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Review Article

How Do Emotions Impact Mobile Services Acceptance? A Systematic Literature Review

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Mobile data services have been rapidly developing and expanding in the recent years; therefore many studies focus on researching their acceptance and use in general or by observing different viewpoints. One of these is emotions, which influence our beliefs and attitudes that impact our decisions and actions. The objective of our research was therefore to explore the field of mobile data services acceptance in regard to emotional factors. We performed a systematic literature review of emotional concepts and their relationships, provided by 43 primary studies. Consequently, our study includes an aggregation of emotional factors obtained from related and reviewed literature, with their definitions and the extent of their usage. Furthermore, it analyses the proportion of emotional factors against all acceptance-related factors as well as the extent of their use through time. Our study tries to guide future work by aggregating the relations that include at least one emotional factor and by providing the rate of their significance. Finally, the study tends to determine the viability of the emotional factors by observing their direct influences on users' intention and proposes a generic theoretical model for supporting future mobile services research.

1. Introduction

Each technology is applied with the aim of achieving a desired goal where a precondition for achieving a goal is its user acceptance. Therefore a lot of information technology (IT) research is dedicated to identifying and understanding the antecedents of IT through cognitive-based models. The most represented models include the technology acceptance model [1], unified theory of acceptance and use of technology [2], theory of planned behaviour [3], theory of reasoned action [4], diffusion of innovations/innovation diffusion theory [5], and task technology fit [6].

The technology acceptance theory presented by Davis [1] is an information systems theory that models how users come to accept and use a specific technology. It is measured by the technology acceptance model (TAM), which indicates that Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) are the two main users' beliefs that determine one's intention to use the technology. The model received two extensions by Venkatesh et al. to TAM2 in 2000 [7] and TAM3 in 2008 [8]. The same authors also proposed an alternative to TAM, the unified theory of acceptance and use of technology (UTAUT), which aims to explore user intentions for using an information system and subsequent usage behaviour by determining the factors: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions [2].

The acceptance of technology is often observed with the help of a psychological theory, such as theory of reasoned action (TRA), presented by Fishbein and Ajzen [4] in 1975, which posits that individual behaviour is driven by behavioural intentions where behavioural intentions are a function of an individual's attitude towards the behaviour and subjective norms surrounding the performance of the behaviour. The theory was in 1991 extended to the theory of planned behaviour (TPB) in order to improve the predictive power of the theory of reasoned action by including Perceived Behavioural Control [3]. On the other hand, the diffusion of innovations/innovation diffusion theory (DOI/IDT) argues that diffusion is the process in which innovation is being communicated over time through certain channels within a particular social system. Individuals are seen as possessing different degrees of willingness to adopt innovations over time [5]. The task technology fit (TTF) theory states that information technology (IT) is more likely to have a positive

impact on individual performance and be used if the capabilities of the IT match the tasks that the user must perform [6].

The definitions of listed cognitive models show that they research the adoption of IT through observing the constructs that are important in helping or causing the desired effect to happen or to be done. As the technology is usually used by many users it is also important to incorporate user emotions as they play a strong role in our lives as they influence our beliefs and attitudes, which guide our thinking, decision making, and actions [9]. Emotions present a mental state of readiness that arises from cognitive appraisals of events or thoughts. They may also result in specific actions to affirm or cope with emotions [10]. The impact of emotions in the field of IT was extensively researched in the study by Beaudry and Pinsonneault [11], which studied direct and indirect effects of different emotions on IT use. Other studies included emotional factors as additional constructs to base cognitive models. Venkatesh [12] researched the influence of emotions as one of the anchors that determine early perceptions about the ease of use of a new system. Perceived Enjoyment was used as a determinant in predicting the ease of use and application specific self-efficacy in process of adopting web-based information systems [13]. Online consumer behaviour was also observed by investigating how emotional and cognitive responses to visiting a web-based store for the first time influence consumers' intentions to return [14]. Technology acceptance was also examined from the viewpoint of emotions by researching the effects of positive mood [15] or emotional attachment [16]. In addition, it is also important to highlight the third extension of the technology acceptance model (TAM3), where effort was made to include an emotional viewpoint. TAM3 model introduces additional factors that address the emotional impact on technology acceptance (Perceived Enjoyment, Computer Anxiety, and Computer Playfulness) [8].

With advancement of IT in ubiquity and mobility, the field extended into new areas. Consequently the research of emotional impacts on IT in general may not cover the whole field of IT. Therefore, this study focuses on mobile technologies, specifically mobile services. Many definitions for mobile (data) services exist. Hong et al. [17] define mobile data services as *"an assortment of data communication services that can be accessed using a mobile phone over a wide geographic area via mobile telephone networks."* Meanwhile, Lu et al. [18] refer to mobile services as *"all types of digital services via wireless networks accessible through any type of mobile device."* They provide wireless access to the digitalized contents of the internet via mobile device [19]. Therefore, consumers are able to conduct a vast range of activities comprised of transactions of services, goods, and information with a monetary value via wireless networks [20]. That creates a wide area of business opportunities, as various services delivered to the users via mobile applications installed on mobile devices, enhancing users' flexibility, mobility, and efficiency. The field of mobile data services is rapidly developing and expanding via the introduction of new technologies and mobile devices [21].

This study extends our previous work [22], which explores the acceptance of mobile services, by focusing on the emotional aspect. The emotional impact on mobile services acceptance is observed in different extent, where the emotional aspect is the focus of the research [23, 24] or it is presented only via the observed factors [25, 26]. Also the emotions are observed in relation to the intention to adopt mobile services [23, 27], continued use intention [24], or postacceptance behaviour [28]. In regard to the emotional viewpoint, the objective of this study is to systematically review the current status in the research of the acceptance of mobile services with the focus on the influencing or influenced emotional factors. It uses the Beaudry and Pinsonneault [11] framework for classifying emotions as a basis and a source of emotional factors that are observed within this work (Figure 1).

The article is further divided into the following sections. In Section 2 we describe our research methodology, while in Section 3 we present our results. Section 4 is intended to answer our research questions and Section 5 is where we present the conclusions.

2. Research Method

This study represents a systematic literature review (hereinafter referred to as a SLR) in the field of mobile services with focus on emotional factors that impact the acceptance of those services. It is based on the guidelines presented by Kitchenham and Charters [69] and it follows the proposed steps. The steps of the conducted SLR method are documented in the following sections.

2.1. Research Questions. The aim of this article was to investigate emotional factors impacting the acceptance of mobile services. To achieve this goal, we defined research questions (RQ) that will be discussed below.

As already mentioned in Section 1, emotions play an important role in researching the acceptance of IT. The framework for classifying emotions (Figure 1) shows that there are many types of emotions that can influence users in their relation to new technologies. Besides, IT itself is a broad field that can be divided into many subareas, where mobile technologies are one of them. They are supported by mobile services that enable wireless access to digital content. Therefore this SLR aimed to determine which emotional factors influence the use of mobile services (RQ1).

> RQ1: which emotional factors exist in the field of mobile services acceptance?

Mobile services present a great opportunity for vendors and users. The extent of their use is dependent on the technology advancement, which is supporting the broad use of mobile devices [21]. Our previous work already determined that mobile services acceptance research correlates with the mobile services technology advancements [22]. In this SLR we wanted to extend existing study by focusing on emotional factors as stated in the following research question:

> RQ2: how active is the field of researching the emotional impact on the acceptance of mobile services?

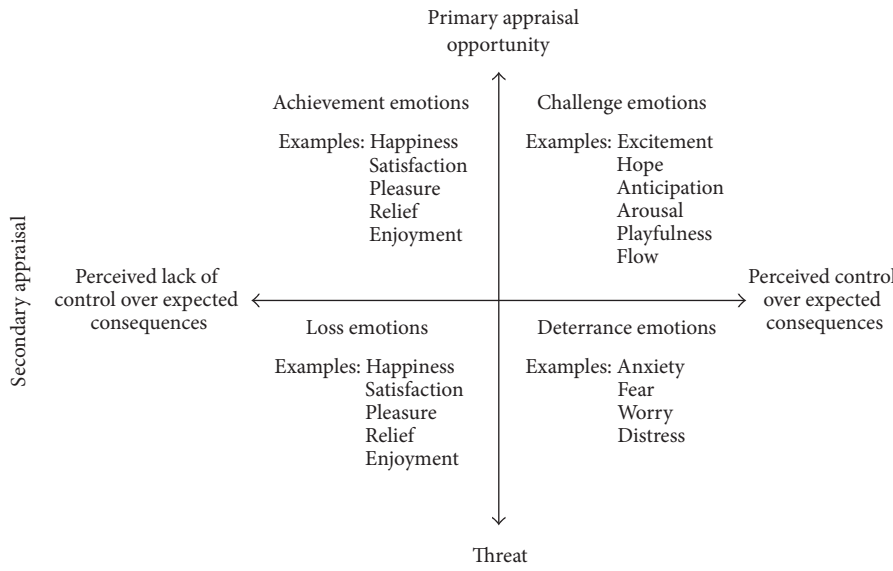

Figure 1: A framework for classifying emotions [11].

IT vendors strive to maximize the use of their products, which also implies mobile services. These are, in most cases, used voluntary. So, achieving the acceptance of products by their users is of critical importance. The acceptance of IT is evaluated by using different theoretical models, which use relations between various factors to determine their significance for the selected technology. This SLR wanted to explore these relations by focusing on those ones that include emotional factors and determine the frequency of their use, significance value, and the percentage of significant relations in relation to nonsignificant ones. In line with this, we defined the following research question:

> RQ3: which causal relations, that include emotional factors, can be observed and which of them are the most significant?

The models that are used to determine the level of acceptance of mobile services are constructed by using a variety of relations predetermined by an underlying theory. However all models have in common one dependent variable, which determines the users intention to use the specific technology. In order to determine the emotions' role on the use of mobile services, this SLR aimed to analyse which relations between the emotional factors and the users' intention to use mobile services are valid. This is summarized in the following research question:

> RQ4: do emotions in fact significantly influence the acceptance of mobile services?

