

BARRIERS TO MOBILE BANKING ADOPTION

A Cross-national Study

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Abstract: The objective of this study is to explore barriers to mobile banking adoption in two distinct European countries namely Finland and Portugal. Even successful innovation may face various types of resistance that may paralyse customers' desire to adopt or use the innovation. We investigated the country effect to five adoption barriers namely usage, value, risk, tradition and image, derived from the earlier literature. An Internet questionnaire was developed and 3.597 usable responses were collected. A confirmatory factor analysis was implemented with SEM to build the constructs' latent score levels. Using non-parametric difference tests we concluded that the resistance is significantly lower among the Portuguese online bank customers in terms of four out of the five barriers. The results can be used for a better understanding and enhancement of adoption of this specific case of m-commerce.

1 INTRODUCTION

The wide penetration and rapid diffusion of mobile phones has opened opportunities for new innovations in the services sector. One such innovation is mobile banking representing one of the most promising, while still marginally adopted, m-service. Previous studies have shown that mobile banking increases efficiency and convenience in bill paying, for example, as the service can be used wherever wanted enabling time savings and immediate reactions to unexpected service need (Laukkanen and Lauronen, 2005; Laukkanen, 2007a).

Finland has long been seen as the most successful European country in terms of the adoption and use of mobile services (Bouwman et al., 2007). However, even though already around two thirds of the Finns pay their bills over the Internet, mobile banking has not yet received the attention of the masses. In general, Finland is referred as one of the leading European countries in terms of Internet banking adoption, while, for example, Portugal is lacking far behind (Eurostat, 2007). In this study we investigated what inhibits

mobile banking adoption in these two European countries and how the countries differ in terms of barriers to the service adoption.

First we describe the Internet and mobile communications market both in Finland and Portugal. Thereafter, we summarise the relevant literature on innovation resistance and banking technologies. Finally, the findings are presented and concluding remarks drawn.

2 INTERNET AND MOBILE COMMUNICATIONS MARKET: FINLAND VS. PORTUGAL

During the last decade the penetration of mobile phones has been dramatic. In addition, the diffusion of Internet-connected computers has been remarkable in the 21st century. These advances in communication technologies have reshaped the service development and revolutionised the service consumption. In Finland the amount of Internet-connected computers per 100 persons have grown from roughly 20 in 2002 to nearly 50 in 2006

(Figure 1). Compared to Portugal, the relative amount of these devices is over three times higher in Finland. These figures may partly explain the higher Internet banking adoption rates in Finland, even though the growth rate of these devices in Portugal has been dramatic during the last years.

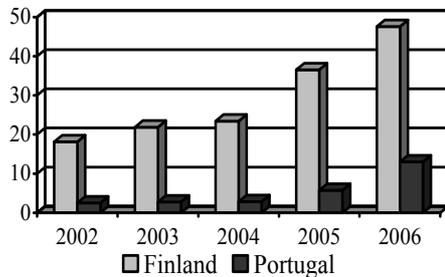


Figure 1: Internet-connected computers per 100 persons (Statistics Finland, 2008).

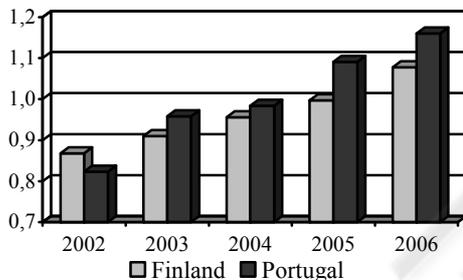


Figure 2: Mobile telephone subscription per capita (Statistics Finland, 2008).

Although the distribution and penetration of mobile handsets in Finland is argued to be among the highest in the world, making the country an interesting test-market for new mobile services (Bouwman et al., 2007), the number of mobile phone subscriptions is even higher in Portugal with 1,16 connections per capita compared to 1,08 in Finland. The relatively low number of computers connected to the Internet and a great number of mobile phones make Portugal a highly potential market for mobile services such as banking.

