

# Explaining mobile commerce services adoption by different type of customers

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## Abstract

*Mobile phones have been proclaimed as the new service frontier. Nowadays, in addition to traditional mobile services, new mobile commerce services are ready to be used by customers based on 3G-related technologies. However, little is known about the reasons why different groups of customers adopt mobile commerce services. By means of a sample of 542 Dutch consumers, we analyze the acceptance of these services by four different groups of customers. We finish our work providing interesting conclusions for academics as well as practitioners*

**Key Words-** mobile commerce services acceptance, communication technologies, mobile wireless systems.

## 1. Introduction

Mobile phones have profoundly transformed the telecommunication industry and they have been proclaimed to be the new service frontier. Mobile commerce services relate to shopping services, purchasing tickets (movie, theatre, etc.), stocks and micro-payment services. The Netherlands are characterized by high levels of penetration of mobile and Internet technology and mobile commerce services are widely available. Practitioners and academics are struggling to predict the use of mobile commerce services and the reasons why consumer adoption behavior regarding mobile commerce services is lagging behind expectations, and adoption levels in other comparable European countries. Insight into the factors that affect the acceptance of mobile commerce in consumer contexts may be gained by examining the applicability of the various theories that attempt to explain acceptance behavior.

Thus, there is both a theoretical and a managerial need for a more in-depth understanding of the way user value is created in mobile commerce services. With this in mind, we have organized this study as follows. Firstly,

we highlight the existence of different types of technology users. Then, we describe the theoretical background regarding the Technology Acceptance Model (TAM) [1] and present its limitations and potential upgrades, taking on board modifications of TAM and contributions from other theories like diffusion theory, presenting the hypotheses we will test. Thirdly, we discuss the data collection procedure and methodology we used. Finally, we discuss the main findings and present a summary of our conclusions.

## 2. Customer clusters in using technologies

In general, markets consist of a number of segments, each of which is made up of natural groupings of customers. Consumers can be split into different segments or clusters, which may have similar characteristics and needs.

For instance, [2] applied a latent class modeling approach to segment Web shoppers into three groups based on benefits sought and risks. In the case of mobile services adoption, [3] obtained four different clusters of mobile Internet users based on demographic (gender, age, marital status, occupation, monthly allowance, and household structure) and attitudinal (credibility, informativeness, entertainment, irritation, and willingness to access) profiling. Also, [4] studies the utility of segmentation analysis in delineating complex relationships among demographics, lifestyles and adoption and use of pagers and mobile phones in China.

A common element in the revised literature is the use of demographic variables to segment technologies users. However, other factors, such as lifestyle characteristics, or attitudes towards mobile devices and services must be considered to group adopters of mobile commerce services. Based on our literature review, we are not aware that this kind of analysis has been previously undertaken.

For our analysis we made use of an existing clustering of consumers based on psychographics in the Dutch market. The psycho-graphical analysis starts from five

questions. For each question respondents are asked to select 3 to 7 alternatives that characterize the respondent. The questions discuss (1) thirty-five personality traits like shyness, impatience, being honest and self-assured, (2) twenty characterization of personal household, like single, warm family, isolated family, busy, and dynamic household, (3) thirty-one leisure activities, like swimming, team sports, golf, playing chess, religious activities, (4) values, like enthusiasm, social harmony, intimacy, status, and success in life, and (5) forty-one profession that the respondent feels attracted to, ranging from shop assistant to CEO. Based on a latent-class segmentation analysis, as used by BSR®, we distinguish four clusters of consumers (Table 1). In latent class analysis every respondent is assigned a specific probability to belong to a specific cluster. The probabilities are based on a model and the observed scores of an object. Based on parameters of the model the objects can be assigned to specific clusters, making use of Latent Gold software. The latent class analysis as used by BSR is validated by comparing results of the latent class analysis with K-means cluster analyses [5]. The horizontal dimension is based on the dichotomy between personal and group orientation, the vertical dimension is defined by the dichotomy between introvert and extravert. The four clusters are labeled *hedonistic yuppies*, *socialites*, *business oriented geeks* and *traditionalists*.

