinality, which suggests that a result may be equally explained by alternative sets of causal conditions (Fiss 2011; Woodside 2014).

Intention to download mobile games occurs through the different combinations of price value, game content quality, positive and negative emotions, gender and gameplay time. For example, users may download a mobile game because of its low price even if they are not satisfied with the game content. Also, users' may decide to purchase a more expensive mobile game with a not so good content because they feel happy playing it, or because they spend many hours playing during the day, thus they play many games.

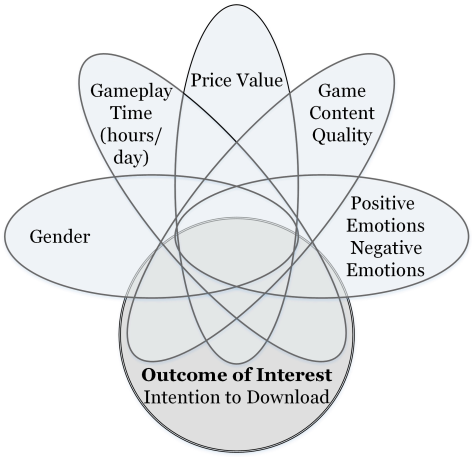

Figure 1. Venn diagram illustrating the conceptual model

Configuration theory proposes the concept of causal asymmetry, which means that, for an outcome to occur, the presence and absence of a causal condition depends on how this condition combines with the other conditions (Fiss 2011; Woodside 2014). In other words, different values of the same condition (i.e., high and low levels of a factor) may appear in different combinations explaining intention to download mobile games, depending on how these conditions combine with each other. For example, high intention to download may be achieved through both high and low perceptions towards price, depending on how good the game content is perceived to be, or how the users' feel when they play. Thus, we propose:

Proposition 1. *No single best configuration of price value, game content quality, emotions, demographics, and gameplay time explains high intention to download mobile games; instead, multiple, equally effective configurations of causal factors exist, leading to high intentions.*

Proposition 2. *Single causal adoption values may be present or absent within configurations of users' high intention to download mobile games, depending on how they combine with other causal conditions.*

Methodology

Sampling and Measures

The research methodology includes a survey conducted through the delivery and collection of individual questionnaires. A snowball sampling methodology was used to attract respondents. We targeted users of mobile games, that is individuals that play games on their mobile devices. Experienced users of mobile games were contacted, who then contacted their business and personal contacts. They were asked to answer based on personal evaluations and perceptions towards mobile games. We aimed at about 1800 users, out of which 593 responded. From the respondents, 531 play mobile games, and they represent the final sample of this study. The sample comprises of more males (60%) than females (40%). The majority (47%) is younger than 28 years old. Next, 26% are between 29 and 35 years old, 19% are between 36-45 years old, and the rest (8%) are 46 years old or older. Regarding employment status, the sample consists of 39% private employees, 33% students, 25% state employees, and 5% retired or unemployed.

Respondents were presented with questions on demographic characteristics, followed by questions on the constructs as identified in the previous section. Table 1 presents the definitions of the adopted constructs and their corresponding source. In all cases, except gameplay time, 7-point Likert scales (1 Not at all - 7 Very Much) were used to measure the constructs. The Appendix lists all the items used in this study.

Construct	Definition	Source
Price Value	Users' perceptions that mobile games are reasonably priced and have a good value for money.	Rezaei and Ghodsi (2014)
Game Content Quality	Users' perception towards attractiveness, timeliness and personalization of mobile game content.	Zhou (2013)
Positive Emotions	The level that users feel happy, satisfied or valued when playing mobile games.	Pappas et al. (2014)
Negative Emotions	The level that users feel angry, in a bad mood, or upset when playing mobile games.	
Intention to download	Users' intention to download mobile games in the future.	
Gameplay time (hours/day)	The hours (approximately) that users spend playing mobile games during the day.	

Table 1. Constructs definition

The constructs of this study are evaluated for reliability with the Composite Reliability and Cronbach alpha indicator, which shall be higher than .7 for every factor. Construct validity requires average variance extracted (AVE) to be greater than .50 (Fornell and Larcker 1981), the correlation between the different variables in the confirmatory models shall not exceed .8 as this suggests low discrimination, and the square root of each factor's AVE shall be greater than its correlations with the other factors (Table 2). Further, variance inflation factor (VIF) for every variable is below 3, thus multicollinearity is not an issue (O'brien 2007). Common method bias is not a problem, as variance from the common latent factor technique and the CFA marker variable technique, is .08 and .21, respectively. (Podsakoff et al. 2003).