The results of this study review the emotional factors and causal relations that are involved in mobile services acceptance research. Using these results, this review wants to determine if the findings can be used to define a causal model that extends an established one (e.g., TAM, UTAUT, and TPB).

> RQ5: can the obtained SLR data be used to extend an established IT acceptance model?

2.2. The Search Process. The aim of the search process was to identify journal articles that investigate mobile services acceptance with a focus on emotional factors. The SLR search process was conducted between September 18 and September 24, 2016, via an electronic search by using online scientific databases. The search string that was used in this study was acquired from our previous work [22]. Although the focus of this SLR was to review emotional acceptance factors, we did not want to limit the results by extending the search string. By doing this, we could also observe the proportion of articles that use at least one emotional factor against all articles in the field of mobile services acceptance. The search string that was used to identify articles was defined as follows:

> (Acceptance OR Adoption OR Acceptance Model OR Behavioural Intention to Use) AND (Mobile OR Services OR Mobility OR Mobile Services)

The search string was limited by searching only for journal articles as they obtain validated empirical results. Therefore, all other types of studies were excluded in the initial search. Other search limitations were not applied. Within all electronic databases (Table 1), a structurally and semantically uniform search string was used, although in some cases it had to be adapted to fulfil the syntax requirements of the given database search engine.

2.3. Study Selection. The initial search returned an extensive number of results (65178), which were further examined via the six stage-based articles exclusions process:

(1) Exclusion based on the subject area (i.e., Computer Science)

(2) Exclusion based on the title

Table 1: Electronic databases used in SLR.

Online database	URL
ScienceDirect	http://www.sciencedirect.com/
Springerlink	http://link.springer.com/
Web of Science	https://apps.webofknowledge.com
IEEExplore	http://ieeexplore.ieee.org/
ACM Digital Library	http://dl.acm.org/
Scopus	https://www.scopus.com/
Emerald Insight	http://www.emeraldinsight.com/

(3) Exclusion based on the availability of the study (we removed articles with limited or no accessibility)

(4) Exclusion based on removing duplicate articles and linguistically unusable articles (e.g., removed articles not written in English language)

(5) Exclusion based on the content of abstract and conclusions

(6) Exclusion based on inclusion and exclusion criteria

2.4. Inclusion and Exclusion Criteria. The articles which were part of this study included the following topics:

(i) Empirical research articles published in journals

(ii) Empirical research articles that analysed the acceptance of mobile services from a user's viewpoint that included the acceptance model and an empirical validation of the selected model

(iii) Empirical research that included at least one emotional factor

(iv) Empirical research articles that explored the voluntary use of mobile services

It has to be stressed that we also included articles where a literature review was one of their elements for the purpose of using them as a standing point for extending this review.

Articles excluded from the further review incorporated topics such as the following:

(i) Empirical research that does not include the topic of mobile services acceptance

(ii) Articles that do not include the empirical validation of the research results

(iii) Articles that research exclusively the continued use intention, future use intention, and postadoption behaviour

(iv) Articles that do not include emotional factors

(v) Articles that address research of the acceptance of mobile services via mandatory use

2.5. Quality Assessment. Articles, which passed previous SLR phases, were further evaluated by posing the following quality assessment questions:

QA1: is the emotional viewpoint on acceptance properly defined?

QA2: does the research include a description of analysed factors involved in mobile service acceptance?

QA3: does the research explore mobile services acceptance with the help of an established acceptance model?

QA4: does the research refer to similar studies?

In line with above quality assessment questions the following values were defined:

(i) QA1: Y (yes): the emotional viewpoint is explicitly defined as a focus or one of the viewpoints of the research; P (partly): the emotional viewpoint is presented and referred to when presenting the causal model or reviewing the results; N (no): emotional viewpoint is presented only in the form of factors used in the causal model.

(ii) QA2: Y (yes): all constructs are defined, and their definition is provided together with the decision to use that certain construct; P (partly): at least half of the constructs are defined together with the definition and the decision to use the construct; N (no): none of the constructs are defined or the decision to use them is not provided.

(iii) QA3: Y (yes): the article explored acceptance using an acceptance model; therefore a model or assortment of models that constitute a model are defined and the decision for choosing the selected model is provided; P (partly): the article explored acceptance towards using an acceptance model; therefore a model or assortment of models that constitute a model are defined but the decision for choosing the selected model was not provided; N (no): the acceptance model is not explicitly defined by the means of accepted models (it is assembled using various factors).

(iv) QA4: Y (yes): the research lists similar studies and puts the study in the frame of the field focus; P (partly): the research lists similar studies but does not place its study in the frame of the field focus; N (no): the research does not refer to similar studies.

Selected articles were assessed by using the numerical function, defined by Kitchenham et al. [70]. The quality score for each question was defined as Y = 1, P = 0.5, and N = 0 or Unknown (the information is not specified). The scoring of articles helped to assess the quality of the primary studies for our literature review and provided us with a mean of weighting the importance of individual studies when summarizing the results. It also helped to provide more detailed inclusion/exclusion criteria [69].

2.6. Data Collection. The data extracted from the selected articles was focused on factors and the relations between them. The obtained relational data model, which was used for raw (i.e., extracted) data manipulation, is presented in Figure 2.

The structure of the extracted data (Figure 2) includes basic research study information including corresponding authors. An important part of obtained data was investigated

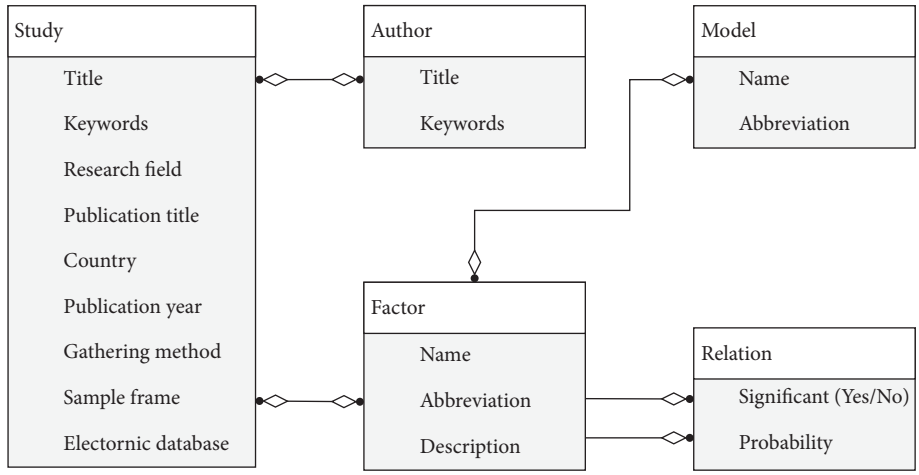

Figure 2: Diagram of extracted data.

factors and their causal relationships. Besides, the underlying theory (i.e., model) was identified.

In accordance with the guidelines, defined by Kitchenham and Charters [69], the extraction process was performed by one of the researchers. Meanwhile, another researcher checked the extraction results. If a disagreement between the researchers occurred, the article content was discussed and after the agreement was made, the extraction of data was repeated.

3. Results

The following section summarizes the results of the performed SLR. The first section represents results of the search process that provided us with the list of primary studies which have also undergone a quality evaluation.

3.1. Search Results. The search process resulted in 43 primary studies. The final number of selected studies was given after the study selection process (described in Sections 2.2–2.4) was completed. It is important to highlight that only 26% of all articles (those that satisfied all conditions prior to applying the exclusion criteria based on emotional factors (43 out of 166)) included emotional factors. The detailed study selection can be seen in Table 2. For each electronic database, the same search process was performed, although some exceptions had to be made in specific databases as discussed in Section 2.2. In the case of IEEExplore and Emerald databases, the elimination based on the subject area could not be performed as the databases do not support filtration by the "Computer Science" category.

The data extracted from 43 selected studies is shown in Table 3. For each article, the table provides study's author, publication, year of publication, research field that defines the mobile service category analysed in the study (having been determined by the definitions presented in Section 1), data gathering method, sample frame, and focal theory (i.e., base acceptance model).

From the listed literature shown in Table 3, it is clear that majority of the studies (28 out of 43) were published in the last four years, which highlights the novelty of the research field. It is also evident that TAM is the focal theoretical model when researching the acceptance of mobile services in light of emotional factors. All of the studies used a survey to gather empirical data, which supports the fact that the survey is the leading mean to gather data in the field of mobile service acceptance.

3.2. Quality Evaluation of Articles. 43 studies, which passed inclusion and exclusion criteria, were additionally put through the process of quality assessment. Each study was assessed by answering the four quality analysis questions, which were presented in Section 2.5. As previously mentioned, the maximum number of achievable points for each of the questions was 1, with a total of 4 points for all questions. For example, the S1 study was evaluated with 3.5 points, with the following assessments: (1) Q1 was partly satisfied (0.5 points), as the emotional viewpoint was only presented and referred to when presenting the causal model; (2) Q2 was satisfied (1 point) in line with article providing with factors' definitions together with the decision to use that certain construct; (3) Q3 was satisfied (1 point) due to the article exploring acceptance using an acceptance model (TAM) with addition to providing a decision for choosing the selected model; (4) Q4 was satisfied (1 point), as research listed related works in addition to putting the study in the frame of the field focus. The overall results of the quality evaluation are presented in Table 4.

Table 4 shows the quality analysis of all 43 primary studies, including the answer for each of the quality analysis questions and the total score for each article. The results show that the overall average quality of the investigated studies was 2.43. Figure 3 also shows an average quality of the studies published in a particular year.

As evident from Figure 3 the average quality of the studies published in the particular year was 2.43. A significant decline

Table 2: Search process.