<p><b>HEDONISTIC YUPIES</b> Energetic, vigorous, relatively young people, creative, are passionate and 'entrepreneurial'. Carpe diem, hedonistic. Early adopters and trendsetters. Intelligent. Hard to focus on specific issues and to stay concentrated on a topic, varied work, non-typical family life <i>VITALITY, FREEDOM</i></p>	<p><b>SOCIALITES</b> People are spontaneous and are enjoyable, they are aimed at "gezelligheid" in an extensive social surroundings. Enjoy with others of situations. Aimed at harmony and social settings, including work. Members of this cluster are prepared to help out, and involved. They have intensive contacts with their direct social environment (family, neighborhood, work, sport, hobby). Attention must be divided <i>HARMONY and EQUILIBRIUM</i></p>
<p><b>BUSINESS ORIENTED GEEKS</b> Members of this cluster are ambitious, and dynamic. Career makers that are control oriented, materialistic and tend to show off. Directive, self-assured and with a strong character, intelligent and a business attitude. Luxury and convenience are important. It is allowed to show off success. <i>CONTROL</i></p>	<p><b>TRADITIONALISTS</b> Social oriented people, in general with a lay back attitude and a serious view on the world. They work hard and are loyal. They are in search for certainty in surroundings, feeling secured. Routines, conservative and traditional, prepared to help out, not interested in changes. Strict behaviour and keep to what is decided. Not opinionated, however, fundamental in their opinions. Small majority of the elderly <i>PROTECTION</i></p>

*Gezelligheid is a Dutch word that is hard to translate; in general it indicates something like social well being in combination with cosiness*

Table 1. Clustering of consumers based on BSR approach

The four different types of consumers in BSR model can be used to analyze the adoption of mobile commerce services as used in scenario analysis [6] (Figure 1). In addition, the clusters in BSR can be compared to other studies. For example, [3] found four clusters. Based on demographic profiling, his cluster 2 is quite similar to "*hedonistic yuppies*" people in the BSR model, while

cluster 1 is more related to "*business oriented geeks*" people. Also, [4] obtains five segments of mobile users. His group named 'status quo' consisted of people who were inactive, content with the status quo and doing nothing except enjoying what they have accomplished. That type of user, with a lower adoption and use rates of mobile phones due to his/her static and inactive way of life [4], is equivalent to "*traditionalists*" consumers in the BSR model. On the other hand, 'yuppies' are influenced primarily by a westernized lifestyle and conspicuous consumption, are well-educated, social actives and influencers, and lead a visible and materialistic life, reflecting "*business oriented geeks*" people in BSR model. Yuppies' segment shows the highest adoption and use rates of mobile phones: more yuppies owned a mobile phone than any other segment and also used it the most by way of a conspicuous, modern and socially-active life [4].

The BSR clusters can also be related to the segments found by [7] for the case of mobile data services adoption. They map their five clusters basing on rewards (extrinsic vs. intrinsic) and needs (individual vs. collective), presenting sophisticates (status needs, material style, image and mass media influences) and technotoys (need for tracking technological developments, willing to pay for new mobile services) as individual, and mobile professionals (seeking value to work life) and socialities (need to keep in touch, social influences, unwilling to pay for data services) as collective. The individual-group criteria is considered in BSR model as well, where "*hedonistic yuppies*" and "*business oriented geeks*" people focus on individual activities, while "*socialites*" and "*traditionalists*" consumers are based on group behavior.

### 3. TAM model explaining mobile commerce services acceptance by different types of customers

Most of the studies around the Information System (IS) acceptance research and specifically the adoption of mobile commerce services are influenced by intention-based models rooted in cognitive psychology. Mainly the proposals arise from the theory of reasoned action (TRA) by [8], the theory of planned behavior (TPB) by [9] and the technology acceptance model (TAM) by [1].

Specifically, the theory of reasoned action (TRA) is based on the proposition that people's actual behavior is determined by their intention to behave in a certain way, and that intention is influenced both by their own attitudes and by the subjective norm (social influences).

The theory of planned behavior (TPB) by [9] was proposed as an extension of the TRA to account for the internal and external constraints (e.g. people's economic situation or experience with the service) on behavior [10].