					Construct				
Construct	**Mean**	**SD**	**CR**	**AVE**	**1**	**2**	**3**	**4**	**5**
1. Price Value	4.06	1.39	.93	.81	**.90**				
2. Game Content Quality	4.63	1.25	.89	.72	.65	**.85**			
3. Positive Emotions	4.66	1.43	.94	.82	.51	.62	**.91**		
4. Negative Emotions	2.62	1.60	.95	.86	.02	-.07	-.01	**.93**	
5. Intention to download	4.96	1.42	.93	.76	.48	.64	.72	-.15	**.87**

Note: Diagonal elements (in bold) are the square root of the average variance extracted (AVE). Off-diagonal elements are the correlations among constructs (all correlations higher than 0.1 are significant, $p < 0.01$;). For discriminant validity, diagonal elements should be larger than off-diagonal elements.

Table 2. Descriptive statistics and correlations of latent variables

Data analysis

The study applies fuzzy-set Qualitative Comparative Analysis (fsQCA), which integrates fuzzy set and fuzzy logic with QCA (Ragin 2008). FsQCA identifies patterns of elements (i.e., configurations), among independent and dependent variables, and goes beyond the traditional analyses of variance and MRAs (Woodside 2014). It offers two types of configurations, which are created with both necessary and sufficient conditions, and provides multiple solutions explaining the same outcome, on which the configurations may be present, absent, or on a "do not care" condition (i.e., either present or absent). Necessary and sufficient conditions create a distinction among core (i.e., strong causal condition with the outcome) and peripheral elements (i.e., weak causal condition with the outcome) (Fiss, 2011).

The variables need to be calibrated into fuzzy sets, by giving them values from 0 to 1, on which 1 stands for the full-set membership and 0 the full non-set membership. For data calibration, three thresholds need to be defined, that is full membership, full non-membership and the cross-over point, which represent the level that a case belongs to a set (Ragin 2008). This way of calibration is the direct method of calibration.

In the direct method, the researcher chooses three qualitative thresholds, whereas in the indirect method, the measurements require rescaling based on qualitative assessments. Either method may be chosen based on the data and the underlying theory. Here, the procedure employed by Pappas et al. (2016b) is followed, so the three thresholds are based on the questionnaire scale (7-point Likert scale). The full membership threshold is set at the value of 6; the full non-membership is set at value 2; and the crossover point is set at value 4. All values are calibrated on a logistic function to fit into the three thresholds.

Next, fsQCA produces a truth table of 2^k rows, where k represents the number of outcome predictors and each row represents each possible combination. For instance, a truth table between two variables (i.e., conditions) provides four possible logical combinations between them. The truth table needs to be sorted based on frequency and consistency (Ragin 2008). Frequency refers to the number of observations for every combination. Consistency refers to "*the degree to which cases correspond to the set-theoretic relationships expressed in a solution*" (Fiss 2011). A frequency cut-off point should be set to ensure that a minimum number of empirical observations is obtained. For small and medium-sized samples, a cut-off point of 1 is appropriate, but for large-scale samples [e.g., over 150 cases], the cut-off point should be set higher (Ragin 2008). Here, the frequency cut-off point is set at 3 (Fiss 2011). Also, a low consistency threshold leads to the identification of more necessary conditions, reducing type II errors (i.e., false negatives), but increasing type I errors (i.e., false positives) (Dul 2016). Thus, a relatively high consistency threshold is set at >.85; not too high, but higher than the recommended value of 0.75.

Findings

Table 3 shows the outcomes of the fuzzy set analysis for high intention to download mobile games. Black circles (●) symbolize the presence of a condition, crossed-out circles (⊗) its absence (Fiss 2011) and blank spaces suggest a "do not care" situation (i.e., a causal condition may be either present or absent). Large circles symbolize core elements of a configuration, and small circles peripheral ones. Table 3 includes set-theoretic consistency values for each configuration as well as for the overall solution, with all values being above the threshold (>0.75). Consistency measures the degree that a subset relationship has been approximated, and coverage assesses the empirical relevance of a consistent subset (Ragin 2008).