The future of mobile communications relies heavily on services. However, the optimistic and experimental mood that we witnessed in the beginning of the century has been replaced by a cautious atmosphere in which fewer risks are taken in the development and marketing of new third generation mobile services (Bouwman et al., 2007). Therefore, insight into the reasons why consumers are not adopting mobile services is needed. In this

paper we explore the adoption barriers to mobile banking in the light of consumer resistance to innovations.

3 LITERATURE

Albeit the pro-innovation bias (Sheth, 1981; Ram, 1987; Rogers, 2003) that majority of the diffusion literature has, there may be product and service categories or market segments where innovation resistance is predominant (Gatignon and Robertson, 1991). The literature on innovation resistance aims to explore the various reasons that inhibit innovation adoption. Sheth (1981) suggests that the two key factors explaining the phenomenon are habit or satisfaction with an existing behaviour and perceived risks associated with innovation adoption. He states that the inclination toward an existing behaviour is related to the typical human tendency to strive for consistency and status quo rather than to continuously search for new behaviours.

Consequently Ellen et al. (1991), note that satisfaction with current performance increases resistance to alternatives and reduces the likelihood of adoption. They further highlight the role of perceived self-efficacy which means the perceived ability or skill to successfully perform a given task. These lines of thought assume that consumers base their decisions on two aspects: perceived benefits over existing methods and perceived risks associated with innovation adoption.

Ram and Sheth (1989) suggest a more comprehensive view on innovation resistance by explaining the phenomenon with five adoption barriers namely usage, value, risk, tradition and image.

3.1 Usage Barrier

Ram and Sheth (1989) suggest that the usage barrier relates to the situation in which an innovation is not compatible with existing workflows, practices or habits. In the context of technological innovations, however, this construct parallels with complexity which, according to Rogers (2003), refers to the degree to which an individual considers an innovation to be relatively difficult to understand and use.

The small size of mobile devices including small screens and tiny multifunction keypads may be troublesome to use and hamper the usability of mobile services. Earlier studies on mobile banking show that the smaller screens appear adequate in

information-based mobile services, such as request for account balance service, but those banking services that involve transactions require a bigger screen size (Laukkanen, 2007b). For example, some bank customers consider bill payment via mobile handheld device to be difficult and time consuming as the device enables only a limited amount of information processing and for this reason, the whole bill is not visible on the display inhibiting the progress in the service process (Laukkanen and Lauronen, 2005; Laukkanen, 2007a). Moreover, some studies highlight the importance of simple authorization mechanisms in mobile banking (Laukkanen and Lauronen, 2005) while some report inconvenience due to changing PIN codes among some bank customers as the codes need to be carried along (Kuisma et al., 2007).

3.2 Value Barrier

The degree to which an individual believes that an innovation is better than the idea it supersedes determines the individual's decision to use the innovation (Rogers, 2003). This is called relative advantage which is a related concept with the value barrier referring to the performance and monetary value of an innovation in comparison to its substitutes (Ram and Sheth, 1989).

In similar vein, the greater the perceived advantage that mobile banking offers over other ways of banking, the more likely it is to be adopted (Brown et al., 2003). The earlier studies show that the option to check the movements or transactions of an account wherever wanted increases customers' feeling of control over their financial affairs adding value to service consumption (Laukkanen and Lauronen, 2005).

However, if an innovation does not offer greater performance to existing alternatives, it is not worthwhile for consumers to change their behaviour (Ram and Sheth, 1989). The extent to which an individual believes that using mobile banking is uneconomical, for instance, has a negative effect on the intention to use mobile banking (Luarn and Lin, 2005).

3.3 Risk Barrier

The risk perceptions in technological innovations usually arise due to the uncertainty to the technology's capability to deliver its expected outcome (Im et al, 2008). Thus, the diffusion of innovation is likely to take the longer the more risk

adverse the innovation is (Dunphy and Herbig, 1995).

As with many other technological innovations, there appear to be security and privacy concerns to mobile banking among some bank customers (Luarn and Lin, 2005). Safety measures of personal details and financial information by the bank are one of the critical factors for the commercial success of mobile banking (Brown et al., 2003). A portable list of PIN codes may also pose security threats as it may be lost by a customer and found by an untrustworthy party (Kuisma et al., 2007).