	Number of articles						
	Initial results	Topic: "Computer Science"	Title	Access	Removed duplicates and non-English articles	Abstract and conclusion	Inclusion/exclusion criteria
ScienceDirect	5226	1348	158	157	151	105	21
Springerlink	17152	2045	48	47	47	37	9
Web of Science	23092	2039	123	98	60	32	6
IEEExplore	983	983	4	4	4	2	0
ACM Digital Library	553	553	77	44	14	6	0
Scopus	14517	4764	344	173	79	44	5
Emerald	3655	3655	41	36	26	19	2
Summary	65178	15387	795	559	381	248	43

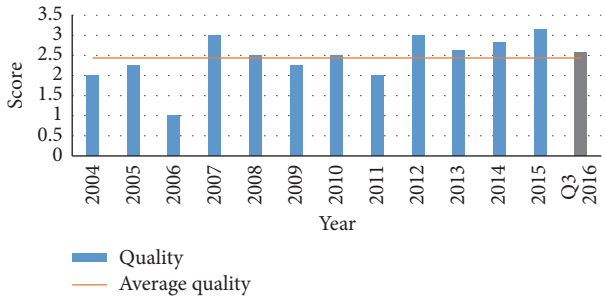

Figure 3: Quality of articles.

in the quality of articles can only be observed in the year 2006, with an average score of 1. However these results are not representative since only one relevant article was published in 2006. A relatively small average quality of the articles can also be attributed to the first quality assessment question that inquired about the references to emotional impacts on technology acceptance. The results show that only three articles completely satisfied the condition where twelve articles partly satisfied the condition. The remaining 28 did not satisfy the condition of the first quality assessment question. All of the primary studies met the requirements of this SLR; therefore further exclusion of any primary studies was not performed.

4. Discussion

In the following sections we provided answers to the stated research questions. Each subsection in this section presents an answer to one of the research questions in the structure where firstly we explain the method of obtaining the results, followed by the results and their interpretation.

4.1. Which Emotional Factors Exist in the Field of Mobile Services Acceptance? As already noted in Section 1 emotional factors play an important role in IT acceptance research; therefore one of the goals of this SLR was to find which of those emotional factors are being used in the field mobile data services. For that purpose, we examined articles to determine which emotional factors and to what extent are being used. The results can be observed in Table 5.

Out of all emotional factors presented in Section 1 the performed SLR resulted in seven emotional factors that were used in mobile services acceptance research. Out of seven, three pertain to achievement emotions (Enjoyment, Satisfaction, and Pleasure), three to challenge (Flow, Playfulness, and Arousal), and one to deterrence (Anxiety). According to this, we can conclude that most of the emotional factors belong to the opportunity section of the framework for classifying emotions (Figure 1). In addition to those emotional factors, our review resulted in two additional factors: Irritation and Dominance. The combined nine factors occurred 51 times out of all 320, which represents 16% of all factors. Given the proportion of emotional factors to all factors, we can determine that emotional factors play a relatively minor role in mobile services acceptance research. The most frequent emotional factor was Enjoyment (in 43% of all emotional factors), which is also a standard factor in TAM3 [8]. Enjoyment was followed by Satisfaction (21%), Flow (12%), Anxiety (10%), and Playfulness (6%).

4.2. How Active Is the Research of the Emotional Impacts on the Acceptance of Mobile Services? Our search process was not limited to the specific time of publishing; therefore the data obtained is only limited by the results of performed SLR. This study wanted to investigate the trends of observing emotions in relation to mobile services acceptance. Figure 4 shows the number of publications per year.

The examination of reviewed articles shows that emotional constructs in the context of mobile service research initially appeared in 2004. This correlates with the advancement of mobile networks that allowed increased capacity for voice and data traffic, reducing costs, and increasing data speeds for the delivery of sophisticated new mobile services [71]. But it was not until the year 2013 when emotional

Table 3: Systematic review studies.

ID [source]	Author	Publication	Publication year	Gathering data	Sample frame	Base acceptance model
S1 [26]	Mac Callum et al.	Computers in Human Behavior	2014	Survey	413	TAM
S2 [29]	Chemingui and Ben Lallouna	International Journal of Bank Marketing	2013	Survey	300	TAM
S3 [30]	Cheng	Journal of Systems and Information Technology	2014	Survey	486	TAM
S4 [31]	Cheong and Park	Internet Research	2005	Survey	1279	TAM
S5 [32]	Chong	Expert Systems with Applications	2013	Survey	376	TAM; UTAUT
S6 [33]	Cimperman et al.	International Journal of Medical Informatics	2016	Survey	400	UTAUT
S7 [34]	Cyr et al.	Information & Management	2006	Survey	60	TAM
S8 [35]	de Kerviler et al.	Journal of Retailing and Consumer Services	2016	Survey	179, 184	Other
S9 [36]	Deng et al.	International Journal of Medical Informatics	2014	Survey	485	TPB
S10 [27]	Ha et al.	Information & Management	2007	Survey	1011	TAM
S11 [17]	Hong et al.	Information Systems Frontiers	2008	Survey	1183	TAM
S12 [37]	Huang et al.	The Electronic Library	2015	Survey	206	ISSM
S13 [38]	Karimi	Computers in Human Behaviour	2016	Survey	130	UTAUT
S14 [19]	Kim et al.	Expert Systems with Applications	2009	Survey	542	TAM
S15 [39]	Kim et al.	Decision Support Systems	2007	Survey	161	TAM
S16 [23]	Kourouthanassis et al.	Pervasive and Mobile Computing	2015	Survey	105	UTAUT
S17 [40]	Lai	Information Systems Frontiers	2004	Survey	150	SERVQUAL; TAM
S18 [41]	Lee and Wong	Procedia-Social and Behavioral Sciences	2016	Survey	2014	ESQUAL
S19 [42]	Lee et al.	Journal of the American Society for Information Science and Technology	2007	Survey	207	TAM
S20 [25]	Lee et al.	Journal of Enterprise Information Management	2015	Survey	538	TAM
S21 [43]	Leong et al.	Computers in Human Behavior	2013	Survey	572	TAM; TRA; TPB; DOI
S22 [44]	Lim et al.	International Journal of Medical Informatics	2011	Survey	175	TAM
S23 [45]	Liu et al.	Internet Research	2015	Survey	271	Other
S24 [46]	Lu and Su	Internet Research	2009	Survey	369	TAM
S25 [47]	Mohammadi	Computers in Human Behavior	2015	Survey	390	TAM; ECT
S26 [48]	Nysveen et al.	Journal of Consumer Marketing	2005	Survey	684	TAM; TRA
S27 [49]	Parreño et al.	Industrial Management & Data Systems	2013	Survey	355	TRA; TAM
S28 [50]	Park and Kim	Telematics and Informatics	2014	Survey	1099	TAM
S29 [51]	Park et al.	Telematics and Informatics	2014	Survey	1409	TAM
S30 [52]	Park and Ohm	Telematics and Informatics	2014	Survey	1109	TAM
S31 [53]	Park et al.	Wireless Personal Communications	2016	Survey	211	TAM
S32 [54]	Su et al.	Computers in Human Behavior	2016	Survey	456	Flow theory
S33 [55]	Verkasalo et al.	Telematics and Informatics	2010	Survey	579	TAM
S34 [56]	Wang et al.	Information Systems and e-Business Management	2013	Survey	192	TAM
S35 [57]	Wang and Li	Internet Research	2012	Survey	497	Other
S36 [58]	Wong et al.	Telematics and Informatics	2015	Survey	271	UTAUT
S37 [59]	Yoon	The Journal of Academic Librarianship	2016	Survey	273	TAM
S38 [60]	Yoon et al.	Information Technology and Management	2015	Survey	396	TAM
S39 [61]	Zhou	Online Information Review	2011	Survey	229	TAM; ISSM
S40 [62]	Zhou	Information Technology and Management	2012	Survey	200	TAM; TRA
S41 [63]	Zhou	Electronic Commerce Research	2013	Survey	278	TAM; TRA
S42 [64]	Zhou	Personal and Ubiquitous Computing	2013	Survey	231	UTAUT; TAM
S43 [65]	Zhou	Personal and Ubiquitous Computing	2013	Survey	285	TAM; IDT; TTF; UTAUT

Table 4: Quality evaluation of studies.

Study	QA1	QA2	QA3	QA4	Total score
S1	P	Y	Y	Y	3,5
S2	P	Y	P	P	2,5
S3	N	P	Y	Y	2,5
S4	N	Y	Y	P	2,5
S5	N	Y	P	Y	2,5
S6	P	P	Y	Y	3
S7	N	P	P	N	1
S8	N	P	N	Y	2
S9	N	P	Y	Y	3
S10	Y	P	Y	Y	3,5
S11	N	P	Y	Y	2,5
S12	P	Y	P	Y	3
S13	Y	P	P	Y	3
S14	N	P	Y	Y	2,5
S15	N	N	P	P	2
S16	P	P	P	Y	2,5
S17	Y	Y	P	Y	3,5
S18	N	Y	Y	Y	3
S19	P	Y	Y	Y	3,5
S20	N	P	Y	Y	2,5
S21	N	Y	Y	Y	3
S22	N	N	Y	P	1,5
S23	P	Y	P	Y	3
S24	P	P	Y	P	2,5
S25	N	Y	Y	Y	3
S26	N	P	Y	P	2
S27	N	Y	Y	P	2,5
S28	N	Y	Y	Y	3
S29	N	Y	Y	P	2,5
S30	N	P	Y	P	2
S31	P	Y	Y	P	3
S32	N	P	P	Y	2
S33	N	Y	Y	P	2,5
S34	N	P	Y	P	2
S35	P	Y	Y	P	3
S36	N	Y	Y	Y	3
S37	N	Y	Y	Y	3
S38	N	Y	Y	Y	3
S39	N	Y	Y	P	2,5
S40	N	Y	Y	Y	3
S41	N	Y	Y	Y	3
S42	N	Y	Y	P	2,5
S43	N	Y	Y	P	2,5

factors became more widely used in studies, which correlates with the advancement of mobile technologies in recent years. It is predicted that, by 2018, 50 percent of consumers in mature markets will use smartphones or wearables for mobile payments [72].