	Solutions									
Configuration	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Price Value	•	⊗	⊗	⊗		•		●	⊗	•
Game Content Quality	●	●	⊗	⊗			●	•	●	●
Positive Emotions	●	●	●	●	●	●	●			
Negative Emotions				●	●	⊗	⊗	⊗	⊗	⊗
Gameplay Time (>1 hour/day)		●			⊗	●		⊗	●	●
Gender (Males)		⊗		⊗	•	•		⊗	⊗	•
Consistency	.96	.94	.93	.94	.92	.96	.96	.93	.95	.95
Raw Coverage	**.59**	.11	.07	.06	.16	.19	**.64**	.07	.09	.19
Unique Coverage	.07	.02	.01	.01	.01	.01	.08	.01	.01	.01
Overall solution consistency	.937									
Overall solution coverage	.791									

Note: Black circles (•) indicate the presence of a condition, and circles with "x" (⊗) indicate its absence. Large circles indicate core conditions; small ones, peripheral conditions. Blank spaces indicate "don't care".

Table 3. Configurations leading to high intention to download mobile games

The overall solution coverage indicates the extent that high intentions can be determined based on the identified configurations, and is comparable to the R-square value. An overall solution coverage of .791 suggests that the ten solutions accounted for a substantial proportion of the outcomes.

For high intention to download mobile games, solutions 1-10 reflect multiple combinations that are able to explain the same outcome. For price value, game content quality, and emotions, their presence represents high values, while their absence represents not high values (i.e., low/medium). In detail, solutions 1-7 present combinations on which positive emotions are always present and a core construct. High positive emotions will lead to high intention to download a mobile when, (S1) perceptions of price value and game content are high as well, regardless of negative emotions, gameplay time, and gender, (S2) perceptions of female users with high gameplay time about game content are high, even when price value perceptions are low regardless of negative emotions, (S3) perceptions of price value and game content are low, regardless of negative emotions, gameplay time, and gender, however only for a small part of the sample. Furthermore, positive and negative emotions may be present at the same and high intention to download may be achieved for (S4) female users with low perceptions towards price value and game content, regardless of gameplay time, and for (S5) male users that spend less than 1 hour per day playing mobile games, regardless of their perceptions towards price value and game content. Finally, regarding emotions, when negative emotions are low and positive emotions are high, (S6) male users that play mobile games for more than 1 hour per day will have high intention to download mobile games when price value is high, regardless of the game content, and (S7) when perceptions of game content is high, users will have high intentions to download mobile games regardless of price value, gameplay time or gender.

Solutions 7-9, present different configurations in which negative emotions are low and high intention to download may be achieved regardless of the role of positive emotions. In detail, (S8) female users that play mobile games less than 1 hour per day will have high intentions if perceptions on price value and game content are high, while (S9) if they play over than 1 hour per day they will have high intentions even when price value perceptions are low. Finally, (S10) male users that play over than 1 hour per day need to have high perceptions on both price value and game content for high intention to download mobile games. It should be noted, that solutions 1 and 7 present the highest raw coverage, thus explaining the vast majority of the sample. The raw coverage for solutions 2-6, and 7-9 varies from .07 to .19, suggesting that a smaller but still important part of the sample presents a different behavior from the majority.

Discussion, Implications and Future Work

This study proposes that for the adoption of mobile applications, and specifically that of mobile games, users' perceptions of price value and game content, their positive and negative emotions, the time they spend playing mobile games, and their gender, combine to form configurations to explain high intention to download mobile games. We build a conceptual model serving as the basis for identifying the aforementioned configurations. Of particular interest in the findings is the important role of positive emotions, consistent with prior studies (Kuo and Wu 2012; Pappas et al. 2014), that are present in 7 out of 10 solutions, always as a core condition. Indeed, the findings suggest that users with high positive emotions may overcome low perceptions on price value, game content or even any negative emotions (S1-7). Even when perceptions of price value and game content are low, (e.g., an expensive game with poor content) some users will have high intentions to download mobile games (S6). Also, high positive emotions are likely to diminish high negative emotions, explaining high intention to download mobile games (S3-4), or help users overcome perceptions of low price value and low game content quality, when comparing for example S3 with S1. Also, the different level of positive (i.e., high) and negative (i.e., low) emotions, on certain occasions as shown in S2 and S9, respectively, leads to high intention to download.

Next, the findings confirm the importance of price value and game content quality, regarding mobile applications, as when both are high (i.e., present), intention to download with also be high for both male and female users, as well as for users with both high and low gameplay time (S8-9). This suggests, that a mobile game that offers content of a certain quality and in accordance with its price, users are likely to download it, regardless of how good they feel about playing mobile games. These solutions identify an existing smaller part of users inside the sample, compared to the majority of users that also have high positive emotions (S1). Similarly, the results indicate that female users that play over 1 hour per day mobile games and have high perceptions of game content, will have high intention to download mobile games even when price value is low (S10). This suggests that, gameplay time is linked with game content, and some users may be willing to pay a higher price for a mobile game, as they consider its content to be of high quality and they spend a lot of time during the day playing.

