

Customer Acceptance of Internet Banking in Estonia

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Abstract

The Internet has emerged as one of the most important distribution channels for financial services firms. However, there is still a need to more fully understand the antecedents to customer use of banking via the Internet. The purpose of this article is to study technology acceptance of Internet banking in Estonia, an emerging east European economy. The present paper modifies the technology acceptance model and applies it to bank customers in Estonia, because Estonia, a country with a developing economy, has focused on Internet banking as an important distribution channel. The findings suggest that Internet bank use increases insofar as customers perceive it as useful. The perceived usefulness is central because it determines whether the perceived ease of Internet bank use will lead to increased use of the internet bank. Put differently, a well-designed and easy to use internet bank may not be used if it is not perceived as useful. We thus conclude that the perceived usefulness of Internet banking is, for banks, a key construct for promoting customer use. We also suggest that models of technology acceptance should be re-formulated to focus more on the key role of the perceived usefulness of the service embedded in the technology. Implications for banks are that they need to put much effort not only into making a user-friendly internet bank, but also into explaining to their customers how the internet bank is useful to them.

Keywords: the Internet, technology acceptance, financial service, bank, relationship marketing

Introduction

A growing phenomenon in financial services is the use of the Internet as a channel for financial services. The Internet bank usage might however not be easy for the consumers. Consumers' use of Internet banking requires acceptance of the technology, which can be complicated because it involves the changing of behavioural patterns (Meuter *et al*, 2000). Technology, on the one hand, can simplify consumers' understanding of exchange, but on the other hand, it can make consumers' understanding more difficult. Mick and Fournier (1998) identify eight such paradoxes of information technology. Consumers perceive Internet technology as leading to control and chaos, freedom and enslavement, new and outmoded practice, increase and decrease in the feeling of competence, increase and decrease in efficiency, fulfilment and creation of needs, promotion and hindrance of social interaction, and engagement and disengagement. These ambiguities make Internet technology difficult for consumers to understand. To use Internet financial services, consumers not only need to understand the technology, they also need to understand financial services. The complex nature of financial services often renders the task of information search easier than information evaluation (Black *et al*, 2002). The combined effect of consumers' understanding of both the Internet channel and financial services is difficult to foresee, and therefore there is a need for more research in consumers' use of complex services in the Internet.

Marketing aims to maintain and increase consumer use of goods or services. Consumers use is important because it builds consumer habits and reduces consumer uncertainty (Sheth and Parvatiyar, 1995), and because it develops understanding in social exchange processes (Kelly and Thibaut, 1978). Internet bank acceptance can be studied by examining the causes behind frequency of use of Internet banking. For such a study, we apply a modified form of the technology acceptance model (TA model), which identifies the perceived usefulness and the perceived ease of use of a technology as determining user behaviour (Davis, 1989). Since many

researchers have found that trust influences consumer behaviour (Polatoglu and Ekin, 2001; Kardaras and Papathanassiou, 2001; Minjoon and Shaohan, 2001), we decided to add this variable to the TA model. The TA model has been applied before, but to our knowledge, not to Internet banking.

The emerging east European economies present a great opportunity for western firms. In many respects, they may also serve as forerunners in product development, as in the case of Estonian Internet banking. The Internet is central to the strategy of Estonian banks, which differentiate them from for example British banks, where the Internet not is considered a significant channel (Howcroft *et al*, 2002).

The purpose of our research is to study technology acceptance in Internet banking in Estonia, an emerging east European economy. This special situation is of interest because the application of established theory to a distinctly different setting provides new insights. The study also contributes by mapping the trajectory of the status and the strategic potential of Internet banking in an emerging east European economy.

Internet banking in Estonia

The Estonian banking industry started in 1988 when permission for the establishment of commercial banks was granted for the first time in the Soviet Union. The liberalization effort was eagerly taken advantage of, and by 1990, there were already 12 banks in Estonia. The number of banks increased to 41 by 1992 (Estonian Bankers Association, 2002), but has come down to five banks, by 2003. In Estonia, contrary to established western bank markets, the history of electronic banking is but a few years younger than the history of banking in general. The first Internet bank in Estonia were introduced in 1996 (Estonia Bankers Association, 2002). Estonia has a relatively high penetration of personal computers and Internet access, where 45 % of the Estonian population (ages 15 to 74) are users of the Internet (Emor, 2003). In one of the

most thorough comparisons of Internet penetration and Internet banking penetration that has been done, Estonia and Scandinavian countries show similar patterns: the adoption (signing a contract to use the Internet bank) of electronic banking is nearly 50% or more of the Internet penetration (OECD, 2002). However, Estonia clearly stands out as an extreme case among CEE (central eastern European) countries. While one in four active Internet users in Europe also is users of the Internet bank (Nielsen NetRatings, 2002), 57 % of the active Internet users in Estonia also is Internet bank users (Emor, 2002). This indicates that, in the case of Estonia, background features other than Internet penetration also has an important role in the Internet banking uptake.