The technology acceptance model (TAM) tries to predict people's intentions to use a technology based on their perceptions of its ease of use and usefulness. The adoption of technological products and services has been predominantly explained by TAM [1] and its extensions, TAM2 [11] and the UTAUT model [12]. One of the reasons those modifications were developed is the constant development of new and more sophisticated IT devices [13], as well as the need to understand moderating effects of individual, technical and context-related characteristics [35].

This research it is mainly based on the TAM model and expanded by making a distinction between different type of customers and their adoption of mobile commerce services. The simplified TAM contains the three basic relationships affecting Behavioral Intention (BI) to adopt Information Technology: 1) Perceived Ease Of Use (PEOU) leads to Perceived Usefulness (PU), 2) PEOU leads to Behavioral Intention (BI), and 3) PU leads to BI.

However, a careful review of the literature has revealed that there is some inconsistency on what the impact of PU is on the BI of mobile systems. Based on the evidence from previous results, this relationship has been found to be significant in some studies [11] and non-significant in others [14]. A potential explanation of these inconsistent findings might be explained by customer differences with regard to lifestyle and behavior.

Personal differences strongly influence the adoption of mobile commerce services. There is evidence that successful acceptance of innovations depends as much on individual adopter differences as on the innovation itself. Recognizing individual differences that impact technology adoption is important because it helps identify segments of adopters who are more likely to adopt technology innovations than others, which in turn, helps providers address adopter needs more closely [15]. Further, these individual adopters can then act as opinion leaders or change agents to facilitate the diffusion of the technology [16]. Different users have different knowledge and skills with respect to a specific technology and perceive different levels of complexity in its use [17]. [18] explored the relationship between the personal values of consumers and internet use and obtained that differences in internet use were attributed to differences in personal values.

Besides, previous studies have indicated that there is a mix of work related and leisure related functional reasons for adoption [19]. In our opinion, the importance of each reason can also be dependant on the type of user or adopter considered, thus positing that the model we propose here can explain adoption of mobile commerce services by diverse types of consumers.

[21] suggested that when consumers believe that systems are easier to use, they are also likely to perceive these systems as being more useful, because it means that

they can spend their time doing other things rather than figuring out how to use the systems. This kind of effect is expected to be even stronger with regard to mobile commerce services, because people are likely to be less familiar with them.

Based on previous discussion on the TAM model assumptions, we posit:

H1: PU has a positive impact on BI towards mobile commerce services.

H2: PEOU has a positive impact on BI towards mobile commerce services.

H3: PEOU has a positive impact on PU of mobile commerce services.

#### **4. The diffusion theory explaining mobile commerce services acceptance by different types of customers**

Although the TAM model is considered very appropriate to apply psychological factors to IS and computer adoption [22], there has been an increasing concern about its appropriateness and comprehensiveness. Some of these criticisms arise from the fact that this model does not consider the socialized effect of other customer on customer adoption decision. Accordingly, based on the diffusion theory, this research also proposes that social influence of peers may be a key element in people's intention to use mobile commerce services.

Social influence, also known as normative pressure [10] or subjective norm [8], is defined as the degree to which an individual has the impression that important others believe he or she should use the new system [12], in our case mobile commerce services. This definition contains the notion that an individual's behavior is influenced by the way in which he/she believes others will view them as a result of having used the technology. The role of social influence in people's decision whether or not to use a technology is complex and subject to a wide range of contingent influences [12]. In the case of mobile Internet services, [23] conclude that more attention should be focused on the importance of internal individual differences and social influences.

We can conclude that in the attempts to explain the acceptance of mobile commerce services, the role of social influence has been underestimated. The underestimation of the role of social influence is specifically relevant for services that are not mandatory and based on adoption on the consumer market, in comparison to the mandatory use of systems within an organizational context.

The social influence that leads people to use a technology has been found to have an indirect impact on their intention to adopt, via PU [e.g., 11], since the link between subjective norm and intention has typically been

empirically non-significant [24]. Also, [23] show that social influences can affect a person's evaluation of advanced wireless Internet in terms of its usefulness.

H4: Social influence has a positive impact on PU of mobile commerce services.