Moreover, the extent to which a person believes a new technology will perform a job consistently and accurately (i.e. reliability) is highly important risk-related factor in technology-based financial service innovations (Lee et al., 2003). Mobile phones, for instance, may be limited in computational power, memory capacity and battery life, limiting the use of mobile services (Siau and Shen, 2003).

3.4 Tradition Barrier

The tradition barrier is related to the change an innovation may cause in a consumer's daily routines. Thus, if the consumer considers routines important in his/her daily behaviour, the tradition barrier will most likely be high. Moreover, the tradition barrier may arise when an innovation is incompatible with the consumer's existing values, norms and past experience (Ram and Sheth, 1989). Thus, an innovation needs to be well-suited with the existing values and norms in order an individual to adopt the innovation (Rogers, 2003).

Kuisma et al. (2007) showed that some consumers resist Internet banking due to their habit of paying bills via bill paying ATMs. Alternatively, a customer may need social interaction and enjoy talking to bank personnel as a strong desire to deal with human tellers is found to discourage consumer from adopting self-service technologies in banking (Marr and Prendergast, 1993). Thus, it may be that in mobile banking the tradition barrier arises if an individual simply prefers to deal directly with the bank clerk instead of using new banking technologies.

3.5 Image Barrier

The image barrier arises from unfavourable associations to the identity of the innovation, such as the country of origin, brand or the product category to which the innovation belongs (Ram and Sheth,

1989). In the case of technological innovations, for instance, image barrier may derive from a negative image of new technology in general and of a product class in particular.

In the late 90's Fain and Roberts (1997) argued that the image barrier in online banking derives from a negative hard-to-use image of computers and the Internet. We argue that this may well be the case in mobile banking today as some consumers may perceive the mobile technology to be too difficult to use and therefore instantly form a negative image of the service related to the mobile technology.

3.6 Hypotheses Development

Following the earlier literature on innovation resistance a research model was designed (Figure 3). According to the Eurostat's (2007) statistics, Finland is among the leading European countries in terms of individuals' Internet banking adoption with 63 percent adoption rate in 2006. Portugal, for example, represents the opposite with only 10 percent adoption rate. Based on these facts we hypothesise that the resistance to electronic banking services, including mobile banking, is significantly lower among the Finns compared to Portuguese bank customers. This leads us to the following hypotheses:

- H1: Usage barrier to mobile banking is significantly lower among the Finns compared to Portuguese
- H2: Value barrier to mobile banking is significantly lower among the Finns compared to Portuguese
- H3: Risk barrier to mobile banking is significantly lower among the Finns compared to Portuguese
- H4: Tradition barrier to mobile banking is significantly lower among the Finns compared to Portuguese
- H5: Image barrier to mobile banking is significantly lower among the Finns compared to Portuguese
- H6: Overall resistance to mobile banking is significantly lower among the Finns compared to Portuguese

4 DATA AND METHODS

Based on the theory of innovation resistance and the existing literature on banking technologies, especially on mobile banking, a survey questionnaire was designed. The five adoption barriers were examined with 17 statements expressed in Table 1. A seven-point *Likert* scale ranging from totally disagree (1) to totally agree (7) was used.

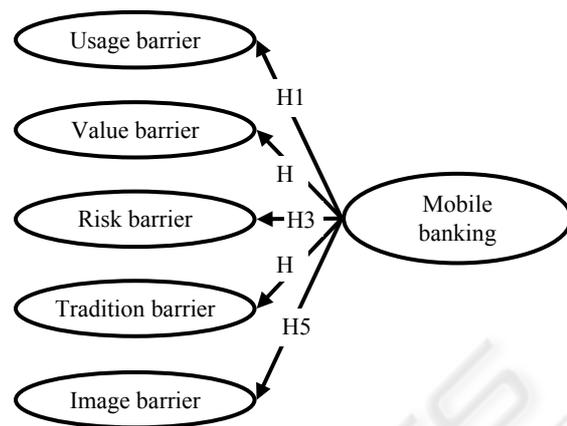


Figure 3: Conceptual model.