Sweden is in the survey of electronic banking conducted by the Economist, considered to be world leader in Internet banking (Economist, 2000). FöreningsSparbanken, which The Economist considers the most successful and advanced of the Swedish banks, only has half as many Internet bank customers per bank branch office as Hansapank, the biggest Estonian bank. This suggests that the structure of the Estonian bank market is distinctly different from the Scandinavian and European bank market, where the Estonian bank market has a much greater reliance on the Internet.

Use of technology

Consumers learn about goods and services to a large extent by the development of experiences from trial and error. Consumer experiences are a major determinant of consumer choice and preferences (Bettman and Park, 1980; Foxall, 2003). However, experience is an ambiguous concept because it refers both to experience of the service content and of the delivery channel. For instance, experiences determined how consumers assessed the service, through one or multiple channels, and how they perceived channel richness (Carlson and Zmud, 1999). Services

are often delivered and consumed in a channel, making determination of which experience, is the important one, that of content or that of deliver, especially difficult.

One way of resolving this issue is to focus on consumer use as an important predictor of experience. Consumer use reduces consumer uncertainty, builds consumer habits (Sheth and Parvatiyar, 1995), and develops understanding in social exchange processes (Kelly and Thibaut, 1978). The ultimate goal of marketing is often that the seller becomes part of a buyer's life concerning the need for the seller's product or service. To achieve such a goal, use of the product or service may be instrumental. For instance, relational marketing is based on the premise that a series of transactions are transformed into a relationship (Cook and Emerson 1978, Grönroos, 2001). Relationship duration and interaction frequency have been found to be good predictors of relationship development (Levinthal and Fichman, 1988). Similarly, theories of social practice also hold that more use leads to more automatic and taken-for-granted behaviour (Brown and Duguid, 2001).

Turning to a technology context of use, the frequency of use has been found to capture the consumer's use of a technology (Lang and Colgate 2003, Ricard *et al*, 2001). Another valid representation of technology use is the duration of the experience with the technology (Ricard *et al*, 2001). The features of a technology are likely to influence how the consumer makes sense of the seller's service offer, which also influences use (Griffith, 1999, Carlell, 2001). For Internet bank customers, their relationship to the bank will thus be characterized by complex sense making of both the more tangible material interface with the bank, such as the layout and function of the website, and the more social response to interaction via the bank's physical site. A study showed that individuals' experience with a new distribution channel is important when they start to use a service, but that the importance of such channel experience decreases over time (Carlson and Zmud 1999). This result indicates that experiences with a new kind of channel are important at first, but that they decreases in importance relative to the benefits of other

factors as the consumer continues learning to exchange in the new way. The same study found that experience with the communicating partner became increasingly important over time. Even though experience with the channel decreases in importance, the understanding and exchange with the communicator becomes more important. Perhaps the consumer feels more confident about the medium for exchange, and starts to focus on the content and the potential for value addition.

Perceived usefulness, ease of use and frequency of use

Davis introduced in 1989 a development of the theory of reasoned action (Ajzen and Fishbein, 1980) – technology acceptance model (TAM) – that was supposed to explain why people accept or reject new technologies (Davis, 1989). It was specifically designed while keeping in mind the adoption of information-technology related products in the organisational context (see Figure 1). The key components of his model were perceived usefulness and perceived ease of use (Davis, 1989). Further research has used this model also in the setting of private individuals, as the theory is relevant outside the organisational context as well (see for example Lu *et al.*, 2003). The model stipulates that usage behaviour depends on the subject's intention to use, which depends on the perceived usefulness of the technology and the perceived ease of use of the technology.