Moreover, social influences can also be related to a person's attitude towards mobile innovations. The attitude towards mobile innovations is based on the concept of personal innovativeness. [25] conceptualize personal innovativeness in the domain of information technology as an individual trait reflecting a willingness to try out any new technology (in our case mobile commerce services).

An innovation creates uncertainty about its expected consequences for potential adopters, and individuals who are generally uncomfortable with uncertainty will tend to interact with their social network before making a decision [23]. Overall, using of an innovation is seen as a form of public consumption and it can be significantly influenced by friends and colleagues.

H5: Social influence has a positive impact on the attitude towards innovations.

Recently, [23] have studied the impact of social influences in terms of subjective norm and image on non-adopters' perceptions of usefulness and ease of use concerning wireless mobile technologies, and they find that those perceptions can be attributed significantly to social influences. Also, in his study, [19] includes links from subjective norm to attitudes toward the use of these services which are developed in social networks and are affected by social norms.

H6: Social influence has a positive impact on PEOU of mobile commerce services.

[25] have found that personal innovativeness can improve PU of IT through an increase in a person's cognitive absorption. However, there is no agreement in literature about whether a person's attitude towards innovation has any influence on PU. [26] suggest that personal innovativeness has a direct, positive influence on the perceived usefulness of IT. With regard to the adoption of mobile commerce services, an innovative attitude towards technological innovations may also enhance the perception of usefulness.

H7: Attitude towards mobile innovations has a positive impact on PU of mobile commerce services.

People's attitudes towards innovations have been used to predict consumer innovative tendencies to adopt a wide variety of technological innovations [27]. Specifically, personal innovativeness may influence a person's use of mobile phone service [28].

H8: Attitude towards mobile innovations has a positive impact on BI towards mobile commerce

services.

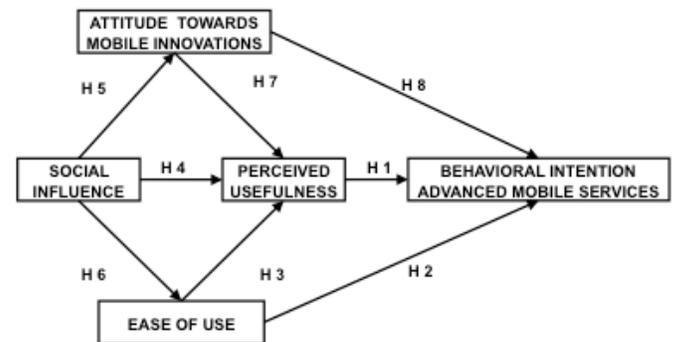


Figure 1. Conceptual model

We assume that this generic model will work out differently for the four clusters. We will come back on this in our discussion of the results.

## 5. Method

Respondents were selected from a large panel of 25.000 households that are regularly used for survey research and are representative for the Dutch population. Potential respondents (N = 900) were first approached via telephone in order to ask if they would be prepared to participate and if they used a mobile phone. Respondents who agreed and fit the selection criterion (N = 714), were sent an email with a link to the online questionnaire in April 2007. We received 532 filled out questionnaires, from which 13 were removed from the data-analyses. The sample was checked on relevant criteria in order to establish if the sample was representative for the Dutch population. The results demonstrated adequate levels of sample representativeness.

Our multi-item scales were drawn from prior studies. To develop the social influence we made use of items from [29]. The review of these studies yielded a total of three items that measure personal social influence. We also included [30] items measuring attitude towards mobiles (four items). PEOU (seven items) and PU were assessed on the basis of [12]. To measure BI we decided to adopt the items of [31]. To measure the different dimensions mobile commerce services we reviewed the literature and different reports classifying those services. Finally, mobile commerce services were measured by four items that pay attention to shopping services, purchasing tickets (movie, theatre, etc.), stocks and micro-payment services.

In order to refine the measures, we conducted a confirmatory factor analyses (CFA) using Lisrel 8.8 to determine the validity and reliability of our measures. The results of the eight factor model provide acceptable fit of the data ( $\chi^2(1130) = 3051.72$ ; CFI=.97 NNFI=.97

RMSEA=.05). All factor loadings for each individual indicator on its respective constructs are statistically significant ( $p < .001$ ), in support of the dimensionality of the constructs. The composite reliabilities [32] and average variance extracted [33] from each construct exceed the usual .60 benchmark and .50 respectively. We further assessed the discriminant validity of the latent constructs in two ways. Firstly, as suggested by [34], we calculated the 99% confidence intervals around the correlation parameter estimates between all possible pairs of scales, and established that none of these intervals included 1. Secondly, the square of two constructs' correlation was less than the average variance extracted estimates of the two constructs [33]. Overall, these results show an adequate level of reliability and validity.