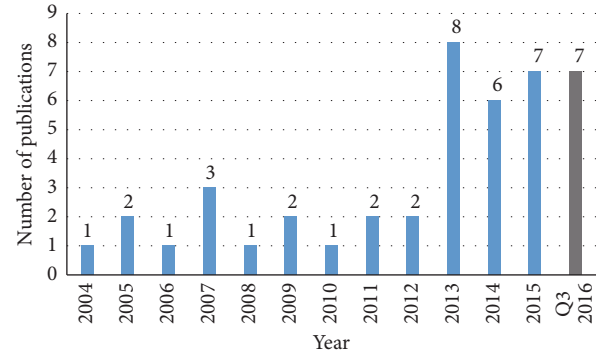

Figure 4: Number of publications per year.

4.3. Which Causal Relations That Include Emotional Factors Can Be Observed and Which of Them Are the Most Significant? The aim of this study was also to find the causal relations that include emotional factors. In the case of this analysis the previously listed nine factors were used and the relation between them was examined. The SLR resulted in 166 causal relations, where in many cases the relations were reoccurring, so they had to be summarized. Besides, since studies use different theoretical models to determine the acceptance of mobile services, the resulting relations obtained from these studies reveal corresponding factors from different theoretical models. These cases were gathered and merged into one relation on the basis of following rules.

The behavioural intention to use, use intention, user adoption, adoption behaviour, adoption intention, and similar constructs all present the dependent variable of many acceptance models that describe the user intention to adopt and use the technology. Similarly as noted by Venkatesh et al., there are five constructs, found in various models that pertain to Performance Expectancy: (1) Perceived Usefulness (TAM/TAM2), (2) Extrinsic Motivation (MM), (3) Job-Fit (MPCU), (4) Relative Advantage (IDT), and (5) Outcome Expectations (SCT) [73]. Three constructs from the existing models capture the concept of Effort Expectancy: (1) Perceived Ease of Use (TAM/TAM2), (2) Complexity (MPCU), and (3) Ease of Use (IDT). Social Influence as a direct determinant of behavioural intention is represented as (1) Subjective Norm in TRA, TAM2, TPB/DTPB, and C-TAM-TPB, (2) Social Factors in MPCU, and (3) Image in IDT. In the case of the Facilitating Conditions, Venkatesh et al. also define the construct in that it captures concepts embodied by three different constructs: (1) Perceived Behavioural Control (TPB/DTPB, C-TAM-TPB), (2) Facilitating Conditions (MPCU), and (3) Compatibility (IDT) [2].

After the data was aggregated, the search process resulted in 89 different relations. Table 6 shows the list of relations, the number of studies that examined the relation, lower, upper, and median of the relation's significance, the difference between the number of significant and nonsignificant relations, and the percentage of significant relations against the nonsignificant ones. As additional data we also provided studies' sample sizes (lower, upper, cumulative, and average sample size). The data representation is adopted and extended

Table 5: Emotional factors found in mobile services acceptance articles.

Factor	Abbreviation	Description	Emotion classification	Number of occurrences
Enjoyment	PE; E	The extent to which the activity of using a particular system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use [1].	Achievement	22
Satisfaction	PSat; Sat	Satisfaction reflects an accumulative feeling developed during multiple interactions with mobile service providers. Satisfaction can also reflect a gap between perceived performance and expectation [61].	Achievement	11
Flow	FS; F	Flow is defined as a holistic sensation that people feel when they act with total involvement [66].	Challenge	6
Anxiety	TA; TAx; Ax; ICTA	The feeling of apprehension or anxiety that one experiences [2].	Deterrence	5
Playfulness	Play; PP	The degree of spontaneity in microcomputer interactions [12].	Challenge	3
Arousal	Ar	The degree to which a user feels excited or stimulated [67].	Challenge	1
Pleasure	Ple	The degree to which a user feels good or happy [67].	Achievement	1
Dominance	Dom	The controlling and dominant nature of the emotion [68].	/	1
Irritation	Irr	The state of feeling annoyed, impatient, or slightly angry (Oxford dictionary).	/	1

from the Zhang et al. study of mobile commerce adoption [74].

The analysis confirms that Enjoyment is one of the most used factors as it is the most represented factor in the analysis of relations. The results also show that in many cases there is only one occurrence of a certain relation, which suggests that the use of emotional factors in mobile services acceptance at the moment does not play a significant role in the field of mobile services acceptance. This study observed emotional factors as independent or dependent variables. Emotional factors in the role of a dependent variable were used in 57 cases and independent in 30 cases. Out of all cases, there were also two where the relation conformed with only emotional variables (Perceived Enjoyment (PE) in relation to Satisfaction (Sat) and Flow State (FS)). This suggests that researchers focused more on the impacts that different factors have on emotions than on how emotions impact the use intention itself. Out of 89 cases, there were only 8 cases where a relation proved insignificant, which suggests that users' emotions influence different aspects that are involved in acceptance of mobile services and also the acceptance of technology itself.

4.4. Do Emotions In Fact Significantly Impact the Acceptance of Mobile Services? Although there were many cases where a relation between factors occurred only once, our study wanted to observe how significant relations that included emotional factors were. In order to determine the influence of emotional factors on the acceptance of mobile services, we extracted only the relations where an emotional factor was used in relation with behavioural intention to use (BI). For each of the relations we provide information in the following form:

$$N_s = X_1,$$
$$N_n = X_2, \quad (1)$$
$$(X_3, X_4, X_5),$$

where X_1 (N_s) represents the number of instances where the relation is validated as significant, X_2 (N_n) conforms to the number of instances where the relation is insignificant, X_3 conforms to the minimum recorded significance value, X_4 conforms to the maximum recorded significance value, and X_5 represents the median of all recorded significance values for the specific relation. The defined relation information is hereinafter used in all similar data presentations. The results can be observed in Figure 5.

The review provided seven relations where researchers studied a direct relation between emotional factors on behavioural intention to use a mobile service: Perceived Enjoyment (PE), Satisfaction (Sat), Flow/Flow State (FS), Anxiety (Ax), Playfulness (Play), Arousal (Ar), and Pleasure (Ple). The observation of the data shows that although some of the relations were represented only in one case, all cases were proven significant, which points to the fact that emotions are an important aspect to consider when researching mobile services acceptance. Therefore the developers and providers of such services should consider users' emotional state of mind in order to achieve their acceptance.

4.5. Can the Obtained SLR Data Be Used to Extend an Established IT Acceptance Model? The search process carried out by the SLR resulted in the relations consisting of emotional

Table 6: Most used relations between factors.

Relation	Number of studies	Corr. (lower)	Corr. (upper)	Corr. (median)	Number of sig	Number of nonsig	Sig %	Sample size (lower)	Sample size (upper)	Cumulative sample size	Average sample size
PE→BI	22	0.076	0.61	0.3	22	0	100%	60	1409	10105	459.3181818
PE→A	9	0.18	0.462	0.26	9	0	100%	684	1409	9703	1078.111111
Sat→BI	8	0.22	0.47	0.379	8	0	100%	150	1409	4836	604.5
SI→PE	7	0.27	0.69	0.5	7	0	100%	211	579	3685	526.4285714
PBC→PE	6	0.34	0.66	0.485	6	0	100%	579	579	3474	579
FS→BI	5	0.24	0.33	0.28	5	0	100%	200	1109	2103	420.6
Play→BI	5	0.15	0.524	0.451	5	0	100%	130	1279	1799	359.8
PEOU→Sat	4	0.151	0.54	0.245	4	0	100%	192	538	1349	337.25
PU→Sat	4	0.13	0.34	0.191	4	0	100%	192	538	1349	337.25
PEOU→FS	3	0.21	0.377	0.27	3	0	100%	200	1011	1442	480.6666667
T→FS	3	0.18	0.51	0.19	3	0	100%	200	285	763	254.3333333
Play→A	2	0.155	0.376	0.2655	2	0	100%	538	1279	1817	908.5
Ax→BI	2	−0.16	−0.14	−0.15	2	0	100%	369	485	854	427
CO→FS	2	0.29	0.35	0.32	2	0	100%	278	285	563	281.5
SA→FS	2	0.16	0.16	0.16	1	1	50%	200	285	485	242.5
MS→PE	2	0.33	0.7307	0.53035	2	0	100%	271	369	640	320
PCost→PE	2	−0.274	−0.169	−0.2215	2	0	100%	542	542	1084	542
Ax→PEOU	2	0.61	0.61	0.61	1	1	50%	400	413	813	406.5
PE→PEOU	2	0.347	0.371	0.359	2	0	100%	211	211	422	211
PE→PU	2	0.21	0.359	0.2845	2	0	100%	192	1011	1203	601.5
PE→PV	2	0.196	0.253	0.2245	2	0	100%	161	271	432	216
PE→Sat	1	0.28	0.28	0.28	2	0	100%	192	192	384	192
PE→FS	1	0.487	0.487	0.487	2	0	100%	1011	1011	2022	1011
FS→A	1	0.222	0.222	0.222	1	0	100%	1011	1011	1011	1011
Irr→A	1	−0.15	−0.15	−0.15	1	0	100%	355	355	355	355
Sat→A	1	0.327	0.327	0.327	1	0	100%	1109	1109	1109	1109
Ax→AICTL	1	0	0	0	0	1	0%	413	413	413	413
Ax→AML	1	0	0	0	0	1	0%	413	413	413	413
PEOU→Ar	1	0	0	0	0	1	0%	105	105	105	105
PU→Ar	1	0.296	0.296	0.296	1	0	100%	105	105	105	105
Sat→AU	1	0.28	0.28	0.28	1	0	100%	390	390	390	390
MS→Ax	1	−0.44	−0.44	−0.44	1	0	100%	369	369	369	369
PE→BAs	1	0.36	0.36	0.36	1	0	100%	497	497	497	497
PE→BAw	1	0.41	0.41	0.41	1	0	100%	497	497	497	497
Ar→BI	1	0.223	0.223	0.223	1	0	100%	105	105	105	105
Ple→BI	1	0.257	0.257	0.257	1	0	100%	105	105	105	105
Ax→BICTL	1	0	0	0	0	1	0%	413	413	413	413
PE→BL	1	0.67	0.67	0.67	1	0	100%	497	497	497	497
Sat→Comm	1	0.528	0.528	0.528	1	0	100%	214	214	214	214
PE→CUI	1	0.324	0.324	0.324	1	0	100%	542	542	542	542
PEOU→Dom	1	0.269	0.269	0.269	1	0	100%	105	105	105	105
PU→Dom	1	0.301	0.301	0.301	1	0	100%	105	105	105	105
ConnQ→FS	1	0.24	0.24	0.24	1	0	100%	231	231	231	231
ContQ→FS	1	0.45	0.45	0.45	1	0	100%	231	231	231	231
PI→FS	1	0.13	0.13	0.13	1	0	100%	200	200	200	200

Table 6: Continued.