*****Insert figure 1 here*****

Numerous empirical studies have found that TAM consistently explains a substantial proportion of the variance (typically about 40%) in the usage behaviour and intentions (Venkatesh and Davis, 2000). The original TAM model was developed for the job context where people behave somewhat more rationally than in their spare time. Although banking is a private matter, there

are some similarities with job context as both imply relatively low levels of entertainment and a high focus on efficiency. Davis (1989) pointed out the prominence of perceived usefulness: users are driven to adopt an application primarily because of functions it performs for them and secondarily for how easy or hard it is to get the system to perform those functions. It means that a high score on ease of use can never compensate for a system that users perceive useless. In recent years TAM has also been used for adoption of online shopping (Childers *et al.*, 2001), another activity that bears similarities to the online banking. Consequently, the technology acceptance model can be considered highly suitable for studying the usage of Internet banking.

The perceived usefulness is defined as “the extent to which a person finds that using the system will enhance his or her job performance” (Doll *et al.*, 1998). The perceived usefulness of something is its ability to provide a means-end relationship (i.e., the given thing as a means to a desired end), or to provide a rationale upon which to make decisions. Means-end knowledge accounts for why consumers use a product (Barczak *et al.*, 1997). The perception of usefulness is formed in interaction with other individuals and a system (Venkatesh and Davis, 2000). The perceived usefulness of the knowledge a person gains depends on how that knowledge can be applied in a particular decision-making situation. The perceived usefulness of gained knowledge in a decision-making situation is contingent upon

- (1) the perceived meaningfulness of the particular knowledge (i.e., does the knowledge makes sense to the user?),
 - (2) the perceived relevance of the goal (i.e., how is knowledge related to the task at hand?),
 - (3) the perceived operational validity (i.e., can something be done with the knowledge?),
- and

- (4) the perceived innovativeness (i.e., the perceived innovativeness (i.e., how new or “non-obvious” is the knowledge?) (Shrivastava, 1987).

Since perceived usefulness has previously been found to effect use behaviour (Davis, 1989; Lu *et al.*, 2003), we constructed the following hypothesis.

Hypothesis 1. Increase in perceived usefulness will positively effect perceived use.

The perceived ease of use is defined as “the extent to which a person believes that using the system will be free of effort” (Doll *et al.*, 1998). Perceived ease of use implies that existing routines can be applied to the situation at hand. In such a case, there will be no perception of uncertainty (Eriksson and Sharma, 2003), in that routines need not be altered to yield an outcome that is at least acceptable (Nelson and Winter, 1982). For instance, the use of marketing research knowledge increased when it confirmed managers’ prior beliefs (Lee *et al.*, 1987). However, the perceived ease of use will be lower if the routines are unsuitable for the situation. Then the firm will have to develop and learn new routines that better suit the situation (Argyris and Schön, 1978). Such development and learning is resource consuming and cannot be accomplished easily (Nelson and Winter, 1982, Argyris and Schön, 1978). Deshpande and Zaltman (1982) found that the higher the degree of surprise in the information, the less its use: meaning that more standardized and accessible market information is more useful because the latter kind of knowledge requires less learning by the firm.

Ease of learning has been an important component of ease of using—in fact, Davis had two learning related questions in his original model (1989). He noted that previous research has found strong correlations between ease of learning and ease of use. This has been validated also in research by Adams *et al.* (1992), Segars and Grover (1993), Subramanian (1994), and Doll *et al.* (1998). Whiteside *et al.*, (1999) have even concluded that ease of learning and ease of use are congruent.

Since perceived ease of use has previously been found to lead to use behaviour, we constructed a second hypothesis.

Hypothesis 2. Increase in perceived ease of use will positively affect perceived use.

The TA model identifies behavioural intentions that mediate the effect of perceived usefulness and of ease of use on user behaviour. Based on the large body of findings that intentions generally result in behaviour (Fishbein and Ajzen 1975, Gollwitzer and Schaal 1998, Ajzen 2001), we modified the TA model by deleting the “intention to use” from the model.

The fact that intention can be excluded from the technology acceptance model without any subsequent information loss has been supported also by the research by Winklhofer, McKechnie, and Ennew (2004). The model we adopt in this paper shows that frequency of use depends on perceived usefulness and ease of use.

Perceived ease of use concerns whether the current routines suit the situation, or whether the firm needs to learn new ones. Simplified, perceived ease of use concerns the state of routines. Perceived usefulness is a more dynamic variable because it focuses the effect of Internet banking on the subject’s situation. The TA model shows that perceived ease of use is antecedent to perceived usefulness in that the former is more of a state, while the latter is more of a process. We constructed a third hypothesis as follows.