## 6. Analysis

Once reliability of all the measures was checked, a structural model was developed to test the hypotheses. As may be observed from Figure 2, as a result of the Lisrel analysis, most of the hypotheses were supported. The overall adjustment indexes are also within the limits recommended in the literature. However, it is generally agreed that researchers should compare rival models and not just test the performance of a proposed model [32]. Our proposed model was compared with another model that also estimates the relationship between social influence and BI to use mobile commerce services. The underlying assumption built into the alternative path from social influence on BI is based on the empirical study by [10] showed that normative pressure has significant effects on the rapid adoption of different mobile services categories. Also, [24] has previously analyzed the adoption of B2C e-commerce and primarily found that subjective norm plays a very significant role in explaining intentions to accept e-commerce services.

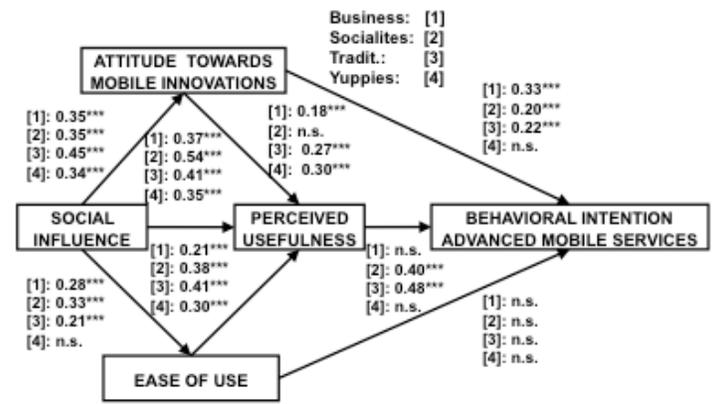
Therefore, we test our theoretical model (TM) against an alternative model specification (AM) that considers this relationship. [34] recommend this procedure and suggest the use of a chi-square difference test (CDT) to test the null hypothesis:  $TM-AM = 0$ . Accordingly, a non-significant CDT would lead to the acceptance of the more parsimonious. The non significant change in chi-square between our model (TM) and the alternative one (AM), leads to the conclusion that TM is a better specification. Results indicate that the fit of our proposed model was much better than the fit of the re-specified model.

## 7. Results

Results prove the importance of considering clusters differences when explaining customer acceptance of mobile commerce services. Most hypotheses are supported, except for H2 relating perceived ease of use

(PEOU) to behavioral intention (BI). H2 is not accepted for any of the four clusters. This finding confirms earlier discussions with regard to the role of PEOU in explaining BI. Unlike PU the effects of PEOU on BI haven't been consistent..

The main differences relate to: 1) social influence does not impact on PEOU for “*hedonistic yuppies*” people, who like the most showing off even if the service is not perceived as easy to use; 2) attitude towards innovations has no impact on PU for “*socialites*” people; 3) PU and attitude towards innovations do not increase BI to use mobile commerce services for “*hedonistic yuppies*”; 4) PU does not influence BI for “*business oriented*” people.



Business:  $\chi^2(267)=371.06$  CFI=0.97 NNFI=0.97 RMSEA=0.05  
 Socialites:  $\chi^2(267)=466.26$  CFI=0.96 NNFI=0.96 RMSEA=0.07  
 Traditionalists:  $\chi^2(267)=512.21$  CFI=0.96 NNFI=0.96 RMSEA=0.07  
 Yuppies:  $\chi^2(267)=426.75$  CFI=0.96 NNFI=0.95 RMSEA=0.07

Figure 2. Adoption of mobile commerce services

In such a changing world, these findings should be of interest to companies in order to develop new mobile commerce services and be aware of the need to target new services to specific groups of consumers. Academics should reformulate the TAM and further study the factors explaining the adoption of new technologies and services, whose development is growing steadily.