Relation	Number of studies	Corr. (lower)	Corr. (upper)	Corr. (median)	Number of sig	Number of nonsig	Sig %	Sample size (lower)	Sample size (upper)	Cumulative sample size	Average sample size
Ub→FS	1	0.26	0.26	0.26	1	0	100%	200	200	200	200
UConn→FS	1	0.1	0.1	0.1	1	0	100%	285	285	285	285
En→Irr	1	0	0	0	0	1	0%	355	355	355	355
PU→Irr	1	−0.31	−0.31	−0.31	1	0	100%	355	355	355	355
PE→MS	1	0.53	0.53	0.53	1	0	100%	369	369	369	369
Sat→NB	1	0.484	0.484	0.484	1	0	100%	206	206	206	206
Chal→PE	1	0.259	0.259	0.259	1	0	100%	456	456	456	456
Com→PE	1	0.183	0.183	0.183	1	0	100%	486	486	486	486
Conf→PE	1	0.49	0.49	0.49	1	0	100%	192	192	192	192
Conv→PE	1	0.32	0.32	0.32	1	0	100%	396	396	396	396
CP→PE	1	0.17	0.17	0.17	1	0	100%	396	396	396	396
DA→PE	1	0.55	0.55	0.55	1	0	100%	60	60	60	60
EOA→PE	1	0.36	0.36	0.36	1	0	100%	369	369	369	369
HI→PE	1	0.196	0.196	0.196	1	0	100%	456	456	456	456
Iden→PE	1	0.16	0.16	0.16	1	0	100%	396	396	396	396
PA→PE	1	0.178	0.178	0.178	1	0	100%	1011	1011	1011	1011
PCS→PE	1	0.577	0.577	0.577	1	0	100%	1409	1409	1409	1409
PMR→PE	1	0.25	0.25	0.25	1	0	100%	207	207	207	207
SInt→PE	1	0.154	0.154	0.154	1	0	100%	456	456	456	456
Skill→PE	1	0.18	0.18	0.18	1	0	100%	456	456	456	456
ContQ→Play	1	0.146	0.146	0.146	1	0	100%	1279	1279	1279	1279
IE→Play	1	0.152	0.152	0.152	1	0	100%	1279	1279	1279	1279
PEOU→Play	1	0.539	0.539	0.539	1	0	100%	1279	1279	1279	1279
PEOU→Ple	1	0.258	0.258	0.258	1	0	100%	105	105	105	105
PU→Ple	1	0.358	0.358	0.358	1	0	100%	105	105	105	105
PE→PQ	1	0.33	0.33	0.33	1	0	100%	497	497	497	497
Ax→PU	1	0	0	0	0	1	0%	413	413	413	413
FS→PU	1	0.38	0.38	0.38	1	0	100%	285	285	285	285
A→Sat	1	0.63	0.63	0.63	1	0	100%	538	538	538	538
AU→Sat	1	0.462	0.462	0.462	1	0	100%	206	206	206	206
Conf→Sat	1	0.24	0.24	0.24	1	0	100%	192	192	192	192
Eff→Sat	1	0.544	0.544	0.544	1	0	100%	214	214	214	214
Empathy→ Sat	1	0.15	0.15	0.15	1	0	100%	150	150	150	150
Full→Sat	1	0.146	0.146	0.146	1	0	100%	214	214	214	214
InfQ→Sat	1	0.199	0.199	0.199	1	0	100%	206	206	206	206
PM→Sat	1	0.487	0.487	0.487	1	0	100%	1109	1109	1109	1109
Pri→Sat	1	0.17	0.17	0.17	1	0	100%	214	214	214	214
PV→Sat	1	0.627	0.627	0.627	1	0	100%	150	150	150	150
SAv→Sat	1	0.165	0.165	0.165	1	0	100%	214	214	214	214
SDQ→Sat	1	0.276	0.276	0.276	1	0	100%	1109	1109	1109	1109
SysQ→Sat	1	0.235	0.235	0.235	1	0	100%	206	206	206	206
T→Sat	1	0.45	0.45	0.45	1	0	100%	229	229	229	229
Tangibles→ Sat	1	0.17	0.17	0.17	1	0	100%	150	150	150	150
Sat→T	1	0.863	0.863	0.863	1	0	100%	214	214	214	214

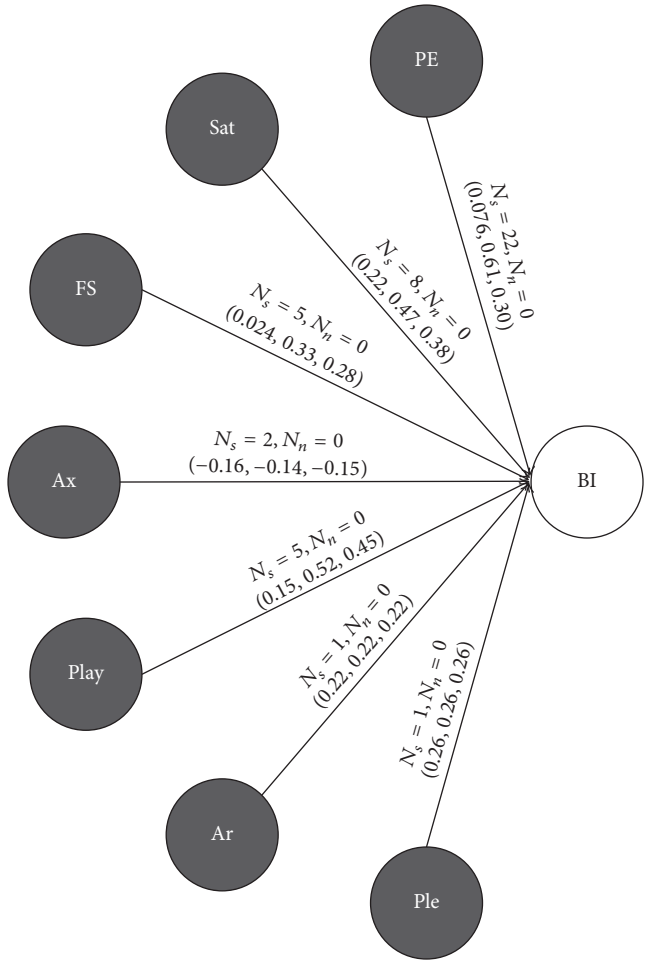

Figure 5: The impact of emotions on behavioural intention to use mobile services.

factors that influence the acceptance of mobile services. The data about relations was used to examine the possibility of constructing an acceptance model, extending one of the established causal models for the purpose of researching the influence of emotion on the acceptance of mobile services. To ensure the reliability of the proposed model, only significant relations that occurred at least twice were used. To display the relations' data, the form defined in Section 4.4 was used, although it was modified to show only the number of significant relations. The resulting model can be observed in Figure 6.

The constructed model consists of 16 factors and 20 relations. Out of nine emotional factors observed in the SLR, the constructed model consists of five: Perceived Enjoyment (PE), Satisfaction (Sat), Playfulness (Play), Anxiety (Ax), and Flow/Flow State (FS). As the model is constructed by using the relations that include emotional factors it also includes relations to factors that do not further influence any dependent factors.

As the goal for the generation of a proposed model was to identify the possibility of extending one of the established acceptance models for the purpose of researching the influence of emotions on acceptance of mobile services, the factors in relations were observed from the viewpoint of causal models presented in Section 1. This was reasonable to determine which of any causal models could present a basis for the proposed acceptance model. The results are presented in Table 7.

The data in Table 7 shows that from all the causal models observed in this study, TAM3 is the most represented (7 factors), since it already includes factors such as Perceived Enjoyment, Anxiety and Playfulness. This correlates with the finding that TAM is the most used base theoretical model in the field. Since TAM3 includes a number of factors that were not observed in correlation with mobile data services acceptance, we have chosen initial TAM as a basis for our conceptual model. The proposed model was constructed by using the relations pertaining to the technology acceptance model (dashed lines) and the relations observed in our study (Figure 7).