Hypothesis 3. Increase in perceived ease of use will have a positive effect on the perceived usefulness.

Trust in Internet banking as an antecedent to ease of use and perceived usefulness

The TA model was originally applied to information systems. In this paper, we apply it to the consumer's Internet bank attitudes and behaviour. This is by no means a simple transition. Drawing on social exchange theory, Gefen and Keil (1996) argue that a model of technology acceptance with more social dimensions requires that trust be included as an antecedent to perceived usefulness and ease of use. Other researchers have also found trust issues and risk perception to be crucial drivers of Internet banking adoption (Bradley and Stewart 2002, Page and Luding 2003). Furthermore, Internet banking is an exchange situation that lacks physical presence of the branch and lacks personal interaction. In such a unique environment, trust has been found to be of key importance (Mukherjee and Nath, 2003). We therefore included trust as an antecedent to perceived usefulness and ease of use, and constructed two more hypotheses.

Hypothesis 4. Increase in trust in Internet banking will have a positive effect on the ease of use.

Hypothesis 5. Increase in trust in Internet banking will have a positive effect on the perceived usefulness.

Methodological review

Estonia, with one of the highest levels of Internet banking in the world, has a constantly growing part of its population using such banking. Examining what is affecting the customers' usage of Internet banking in Estonia is therefore important.

A quantitative study was selected to obtain data regarding the usage of, and attitudes towards, the Internet as a banking channel. To examine what influences customers use of the Internet bank a questionnaire was sent to 9000 bank customers in Estonia. For 330 of those customers, the questionnaires were not delivered because we did not have their current addresses. Besides background questions, the survey contained questions concerning the customers' experiences with computers, their uses of the Internet bank, and factors that had convinced them to use

Internet bank, along with several attitude questions. The purpose of the survey was to examine statistically some of the things that influenced customers' decisions to use the Internet bank.

Table 1 presents the frequencies and percentages of the respondents divided according to gender, age, education, personal net income. Having received 1831 completely answered questionnaires from the Internet bank customers, the response rate was 21.12 per cent (female, 56 percent; median age, between 36 and 40 years; holding a university degree, 46.2 percent; using the Internet bank more than 3 years, 42.8 percent).

Insert table 1

Factor analysis

A factor analysis was conducted to develop constructs that will help analyze the questionnaire responses and to evaluate factors that influence customers' actual usage of the Internet bank. Factor analysis assists in condensing a large set of variables into a smaller number of basic components, which include some connected variables (Pallant, 2001). To gain further insights in which factors were actually affecting usage and how they are interrelated a model was developed using LISREL.

The factor analysis made use of 8 questions concerning the customer usage of Internet banking. The 8 questions were subjected to Principal Component Analysis (PCA) using as software Statistical Package for Social Sciences (SPSS). According to the PCA the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser-Meyer-Okin- value reached 0.716, which is more than the recommended minimum of 0.6 (Kaiser, 1974). Barlett's Test of Sphericity (Bartlett, 1954) reached statistical significance (0.000), supporting the factorability of the correlation matrix.

PCA revealed the presence of four components that together explained 78.4 per cent of the variance. The Screeplot revealed a break after the fourth component; that is why we chose to retain these four components for further investigations (Catell, 1966).

After reducing the analysis to four components, those components appeared to form a clear structure. To receive a better overview of the four factors, a Varimax rotation was performed. The Varimax rotated matrix presented in table 2 revealed the presence of a structure in which all components showed strong loadings, and all variables load to only one component (Pallant, 2001). The four components will be used to further evaluate customer usage of Internet banks. The first component illustrates the customers' trust in the Internet banks safety. The second component illustrates customer apprehension of "ease of use". The third component illustrates the customers' perceived usefulness of Internet banking. The fourth component illustrates the customers' usage of Internet banking. All the factors include 2 questions. In Table 2 we present the factors and the questions pertaining each.

Insert table 2

Constructs

The conducted factor analysis generated four components that are be used to examine what is influencing the customers' usage of the Internet banking.