Table1: Measure development of the barriers.

Statements measuring the barriers	
Usage barrier	
B1.	In my opinion, mobile banking services are easy to use *
B2.	In my opinion, the use of mobile banking services is convenient *
B3.	In my opinion, mobile banking services are fast to use *
B4.	In my opinion, progress in mobile banking services is clear *
B5.	The use of changing PIN codes in mobile banking services is convenient *
Value barrier	
B6.	The use of mobile banking services is economical *
B7.	In my opinion, mobile banking does not offer any advantage compared to handling my financial matters in other ways
B8.	In my opinion, the use of mobile banking services increases my ability to control my financial matters by myself *
Risk barrier	
B9.	I fear that while I am paying a bill by mobile phone, I might make mistakes since the correctness of the inputted information is difficult to check from the screen
B10.	I fear that while I am using mobile banking services, the battery of the mobile phone will run out or the connection will otherwise be lost
B11.	I fear that while I am using a mobile banking service, I might tap out the information of the bill wrongly
B12.	I fear that the list of PIN codes may be lost and end up in the wrong hands
B13.	I trust that while I am using mobile banking services, third parties are not able to use my account or see my account information *
Tradition barrier	
B14.	Patronizing in the banking office and chatting with the teller is a nice occasion on a weekday
B15.	I find self-service alternatives more pleasant than personal customer service *
Image barrier	
B16.	In my opinion, new technology is often too complicated to be useful
B17.	I have such an image that mobile banking services are difficult to use

*Reversed scale

The questionnaire was first designed in Finnish and thereafter translated to English. The English questionnaire was then translated to Portuguese. The questionnaires both in Finland and Portugal were placed in a log-out page of large banks' online service. Due to a vast number of online banking users in Finland the questionnaire was open much longer in Portugal than in Finland. In Finland the questionnaire was open for 72 hours between November 6th and 9th 2006, whereas in Portugal the questionnaire was open for 2 weeks, between June 28th and July 13th 2007. The surveys generated a total random sample of 3597 usable responses without missing values.

The Finnish sample is slightly male dominated (53%) and relatively young with 36.7 percent of the respondents being less than 35 years old. Finnish sample consisted of a total number of 1,494 valid responses of which 28 percent (419 cases) represented mobile banking users. The Portuguese sample is largely male dominated (61%) and even younger than the Finnish sample with 59.3 percent of the respondents being less than 35 years old. A total number of 2,103 valid responses were obtained from Portugal with 32.7 percent (688 valid cases) of mobile banking users.

In the data analysis phase the scales of positively formed statements were reversed so that the scales of all statements were comparable. Thus, a higher mean of a statement determines higher resistance of the respondent. A Structural Equation Model (with AMOS 7.0 software) was estimated and its fit and constructs' reliability was checked. Latent scores were also computed at the constructs' level. Using non-parametric tests (*Kolmogorov-Smirnov Z* and *Mann-Whitney U*), the differences between the countries were assessed (variables and latent scores did not follow normal distribution).

5 RESULTS

The constructs' Cronbach's Alphas indicated satisfactory internal consistency reliability (usage=0,92; value=0,60; risk=0,80; tradition=0,59; image=0,65) and the estimated structural model showed an acceptable fit ($\chi^2=2896,10$; d.f.=115; $p=0,00$; CFI=0,90; RMSEA=0,08; GFI=0,91). All coefficients revealed to be significant.

The second order structural model showed that the resistance to the adoption of mobile services mainly derives from usage (standardized structural impact=0.93) and value (0.84) barriers. Image and risk barriers also influenced the overall resistance,

the effects being 0.51 and 0.31 respectively. On the other hand, tradition had a negative influence to the overall resistance, with a standardized structural coefficient of -0.15.