The proposed model includes nine factors, out of which five are emotional factors. In regard to the framework for classifying emotions, presented in Section 1, the theoretical model includes two achievement emotions (Enjoyment and Satisfaction), two challenge emotions (Flow and Playfulness), and one deterrence emotion (Anxiety). The proposed model

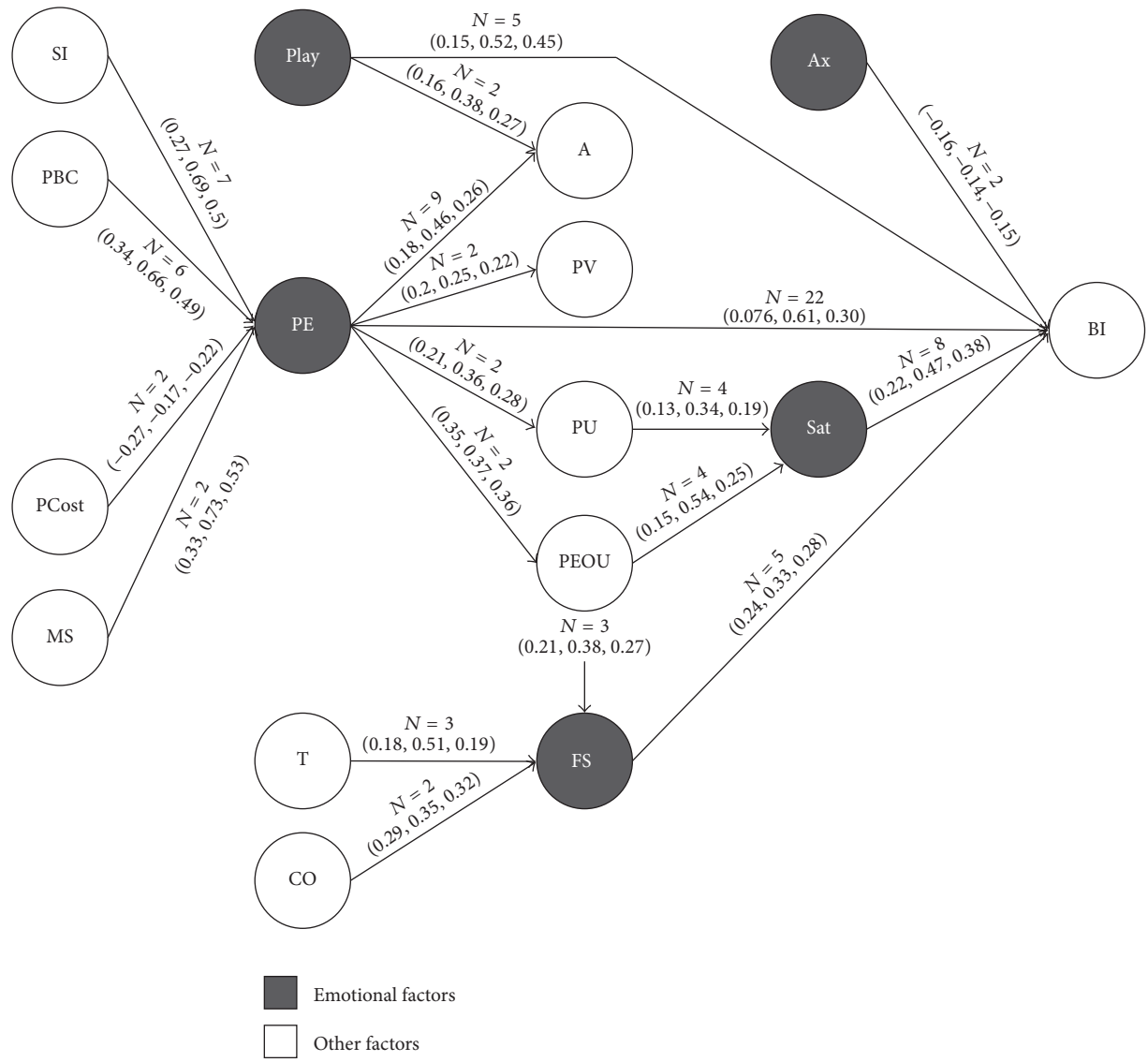

Figure 6: Causal model consisting of relations that use emotional factors.

was compared to the research results from the broad field of IT acceptance. The results show that the proposed model shares all emotional factors with the TAM3 model (Playfulness, Anxiety, and Enjoyment), varying only in the dependent factor of certain relations. Enjoyment seems prevalent in influencing the acceptance of IT, since it was found significant in several works regarding IT acceptance [13, 75, 76]. The same applies to Anxiety [11, 77] and Satisfaction, which positively impacts the acceptance or continued use of IT [78, 79]. The same cannot be confirmed for the Playfulness and Flow State factors. Both were proven to significantly impact IT acceptance in some cases (Playfulness [76, 80], Flow State [81, 82]) and insignificant in others (Playfulness [75], Flow State [83]). The comparison showed that, in majority (60%) of relations based on emotions, the proposed model aligns with the broader field of IT acceptance. Furthermore, as the relations used in the construction of the proposed model were only those that were significant and used at least twice, the resulted model is in relation to certain relations somewhat limited by the number of studies that support it. This can contribute to the validity of the specified relation. The proposed model could serve as a starting point for authors researching the field. Although the model is assembled by using validated relations, it has to be treated as a proposed model which needs further investigation and validation.

5. Conclusions

This systematic literature review (SLR) was aimed at researching emotional factors and their influence on acceptance of mobile services. From the initial search results that returned 65178 articles, this SLR analysed 43 primary studies. Primary studies were used to determine which emotional factors are used in the field of mobile services acceptance research and what was the extent of their use over the years. Afterward the review focused on exploring relations that include emotional

Table 7: Factors used in the model in relation to established acceptance models.

Factors	Causal models							
	TAM	TAM2	TAM3	UTAUT	IDT/DOI	TPB	TRA	TTF
Perceived Enjoyment (PE)	/	/	Yes	/	/	/	/	/
Satisfaction (Sat)	/	/	/	/	/	/	/	/
Flow/Flow State (FS)	/	/	/	/	/	/	/	/
Anxiety (Ax)	/	/	Yes	/	/	/	/	/
Playfulness (Play)	/	/	Yes	/	/	/	/	/
Social Influence (SI)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	/
Perceived Behavioral Control (PBC)	/	/	/	/	/	Yes	/	/
Perceived Cost (PCost)	/	/	/	/	/	/	/	/
Mobile Skillfulness (MS)	/	/	/	/	/	/	/	/
Attitude (A)	Yes	/	/	/	/	Yes	Yes	/
Perceived Value (PV)	/	/	/	/	/	/	/	/
Perceived Usefulness (PU)	Yes	Yes	Yes	Yes	Yes	/	/	/
Perceived Ease of Use (PEOU)	Yes	Yes	Yes	Yes	Yes	/	/	/
Trust (T)	/	/	/	/	/	/	/	/
Contextual offerings (CO)	/	/	/	/	/	/	/	/
Behavioral intention (BI)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	5	**4**	**7**	**4**	**4**	**4**	**3**	**1**

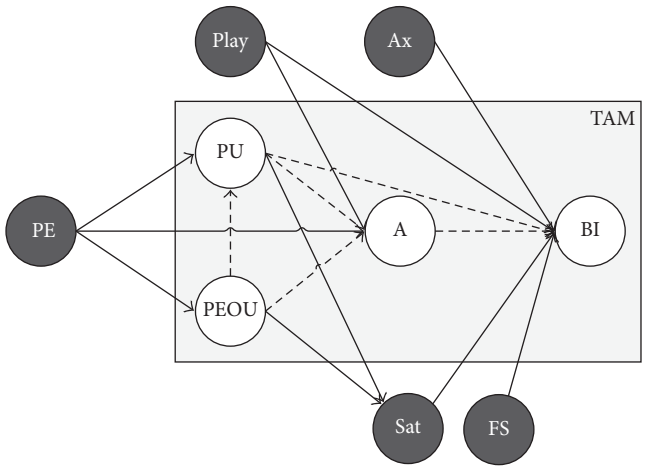

Figure 7: Proposed acceptance model.

factors to determine the frequency of their use, significance value, and the percentage of significant relations in relation to nonsignificant ones. In addition, the identified causal relations were used to observe the direct influence of emotional factors on behavioural intention to use mobile service in order to determine the viability of emotions in mobile service acceptance research. All data analysed in this SLR was finally used to determine the possibility of extending one of the established theoretical models for the purpose of exploring emotional impact on the acceptance of mobile services.

5.1. Research Limitations. Readers of this SLR should interpret our results considering the following limitations. First, this study was designed to research the field of mobile services as broadly as possible. This fact constitutes a limitation as it does not focus on any specific mobile service or mobile service category.

Second, the SLR process was defined in such a way that it excluded all articles that research exclusively the continued use intention, future use intention, or postadoption behaviour. That can present a limitation, as emotions can arise in the postimpact period based on the user's assessment of the personal meaning and significance of the new IT for the long term [11]. Also, the search process in this SLR was also limited to journal articles only. Both limitations could lead to the fact that some important recent works may not have been included in this review.

In addition to that, the research question RQ5 only addressed the factors and the relations that occurred more than twice in separate studies, to ensure the viability of the results. That represents a limitation, since some of the factors and their relations were excluded from the interpretation.

5.2. Review Results. The results of this review show that research of emotions and their impact on the acceptance of mobile services is quite rare, as out of 43 primary studies only three explicitly focused on that field. In addition, out of 166 studies that were observed prior to introducing the exclusion criteria that observed emotional factors, only 26% of all articles satisfied the condition. Although there are many emotions that can be considered in IT acceptance research (Section 1), there were only nine that were observed in relation to mobile services. These nine factors occurred 51 times out of all 320, which represents 16% of all factors. Given the proportion of emotional factors to all factors, we can determine that emotional factors play a relatively minor role in mobile services acceptance research. The factor that was used in the most cases was Enjoyment, represented as a standard factor in TAM3 (22 cases). Enjoyment was followed

by Satisfaction (11 cases), Flow (6 cases), Anxiety (5 cases), Playfulness (3 cases), and others that occurred only once (Arousal, Dominance, Irritation, and Pleasure).

Studies that included emotional factors were observed also from the viewpoint of their publication date in order to determine the activity in the field. Although the search process applied no limitation regarding the publication date, the activity in observing emotions in regard to mobile service acceptance is increasing. Since 2004, when the first relevant study analysed in this review was presented, the amount of research in the field expanded rapidly from the year 2013.