Trust

According to Morgan and Hunt (1994), confidence stems in a part from the belief that the trustworthy party is reliable and has high integrity. An effective customer-company relationship requires trust (Morgan, Hunt, 1994), and for the company, such relationships are crucial to managing trust, because a customer typically must buy a service before experiencing it (Berry, Parasuraman). The importance of including trust has been pointed out by Polatoglu and Ekin (2001) in their qualitative study, and also by Kardaras and Pathanassiou (2001), who researched corporate customers. Daniel (1999) predicted security to be one of the determinants of customer acceptance of Internet banking.

Customers appear to be much more concerned with the security of the Internet banking than they are with that of traditional banking (Minjoon and Shaohan 2001). So as to measure the significance of trust, we chose to include it in our study. The component “trust” was addressed in questions to customers about their attitudes towards the bank’s reliability and security.

The component trust comprised customers’ attitudes towards their bank’s safety and also their confidence in their bank’s store of customer data. The customers’ trust in their bank is dependent of their confidence in their bank’s reliability and integrity. Trust is an apprehension of the banks trustworthiness, which arises from the bank’s expertise and reliability. The trust component, which indicates at which level the customer has confidence in, and is willing to rely on, the bank, was included to examine how the customer’s trust in their banks is affecting the customers’ usage of Internet banking.

Perceived Usefulness

If a customer believes that a certain application will help him perform his job better, he will be more likely to use it than if he does not realize the application’s usefulness (Davis, 1989).

Davis (1989) and many other researchers (Karahanna *et al* 1999, Doll *et al* 1998, Venkatesh and Davis, 2000, Gerrard and Cunningham, 2003) have realized that perceived usefulness has a strong influence over the customer’s usage of an application. However we found no research on

the direct significance of perceived usefulness to the customers' usage of Internet banking, but such perceived usefulness is another variable generated from our factor analysis. This variable, as a component generated from the factor analysis, consists of two questions concerning the customers' apprehension of the usefulness of the Internet channel as a part of the interaction with the bank. The two questions concern how the Internet bank has contributed to offering the customer a better overview of their finances, and to giving customers a more convenient and useful way of conducting their bank business.

Ease of use

The third component generated from the factor analysis is "ease of use", which has been found to influence customers' usage behaviour in previous studies (Davis, 1989), is a factor referring to the customers' believing that usage of the Internet bank will be free of effort.

This factor consists of two questions. The first concerns the customers' apprehension of the efforts required to learn to use the Internet bank. The second question concerns the persons' interest in new services provided by the Internet bank, which can be used to indicate customers' apprehension of the level of effort involved in using the new services.

Usage

The fourth component generated from our factor analysis is usage of Internet banking. This component refers to the customers' usage behaviour for the Internet banking. The component consists of two questions concerning the customers' usage. The first question concerns how long they have been using the Internet bank; the second question, how often. These two questions relate to analogous considerations in Davis's original study (1989), where self-reported frequency and length of Internet bank use was a measure of use. Ajzen (1988) has argued that subjective and objective measures of neutral activities (that do not possess elements of social desirability) are highly consistent. These two questions provide a picture of the customers' usage behaviour regarding Internet banking.

The aim is to study technology acceptance in Internet banking in Estonia, and to do this, we started from Davis' technology acceptance model. Therefore we use perceive usefulness, perceived ease of use, to study the technology acceptance. We however also has chosen to include trust, which by several researchers has been found influencing the consumers (Polatoglu and Ekin, 2001; Kardaras and Papathanassiou, 2001; Minjoon and Shaohan, 2001). To examine how these components affected the customers' usage, these components were evaluated in LISREL. LISREL gives the enables one to evaluate the components within a complex model, and can therefore illustrate how usage of Internet banking is affected by the other components.

LISREL

After generating four factors in SPSS, the data were processed using LISREL, a structural equations modelling technique that traces structural relations in a set of data (Hayduk, 1987; Anderson and Gerbing, 1988; Bollen, 1989; Jöreskog and Sörbom, 1993). LISREL has been found to be robust to non-normality (Mattsson, 1998). Structural models are formed by defining relations between latent variables, which are higher order variables that represent underlying commonalties of the observed variables. Groups of observed variables are indicators of a latent variable, which is often interpreted as a theoretical construct. The formation of constructs and models together with the error covariance and correlations make up the fundamental dimensions of LISREL. The formation of constructs and models may be described as causal dimensions, whereas the pattern of covariance in error terms and correlations may be described as a structural pattern in data.