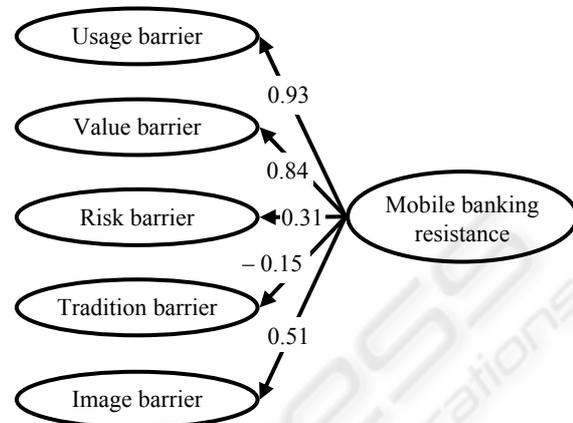


Figure 4: Standardized parameter estimates.

The latent scores were calculated using *Kolmogorov-Smirnov Z* and *Mann-Whitney U* tests. Both tests showed statistically significant differences to the five constructs and overall resistance level (Table 2). Apart from the tradition barrier, the results indicated higher values for Finland in all the barriers explored.

Table 2: Resistance levels across countries (latent scores).

	Finland n=1494	Portugal n=2103	Sig.
Overall resistance	4,052	3,516	0,000
Value barrier	3,058	2,781	0,000
Image barrier	2,345	2,159	0,000
Tradition barrier	3,555	4,047	0,000
Risk barrier	3,879	3,594	0,000
Usage barrier	4,241	3,588	0,000

Table 3: Resistance levels across countries among non-users (latent scores).

	Finland n=1075	Portugal n=1415	Sig.
Overall resistance	4,516	3,907	0,000
Value barrier	3,420	3,083	0,000
Image barrier	2,583	2,287	0,000
Tradition barrier	3,514	3,828	0,000
Risk barrier	4,114	3,752	0,000
Usage barrier	4,727	4,011	0,000

In addition, differences between countries were computed only for non-users of mobile banking (Table 3). Out of the total number of 3597 responses 2490 respondents represented this group of

customers with 1075 and 1415 observations in Finland and Portugal respectively. The results of these responses follow the research results of the total sample. Therefore, the hypotheses H1, H2, H3, H5 and H6 are rejected and only the hypothesis H4 is supported by the data in terms of both the total sample and the sample of non-users.

6 CONCLUSIONS AND FUTURE RESEARCH

The structural equation model showed that usage and value barriers are the most intense determinants of overall resistance to mobile-banking, followed by image and risk barriers respectively. These results suggest that functional usability and relative advantage compared to other ways of banking are currently the most powerful inhibitors of mobile banking adoption. Interestingly, tradition appeared to be a negative determinant of resistance. Furthermore, Portuguese online bank customers showed less resistance in terms of usage, value, risk and image to adopting mobile banking services than their Finnish counterparts. However, Portuguese online bank customers showed greater preference for personal service, indicating more traditional banking behaviour compared to Finns. This idiosyncrasy of the Portuguese could mean a high pre-disposition to adopt new service channels alongside with more traditional ones.

Compared to Finland, the relatively low resistance scores to mobile banking among the Portuguese may reflect the fact that Portugal has simultaneously a low number of internet-connected computers and a high mobile penetration, a situation very auspicious for mobile services (Narinder, 2007). Another explanation for such surprising result might be related to the sampling method as only online banking users participated in the study. Rogers (2003) argues that adopter categorisation is based on innovativeness, i.e. the degree to which an individual is relatively earlier in adopting new ideas than other members of a social system. The fact that only the Innovators and Early Adopters of the total population in Portugal have so far adopted Internet banking, and that in Finland the diffusion of the innovation has already reached the Late Majority, may have resulted that, in general, the Portuguese sample consisted of more innovative individuals than the Finnish sample.

In general, innovativeness is related to demographics such as age. In our study the Portuguese sample consisted of much younger respondents compared to the Finnish sample. Future

research is needed related to the role of innovativeness and demographic variables in mobile banking adoption. Moreover, Finland and Portugal represent very divergent countries in terms of cultural dimensions (e.g. Hofstede, 1980), hence providing good means to study the effect of culture (Kivijärvi et al., 2007). Future research could investigate the role of culture in consumer resistance to technological innovations.

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