The aim of this SLR was primarily to discover and observe the causal relations that include emotional factors. The search provided 166 causal relations, where in many cases the relations were reoccurring. After the aggregation of duplicates the process resulted in 89 different relations. For each of the relations we provided the significance percentage value that represents the number of studies that confirmed the significance of the particular relation, versus the ones that did not. This percentage can be used as a guideline to influence the decision to use the particular relation in mobile service acceptance analysis. The analysis also observed the role of emotional factors in causal models. Emotional factors as dependent variables were used in 57 cases, where independent factors were used in 30 cases. There were also two cases where the relation conformed to only emotional variables. This suggests that researchers focused more on the impacts that different factors have on emotions than how emotions impact the use intention itself. It is also important to note that, out of all cases, there were only eight cases where a relation proved insignificant, which points to the validity of use of emotional factors in acceptance research.

The causal relations observed in this study also served as a standing point in researching the direct impact of emotions on behavioural intention to use mobile services. Out of nine emotional factors observed in this study there were seven cases where a direct relation could be observed. The results showed that although certain relations were represented only in one case, all the relations proved significant in relation to the intention to use mobile service. Therefore the developers and providers of such services should consider users' emotional state of mind in order to achieve their acceptance.

Based on the gathered data, this SLR also wanted to determine if the data can be used to extend an IT acceptance model. In order to achieve that, all relations that significantly occurred at least twice in separate studies were used to construct a causal model. All factors from that model were observed from the viewpoint of different theoretical models in order to determine the most viable base model. Based on the factors, the most suitable was TAM3 model, which already uses factors such as Perceived Enjoyment, Perceived Playfulness, and Computer Anxiety. As TAM3 model also includes factors that were not observed in relation to mobile services, the decision was made to use TAM as a base theoretical model. The resulting model was compared to different models used in IT acceptance research, which determined that the majority (60%) of emotion based relations align with the broader field of IT acceptance. The resulting model can be used as a guideline or basis for further research.

5.3. Practical Implications and Future Work. Aside from the authors researching the field of mobile services acceptance, the results of this SLR could serve different stakeholders involved in mobile service development and use. The study determines that emotions play a significant role in the stage of accepting and using of mobile services. Therefore the developers could benefit from the results by including these results and consequently develop better mobile services for consumers who would get better products, aimed at better user experience, easier and safer use, and consequently increased overall use of mobile services. Mobile services vendors could also benefit from the results, as they could provide more user-centered offers to their customers.

For the future work we plan to extend this study by including other acceptance periods, such as continued use, future use, and postadoption. In order to provide additional data to support our research results, we also aim to include articles from established conferences. The results of this study also present a basis for our future work, as we plan to research and empirically validate the proposed theoretical model.

Competing Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

References

[1] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly*, vol. 13, no. 3, pp. 319–340, 1989.

[2] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of information technology: toward a unified view," *MIS Quarterly*, vol. 27, no. 3, pp. 425–478, 2003.

[3] I. Ajzen, "The theory of planned behavior," *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179–211, 1991.

[4] M. Fishbein and I. Ajzen, *Belief, Attitude, Intention and Behaviour: An Introduction to Theory and Research*, 1975.

[5] E. M. Rogers, "Diffusion of innovations," in *Elements of Diffusion*, pp. 1–20, 1995.

[6] D. L. Goodhue and R. L. Thompson, "Task-technology fit and individual performance," *MIS Quarterly*, vol. 19, no. 2, pp. 213–233, 1995.

[7] V. Venkatesh, F. D. Davis, and S. M. W. College, "A theoretical extension of the technology acceptance model: four longitudinal field studies," *Management Science*, vol. 46, no. 2, pp. 186–204, 2000.

[8] V. Venkatesh and H. Bala, "Technology acceptance model 3 and a research agenda on interventions," *Decision Sciences*, vol. 39, no. 2, pp. 273–315, 2008.

[9] P. Thagard, J. Gratch, and S. Marsella, "A domain-independent framework for modeling emotion," *Cognitive Systems Research*, vol. 5, no. 4, pp. 269–306, 2004.

[10] R. P. Bagozzi, M. Gopinath, and P. U. Nyer, "The role of emotions in marketing," *Journal of the Academy of Marketing Science*, vol. 27, no. 2, pp. 184–206, 1999.

[11] A. Beaudry and A. Pinsonneault, "The other side of acceptance: studying the direct and indirect effects of emotions on information technology use," *MIS Quarterly: Management Information Systems*, vol. 34, no. 4, pp. 689–710, 2010.

[12] V. Venkatesh, "Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model," *Information Systems Research*, vol. 11, no. 4, pp. 342–365, 2000.

[13] M. Y. Yi and Y. Hwang, "Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model," *International Journal of Human Computer Studies*, vol. 59, no. 4, pp. 431–449, 2003.

[14] M. Koufaris, "Applying the technology acceptance model and flow theory to online consumer behavior," *Information Systems Research*, vol. 13, no. 2, pp. 205–223, 2002.

[15] S. Djamasbi, D. M. Strong, and M. Dishaw, "Affect and acceptance: examining the effects of positive mood on the technology acceptance model," *Decision Support Systems*, vol. 48, no. 2, pp. 383–394, 2010.

[16] W. Read, N. Robertson, and L. McQuilken, "A novel romance: the technology acceptance model with emotional attachment," *Australasian Marketing Journal*, vol. 19, no. 4, pp. 223–229, 2011.

[17] S.-J. Hong, J. Y. L. Thong, J.-Y. Moon, and K.-Y. Tam, "Understanding the behavior of mobile data services consumers," *Information Systems Frontiers*, vol. 10, no. 4, pp. 431–445, 2008.

[18] J. Lu, C. Liu, C.-S. Yu, and K. Wang, "Determinants of accepting wireless mobile data services in China," *Information and Management*, vol. 45, no. 1, pp. 52–64, 2008.

[19] B. Kim, M. Choi, and I. Han, "User behaviors toward mobile data services: the role of perceived fee and prior experience," *Expert Systems with Applications*, vol. 36, no. 4, pp. 8528–8536, 2009.

[20] S. Quan, C. Hao, and Y. Jianxin, "Factors influencing the adoption of mobile service in China: an integration of TAM," *Journal of Computers*, vol. 5, no. 5, pp. 799–806, 2010.

[21] NetLab, *Understanding, Managing and Trouble-Shooting the Evolving Cellular Data Networks*, 2012, http://networking.cs.umn.edu/site/understanding-cellular-data-networks.

[22] B. Ovčjak, M. Heričko, and G. Polančič, "Factors impacting the acceptance of mobile data services—a systematic literature review," *Computers in Human Behavior*, vol. 53, pp. 24–47, 2015.

[23] P. Kourouthanassis, C. Boletsis, C. Bardaki, and D. Chasanidou, "Tourists responses to mobile augmented reality travel guides: the role of emotions on adoption behavior," *Pervasive and Mobile Computing*, vol. 18, pp. 71–87, 2015.

[24] Y. Ding and K. H. Chai, "Emotions and continued usage of mobile applications," *Industrial Management and Data Systems*, vol. 115, no. 5, pp. 833–852, 2015.

[25] C.-Y. Lee, C.-H. Tsao, and W.-C. Chang, "The relationship between attitude toward using and customer satisfaction with mobile application services: an empirical study from the life insurance industry," *Journal of Enterprise Information Management*, vol. 28, no. 5, pp. 680–697, 2015.

[26] K. Mac Callum, L. Jeffrey, and Kinshuk, "Comparing the role of ICT literacy and anxiety in the adoption of mobile learning," *Computers in Human Behavior*, vol. 39, pp. 8–19, 2014.

[27] I. Ha, Y. Yoon, and M. Choi, "Determinants of adoption of mobile games under mobile broadband wireless access environment," *Information and Management*, vol. 44, no. 3, pp. 276–286, 2007.

[28] C. H. Hsiao and K. Y. Tang, "On the post-acceptance of mobile movie-themed games," *Electronic Commerce Research and Applications*, vol. 18, pp. 48–57, 2016.

[29] H. Chemingui and H. Ben Lallouna, "Resistance, motivations, trust and intention to use mobile financial services," *International Journal of Bank Marketing*, vol. 31, no. 7, pp. 574–592, 2013.

[30] Y.-M. Cheng, "Exploring the intention to use mobile learning: the moderating role of personal innovativeness," *Journal of Systems and Information Technology*, vol. 16, no. 1, pp. 40–61, 2014.

[31] J. H. Cheong and M.-C. Park, "Mobile internet acceptance in Korea," *Internet Research*, vol. 15, no. 2, pp. 125–140, 2005.

[32] A. Y.-L. Chong, "A two-staged SEM-neural network approach for understanding and predicting the determinants of m-commerce adoption," *Expert Systems with Applications*, vol. 40, no. 4, pp. 1240–1247, 2013.

[33] M. Cimperman, M. Makovec Brenčič, and P. Trkman, "Analyzing older users' home telehealth services acceptance behavior—applying an extended UTAUT model," *International Journal of Medical Informatics*, vol. 90, pp. 22–31, 2016.

[34] D. Cyr, M. Head, and A. Ivanov, "Design aesthetics leading to m-loyalty in mobile commerce," *Information & Management*, vol. 43, no. 8, pp. 950–963, 2006.

[35] G. de Kerviler, N. T. Demoulin, and P. Zidda, "Adoption of in-store mobile payment: are perceived risk and convenience the only drivers?" *Journal of Retailing and Consumer Services*, vol. 31, pp. 334–344, 2016.

[36] Z. Deng, X. Mo, and S. Liu, "Comparison of the middle-aged and older users' adoption of mobile health services in China," *International Journal of Medical Informatics*, vol. 83, no. 3, pp. 210–224, 2014.

[37] Y.-M. Huang, Y.-H. Pu, T.-S. Chen, and P.-S. Chiu, "Development and evaluation of the mobile library service system success model: a case study of Taiwan," *Electronic Library*, vol. 33, no. 6, pp. 1174–1192, 2015.