The method for assessing validity stems from the basic dimensions used in modelling. We assess the validity of our structural model in three dimensions: (a) nomological validity, meaning the validity of the entire model; (b) convergent validity, meaning the homogeneity of constructs in the model; and (c) discriminant validity, meaning the degree of separation between constructs.

Estimates for assessing validity are derived from the structural model and a measurement model, which contains no structural relations. The key statistical estimates result from both error covariances and correlations, but their separate contribution can also be estimated.

There is an ongoing debate on what measures to choose for assessment of nomological validity (Bollen and Long, 1993). Three frequently mentioned measures are (1) the GFI, which checks for sample size effects and should be above 0.90, (2) the RMSEA, which measures population discrepancy per degree of freedom and should be below 0.08, and (3) the CFI, which checks for non-normal distributions and should exceed 0.90 (Murtha, Lenway, and Bagozzi, 1998; Bollen, 1988). Convergent validity is confirmed if indicators load only on their constructs. Convergent validity is judged by factor loadings, t-values, and an R² values, which measure the strength of the linearity in the relation (Jöreskog and Sörbom, 1993; Bagozzi, Yi, and Phillips, 1991; Bollen, 1989).

Discriminant validity is assessed from the measurement model. Correlations between latent variables should be significant and should not be multidimensional. Significance is investigated by estimating the t-values of correlations. Unidimensionality is tested by forming an approximate confidence interval from error terms and correlation coefficients. An interval including the number 1 suggests unidimensionality and thus rejects discriminant validity (Jöreskog and Sörbom, 1993; Bagozzi, Yi, and Phillips, 1991; Bollen, 1989). Interpretation of a valid model should be done with the awareness that each relation in the model is a part of the broader context of the model itself. The model contains many counteracting and reinforcing structural effects; therefore, viewing one part of the model in the context of the entire model is essential. Bollen (1989) points out the following: "In the typical regression analysis the regression coefficient is an estimate of the direct effect of a variable. If we ignore the indirect effects that a variable may have through other variables, we may be grossly off in the assessment of its overall effect."(p.38). Ignoring of the indirect effects is especially serious when there are direct and

indirect effects of equal magnitude but opposite in sign. In such a case, the omission of a mediating variable leads to a "...total effect of considerably less than the absolute values of the direct or indirect effects of which it is comprised" (Bollen, 1989). A simple example is a causal chain where the construct *a* causes *b*, and *b* causes *c*. In such a model, *a* has an effect on *b*, and *b* has an effect on *c*, but *a* also has an indirect effect on *c* that is mediated by *b*. The effect of *b* on *c* is thus the total effect of the direct effect of *b* on *c* and the indirect effect of *a* on *c*. The correct interpretation of this simple example is that *b* has an effect on *c* in the context of *b* being affected by *a*. Patterns of causal effects are often very complex, so the researcher should be as parsimonious as possible in structural modelling (Bollen, 1989). Another implication is that validity cannot be assessed piece by piece. The causal effect cannot be correctly investigated from *a* to *b* in one model, and then from *b* to *c* in another to conclude that *a* has an effect on *c*. All constructs and relations have to be assessed in one and the same model.

Results

The hypotheses are tested in a structural equations model, as depicted in Figure 1 below. The model's key statistics are good since the GFI is 0.99, the CFI is 0.98, the RMSEA is 0.051, and the NFI is 0.98. We can thus safely conclude that the model is valid and can continue to analyze the outcome of the hypothesized causal effects.

Insert figure 2

The perceived use is positively affected by perceived usefulness, which supports hypothesis 1., - But perceived ease of use has not a positive effect on perceived use, so hypothesis 2 is not confirmed. Perceived ease of use has a positive effect on the perceived usefulness, which confirms hypothesis 3. Trust has a positive effect on both perceived ease of use and perceived usefulness, confirming hypotheses 4 and 5.

Closer examination of the only unsupported hypothesis yields interesting findings. Structural equation models are often complex webs of reinforcing and counteracting effects. One variable can often mediate the effect of another variable on a third, dependent variable. The estimate of the effect of perceived ease of use on perceived use, mediated via perceived usefulness is 0.37, with a t-value of 6.99. This result suggests that perceived ease of use has an effect on perceived use, but only via the mediating variable, perceived usefulness. We take this as partial support for hypothesis 2.