## 8. Discussion, limitations and conclusions

Our research doesn't confirm the relation between PEOU and BI, for none of the four specified groups. Our findings confirm the inconsistencies found in earlier research. There might be some moderating effects involved. These moderating effects might have to do with the type of services. The use of e-commerce is slowly growing over the last decades, showing inconsistent patterns for online ordering, ticket reservations, the use of on-line banking and on-line payments. The transfer of these services to mobile devices might follow alternative

sometimes opposite patterns. So micropayments might fit into behavior enabled by mobile devices more easily, then for instant mobile shopping. In another research, we have found that specifically the transaction itself is supported by mobile devices [36], and that mobile devices didn't play a role in the pre-sales or after-sales phases. The complexity of the mobile transaction process and the limitations of the mobile device might be a hindering factor affecting ease of use. Moreover we know that personal characteristics like gender also might have a moderating effect on the relation between PEOU and BI [12].

If we would specify the relation between social influence and constructs like attitude towards mobile innovations, perceived usefulness (PU), and perceived ease of use (PEOU), we have to be aware that the role of families, peers and significant others is more important to socialites and traditionalists. So for all of these relations we would expect that the path coefficients would be higher for these two groups than for the other two groups, i.e. business people and yuppies. Although not formally hypothesized we see some examples of this pattern in our results, Yuppies apparently don't care if they perceive the system is easy to use, they need the system anyway in order to show off, whether they intend to use it or not. In general, none of the core constructs from the TAM model that predict behavioral intention to use mobile commerce services, is applicable for yuppies. This is the case for perceived usefulness (PU) as well as for perceived ease of use (PEOU). It can be speculated that for instance the flexibility that comes with mobile devices and services might be far more relevant to Yuppies. Some interpretative research confirms this view [37].

The lacking correlation between socialites attitude towards mobile innovations and perceived usefulness can be explained. For these people the concept of usefulness is not very relevant for their daily life. Even in the work environment usefulness is not their primary concern, but the well being of colleagues and themselves is important. So although they might have a positive attitude towards mobile innovation it is not relevant in their evaluation of the usefulness of mobile commerce.

The lacking relation between perceived usefulness and behavioral intention to use for business oriented persons might be explained to the fact that the use of mobile might be more mandatory than voluntary. Moreover costs factors are ignored in most TAM-studies on consumer adoption of mobile information systems. we know relatively little about the specific costs associated with advanced mobile services [38]. This may be an interesting area for further analysis of customer acceptance of this type of services

In general our results show that the patterns explaining the core concepts of the TAM concepts can be explained by a mix of characteristics that are related to (1) individual differences, like age, gender and income, (2)

the cluster individuals belong to, as discussed in this paper, (3) the voluntary or mandatory use of systems within specific place-time defined situations, and (4) the mobile devices and services under study, like device characteristics such as screen size, used platforms, but also the way in which security and privacy are dealt with, or types of services under study. Finding the proper mix in understanding customer behavior, as well as responding to these subtle mixtures by service providers and telecom operators is a difficult task. It will be clear that understanding this fit might favor practitioners.

Nevertheless, there are some limitations to our research. First of all we have to be aware that the results indicate that there are subtle cultural differences between the four clusters under study. It will be clear that these clusters are directly related to the Dutch society, and that these clusters are partly cultural dependent. Although some of the clusters might have a broader meaning, it will be clear that some clusters are specifically Dutch. The results of this research can therefore only be generalized to the Dutch society. Another limitation is related to the mixture of m-commerce services. M-commerce services are only an example of one group of services. It can be expected, as we have shown in [30] that if we study other sets of services, like communication-based mobile services, or Mobile Internet services, we will find different results. Another limitation of most of the current research focused on mobile service acceptance that is based on TAM, that it is cross-sectional research, while longitudinal research, specifically panel studies, might offer more interesting results. Finally what most research in the mobile domain is missing is a clear conceptualization of what makes research in *mobile* information systems, and service so distinctly different from existing research in the IS domain. Mobility as a concept needs further elaboration beyond the simple concept of availability anyplace, anytime, anywhere.

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