[38] S. Karimi, "Do learners' characteristics matter? An exploration of mobile-learning adoption in self-directed learning," *Computers in Human Behavior*, vol. 63, pp. 769–776, 2016.

[39] H.-W. Kim, H. C. Chan, and S. Gupta, "Value-based adoption of mobile internet: an empirical investigation," *Decision Support Systems*, vol. 43, no. 1, pp. 111–126, 2007.

[40] T. L. Lai, "Service quality and perceived value's impact on satisfaction, intention and usage of short message service (SMS)," *Information Systems Frontiers*, vol. 6, no. 4, pp. 353–368, 2004.

[41] W. O. Lee and L. S. Wong, "Determinants of mobile commerce customer loyalty in Malaysia," *Procedia—Social and Behavioral Sciences*, vol. 224, pp. 60–67, 2016.

[42] M. K. O. Lee, C. M. K. Cheung, and Z. Chen, "Understanding user acceptance of multimedia messaging services: An Empirical Study," *Journal of the American Society for Information Science and Technology*, vol. 58, no. 13, pp. 2066–2077, 2007.

[43] L.-Y. Leong, K.-B. Ooi, A. Y.-L. Chong, and B. Lin, "Modeling the stimulators of the behavioral intention to use mobile entertainment: does gender really matter?" *Computers in Human Behavior*, vol. 29, no. 5, pp. 2109–2121, 2013.

[44] S. Lim, L. Xue, C. C. Yen et al., "A study on Singaporean women's acceptance of using mobile phones to seek health information," *International Journal of Medical Informatics*, vol. 80, no. 12, pp. e189–e202, 2011.

[45] F. Liu, X. Zhao, P. Y. K. Chau, and Q. Tang, "Roles of perceived value and individual differences in the acceptance of mobile coupon applications," *Internet Research*, vol. 25, no. 3, pp. 471–495, 2015.

[46] H.-P. Lu and P. Y.-J. Su, "Factors affecting purchase intention on mobile shopping web sites," *Internet Research*, vol. 19, no. 4, pp. 442–458, 2009.

[47] H. Mohammadi, "Social and individual antecedents of m-learning adoption in Iran," *Computers in Human Behavior*, vol. 49, pp. 191–207, 2015.

[48] H. Nysveen, P. E. Pedersen, and H. Thorbjørnsen, "Explaining intention to use mobile chat services: moderating effects of gender," *Journal of Consumer Marketing*, vol. 22, no. 5, pp. 247–256, 2005.

[49] J. M. Parreño, S. Sanz-Blas, C. Ruiz-Mafé, and J. Aldás-Manzano, "Key factors of teenagers' mobile advertising acceptance," *Industrial Management and Data Systems*, vol. 113, no. 5, Article ID 17088258, pp. 732–749, 2013.

[50] E. Park and K. J. Kim, "An integrated adoption model of mobile cloud services: exploration of key determinants and extension of technology acceptance model," *Telematics and Informatics*, vol. 31, no. 3, pp. 376–385, 2014.

[51] E. Park, S. Baek, J. Ohm, and H. J. Chang, "Determinants of player acceptance of mobile social network games: an application of extended technology acceptance model," *Telematics and Informatics*, vol. 31, no. 1, pp. 3–15, 2014.

[52] E. Park and J. Ohm, "Factors influencing users' employment of mobile map services," *Telematics and Informatics*, vol. 31, no. 2, pp. 253–265, 2014.

[53] S.-T. Park, H. Im, and K.-S. Noh, "A study on factors affecting the adoption of LTE mobile communication service: the case of South Korea," *Wireless Personal Communications*, vol. 86, no. 1, pp. 217–237, 2016.

[54] Y. Su, W. Chiang, C. James Lee, and H. Chang, "The effect of flow experience on player loyalty in mobile game application," *Computers in Human Behavior*, vol. 63, pp. 240–248, 2016.

[55] H. Verkasalo, C. López-Nicolás, F. J. Molina-Castillo, and H. Bouwman, "Analysis of users and non-users of smartphone applications," *Telematics and Informatics*, vol. 27, no. 3, pp. 242–255, 2010.

[56] T. Wang, L.-B. Oh, K. Wang, and Y. Yuan, "User adoption and purchasing intention after free trial: an empirical study of mobile newspapers," *Information Systems and e-Business Management*, vol. 11, no. 2, pp. 189–210, 2013.

[57] W.-T. Wang and H.-M. Li, "Factors influencing mobile services adoption: a brand-equity perspective," *Internet Research*, vol. 22, no. 2, pp. 142–179, 2012.

[58] C.-H. Wong, G. W.-H. Tan, B.-I. Tan, and K.-B. Ooi, "Mobile advertising: the changing landscape of the advertising industry," *Telematics and Informatics*, vol. 32, no. 4, pp. 720–734, 2015.

[59] H.-Y. Yoon, "User acceptance of mobile library applications in academic libraries: an application of the technology acceptance model," *The Journal of Academic Librarianship*, vol. 42, no. 6, pp. 687–693, 2016.

[60] C. Yoon, C. Jeong, and E. Rolland, "Understanding individual adoption of mobile instant messaging: a multiple perspectives approach," *Information Technology and Management*, vol. 16, no. 2, pp. 139–151, 2015.

[61] T. Zhou, "Examining the critical success factors of mobile website adoption," *Online Information Review*, vol. 35, no. 4, pp. 636–652, 2011.

[62] T. Zhou, "Examining mobile banking user adoption from the perspectives of trust and flow experience," *Information Technology and Management*, vol. 13, no. 1, pp. 27–37, 2012.

[63] T. Zhou, "An empirical examination of user adoption of location-based services," *Electronic Commerce Research*, vol. 13, no. 1, pp. 25–39, 2013.

[64] T. Zhou, "Understanding the effect of flow on user adoption of mobile games," *Personal and Ubiquitous Computing*, vol. 17, no. 4, pp. 741–748, 2013.

[65] T. Zhou, "An empirical examination of the determinants of mobile purchase," *Personal and Ubiquitous Computing*, vol. 17, no. 1, pp. 187–195, 2013.

[66] M. Csikszentmihalyi and I. S. Csikszentmihalyi, Eds., *Optimal Experience: Psychological Studies of Flow in Consciousness*, 1988.

[67] H.-W. Kim, H. Chan, Y. Chan, and S. Gupta, "Understanding the balanced effects of belief and feeling on information systems continuance," in *Proceedings of the International Conference on Information Systems (ICIS '04)*, Washington, DC, USA, December 2004.

[68] A. Mehrabian and J. A. Russell, *An Approach to Environmental Psychology*, vol. 315, 1974.

[69] B. Kitchenham and S. Charters, *Guidelines for Performing Systematic Literature Reviews in Software Engineering*, 2007.

[70] B. Kitchenham, O. Pearl Brereton, D. Budgen, M. Turner, J. Bailey, and S. Linkman, "Systematic literature reviews in software engineering-a systematic literature review," *Information and Software Technology*, vol. 51, no. 1, pp. 7–15, 2009.

[71] U. Forum, "AT&T Wireless Launches Commercial 3G Services Powered by Nortel Networks," 2004, http://www.businesswire.com/news/home/20040720005480/en/ATT-Wireless-Launches-Commercial-3G-Services-Powered.

[72] V. Woods and R. van der Meulen, *Gartner Says by 2018, 50 Percent of Consumers in Mature Markets Will Use Smartphones or Wearables for Mobile Payments*, 2015, http://www.gartner.com/newsroom/id/3178217.

[73] H. E. Riquelme and R. E. Rios, "The moderating effect of gender in the adoption of mobile banking," *Marketing Intelligence and Planning*, vol. 28, no. 5, pp. 328–341, 2010.

[74] L. Zhang, J. Zhu, and Q. Liu, "A meta-analysis of mobile commerce adoption and the moderating effect of culture," *Computers in Human Behavior*, vol. 28, no. 5, pp. 1902–1911, 2012.

[75] J. Wu and C. Holsapple, "Imaginal and emotional experiences in pleasure-oriented IT usage: a hedonic consumption perspective," *Information and Management*, vol. 51, no. 1, pp. 80–92, 2014.

[76] S.-Y. Hung, J. C.-A. Tsai, and S.-T. Chou, "Decomposing perceived playfulness: a contextual examination of two social networking sites," *Information & Management*, vol. 53, no. 6, pp. 698–716, 2016.

[77] G. Hackbarth, V. Grover, and M. Y. Yi, "Computer playfulness and anxiety: Positive and negative mediators of the system experience effect on perceived ease of use," *Information and Management*, vol. 40, no. 3, pp. 221–232, 2003.

[78] C.-H. Hsiao, J.-J. Chang, and K.-Y. Tang, "Exploring the influential factors in continuance usage of mobile social Apps: satisfaction, habit, and customer value perspectives," *Telematics and Informatics*, vol. 33, no. 2, pp. 342–355, 2016.

[79] M. Kim, Y. Chang, M.-C. Park, and J. Lee, "The effects of service interactivity on the satisfaction and the loyalty of smartphone users," *Telematics and Informatics*, vol. 32, no. 4, pp. 949–960, 2015.

[80] T. Ahn, S. Ryu, and I. Han, "The impact of Web quality and playfulness on user acceptance of online retailing," *Information and Management*, vol. 44, no. 3, pp. 263–275, 2007.

[81] C.-C. Chang, "Examining users' intention to continue using social network games: a flow experience perspective," *Telematics and Informatics*, vol. 30, no. 4, pp. 311–321, 2013.

[82] C.-L. Hsu and H.-P. Lu, "Why do people play on-line games? An extended TAM with social influences and flow experience," *Information and Management*, vol. 41, no. 7, pp. 853–868, 2004.

[83] M. I. Merhi, "Towards a framework for online game adoption," *Computers in Human Behavior*, vol. 60, pp. 253–263, 2016.