Discussion

The findings of this study point to the perceived usefulness of Internet banking as the primary reason that Estonian bank customers use the Internet for banking. The perceived ease of use of the Internet banking does not directly increase the use of Internet banking, but it does lead to greater perceived usefulness, which then increases that use. These findings are supported by Davis's (1989) findings that perceived usefulness has a stronger influence on usage than does ease of use. Davis's study shows that users are driven to adopt a technology primarily because of the functions it provides them, and secondarily because of the easiness of benefiting from those functions. Customers are often willing to overlook some difficulties of usage if the service provides critically needed functions: no amount of ease of use can compensate for a system that does not perform a useful function (Davis, 1989). Contrary to our findings, Davis found a

relationship between ease of use and usage. Our findings might differ from Davis's in that we study technology adoption in a special setting: Internet banking in Estonia. Perhaps the technology acceptance model is put to a challenging test in this unique environment, resulting in perceived ease of use being a mediating variable, with ease of use as antecedent, and use as outcome. Because the model that we found support for is more universally applicable, and because Davis found that perceived usefulness has a stronger relation to use than perceived ease of use, we suggest that the technology acceptance model should be redefined, to take account of our findings, and to include trust, in order to put a greater emphasis on the social exchange processes that are central to technology adoption. Based on such a redefinition, we identify a model of technology acceptance, depicted in Figure 2 below, that is valid also for Internet banking in Estonia. We speculate that such a model is generally applicable to internet banking in all sorts of countries, and perhaps also generally applicable to technology acceptance of other service industries. However, it is for future research to show this.

Insert figure 3

Managerial implications

From the bank's point of view it is necessary to know the relationship between perceived usefulness and ease of use, because their influence on the actual usage is different. It may seem tempting to concentrate efforts on making the user interface easier and more appealing, but even in the pre adoption stage the real content is what matters most. No amount of added ease of use can compensate for lack of usefulness. There are also factors, not so directly linked to Internet bank, that affect usage, like overall trust in the bank. The consumers pursue an integrated

perception of the bank and failures in overall performance also influence attitudes towards Internet banking

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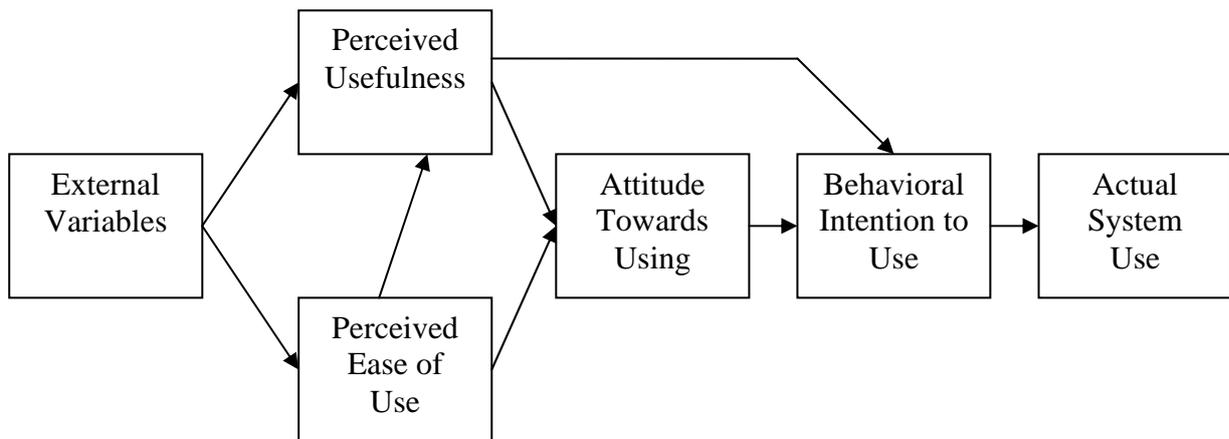


Figure 1. Technology acceptance model
(Davis *et. al.* 1989)

Table 1

Demographic profile of the respondents.

Demographic characteristics	Frequency	Valid Percentage
Gender		
Male	794	44
Female	1009	56
Age		
-25	455	25.1
26-35	370	20.4
36-45	384	21.2
46-55	349	19.3
56-	252	13.9
Education		
Primary school	50	2.8
Secondary school	401	22.3
Secondary special	504	28
University degree	760	42.2
Post diploma (PhD, MBA)	87	4.8
Personal income		
Below 192 EUR	459	26.6
193-320 EUR	352	20.4
321-512 EUR	441	25.6
513-769 EUR	259	15.0
770- EUR	213	12.4

Table 2

Rotated Component Matrix (a).