It is interesting to note that for users who play over one hour a day, price value is less important, as it always is a peripheral factor (either present or absent) (S2,S6,S9,S10). Instead, for users that play less than an hour per day price value is very important (i.e., core factor) when it is present (S8). This suggests, that users who do not spend much time playing mobile games may be more particular on how much money they spend on gaming, as opposed to heavy gamers who may more on game content, which is a core factor, and might be willing to spend more money for a game of high quality. The findings suggest that both male and female users behave in a similar way regarding their emotions and gameplay time. However, female users may focus more on game content, which is present in more solutions, and less on price value, which is absent in more solutions, than male users. The latter indicates towards an interesting differentiation, where female gamers may seek high quality games even if they are not reasonably priced.

The study contributes to theory and practice regarding the behaviour of users' and the design of personalized services. We empirically validate the synergetic nature of price value, game content quality, positive and negative emotions, gender, and gameplay time as they combine to explain intention to download mobile games. The findings verify and extend previous studies that identify the central role of price value and content quality on users' mobile gaming experience and behavioural intentions (Rezaei and Ghodsi 2014; Zhou 2013). Also, we identify the importance of positive emotions, verifying previous studies in the area of online services (Pappas et al. 2016b). Although users are expected to choose games because they like them, feel happy or have a positive experience, our findings contradict online and mobile gaming studies (Liu and Li 2011; Rezaei and Ghodsi 2014), that found no effect of emotions (e.g., enjoyment) on behavioural intentions. This hints that a deeper understanding of emotions is required, to be achieved by extending traditional MRAs and SEM analyses with fsQCA, which when employed with complexity theory contributes to theory building (Fiss 2011; Woodside 2014). FsQCA recognizes combinations of various factors explaining a certain outcome, thus, multiple combinations of independent factors explaining the same outcome can be identified.

This paper offers specific paths leading to high intention to download mobile games, which may be used by practitioners to improve their game and the ways they communicate with their users. Game developers should take into consideration users' characteristics based on their gameplay time, choose to target specifically gamers, and highlight different aspects each time. For example, focus on the quality of the content when addressing heavy users, or on the price when addressing users who do not play a lot during the day. By extension, developers may choose different communication channels, based on how much time their user spends within the game. For instance, in might be an effective strategy if in-game advertisements focus on heavy gamers since they spend more time playing. Developers should constantly interact with their users, through various channels, to capture their preferences, and emotions, in order design challenging and interesting games (Liu and Li 2011).

This study has some limitations. First, we did not control for the use context (e.g., playing while commuting), which has been found to be important in mobile game adoption (Liu and Li 2011). Also, we do not examine social factors, social interactions and value co-creation, or motivations to download a game, however future studies should take them into account as contradicting results exist on how they influence intentions, offering deeper insights in explaining user behaviour (Pappas et al. 2017a; Pappas et al. 2017b; Rezaei and Ghodsi 2014; Zhou 2013). This paper differs from previous studies in the area examining net effects among variables, by employing fsQCA to explain intention to download mobile games. Future studies should take a similar approach to verify our findings, and extend them by employing complementary symmetrical (e.g., SEM) analyses.

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Appendix

Construct and scale items	**Mean**	**S.D.**	**Loading**
Price value, Cronbach alpha = .88			
Mobile games are reasonably priced	4.10	1.63	0.86
Mobile games offer value for money	3.99	1.57	0.93
Mobile games are good product for the price	4.11	1.45	0.91
Game Content Quality, Cronbach alpha = .81			
Mobile games provide up to date contents	4.66	1.58	0.83
Mobile games provide attractive content	4.76	1.38	0.87
Mobile games provide content pertaining to my needs	4.49	1.46	0.85
Positive Emotions, Cronbach alpha = .91			
I feel happy when I play mobile games	5.06	1.59	0.94
I feel satisfied when I play mobile games	4.88	1.57	0.94
I feel valued when I play mobile games	4.39	1.64	0.83
Negative emotions, Cronbach alpha = .94			
I feel angry when I play mobile games	2.77	1.74	0.90
I feel in a bad mood when I play mobile games	2.59	1.74	0.93
I feel upset when I play mobile games	2.44	1.73	0.93
Intention to download, Cronbach alpha = .90			
In the future, I intend to continue downloading mobile games.	5.12	1.63	0.89
My general intention to download mobile games very high.	4.68	1.64	0.89
I will download mobile games in the future.	4.85	1.60	0.81
I will think to download mobile games.	5.18	1.63	0.90

Appendix. Scale items with mean, standard deviation and standardized loading