	Component			
	1	2	3	4
I think customer data is kept securely by banks.	,888			
The bank I am using is safe.	,852			
I am interested in new electronic bank services.		,853		
It is easy to learn Internet banking.		,771		
Internet banking gives me better overview of my finances.			,801	
Internet banking has made communication with banks easier.			,791	
How long have you been using Internet bank?				,852
How often do you use Internet bank?				,751

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a Rotation converged in 5 iterations.

Figure 2

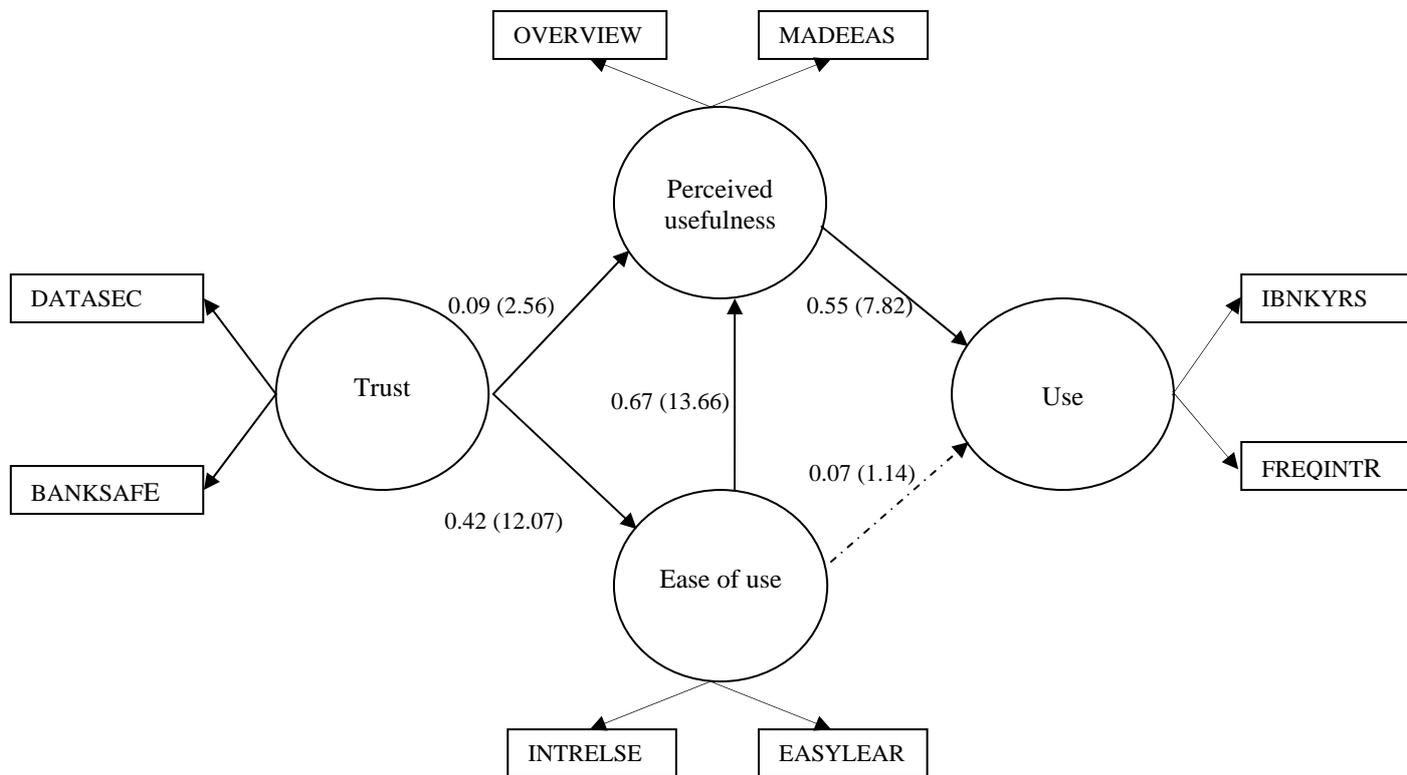


Figure 3

Technology acceptance model redefined to encompass Internet banking in Estonia.

