



Negative emotions and consumer behavioural intention to adopt emerging e-banking technology

Masoom Abikari¹ · Peter Öhman¹ · Darush Yazdanfar^{1,2}

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Abstract

Successful implementation of e-banking technology depends on how consumers perceive the technology and how likely they are to adopt it. Although several studies have analysed the impact of some specific negative emotions, few studies examine a broad range of consumers' negative emotions (i.e. both deterrence and loss emotions) arising from appraisals of e-banking technology. This study investigates the possible relationships between deterrence and loss emotions, and consumers' behavioural intention to adopt emerging e-banking technology. Based on the unified theory of acceptance and use of technology, partial least squares structural equation modelling was used to analyse a conceptual model and related hypotheses. The empirical evidence draws attention to the relationship between loss emotions and consumers' behavioural intention to adopt emerging e-banking technology through effort expectancy and performance expectancy, respectively.

Keywords Emerging e-banking technology · Unified theory of acceptance and use of technology · Deterrence emotions · Loss emotions

Introduction

The banking industry has continuously responded to changes in the market (Yaseen and Qirem 2018). Of particular importance is that advances in information technology (IT) have influenced the industry and created an increasingly competitive atmosphere (Giovani et al. 2019). Electronic financial service channels such as Internet banking (IB) and mobile banking (MB) have emerged (Gan et al. 2006), and scholars have applied the umbrella term “electronic banking” or “e-banking” when investigating these channels from different perspectives. E-banking is defined as the automated delivery of bank products or services over electronic networks and Internet technology (Abbad 2013; Daniel 1999).

Investigations have recognized factors that encourage consumers to adopt new technology, leading to practical suggestions as to how managers and policy-makers can improve the prediction of consumers' behavioural intention to use emerging e-banking services (Rahi et al. 2018; Simiyu et al. 2018; Tan and Lau 2016; Yousafzai 2012). Many studies have focused on the functional, utilitarian, and instrumental aspects of e-banking technology adoption. These studies have examined cognitive factors such as relative advantages (Ayo et al. 2016; Kolodinsky et al. 2004), perceived usefulness and ease of use (Arora and Sandhu 2018; Jahangir and Begum 2008; Wan et al. 2005), effort expectancy and performance expectancy (Kaabachi et al. 2019; Raza et al. 2019; Yaseen and Qirem 2018), perceived risk (Odumeru 2012; Simiyu et al. 2018; Takele and Sira 2013), trust (Alalwan et al. 2015; Sánchez-Torres et al. 2018), and government support (Sánchez-Torres et al. 2018).

Considering non-cognitive aspects, emotions have been recognised as influential on the adoption of e-banking technology because they affect an individual's thinking, attitudes, decision making, and actions (Mehrabian and Russell 1974). However, studies in the e-banking context have mainly concentrated on a range of positive emotions such as joy, excitement, satisfaction, and hedonic motivation (referring to enjoyment, fun, and pleasure) (e.g. Abbad

✉ Peter Öhman
peter.ohman@miun.se

Masoom Abikari
Masoom.abikari@miun.se

Darush Yazdanfar
darush.yazdanfar@miun.se

¹ Centre for Research on Economic Relations, Mid Sweden University, 851 70 Sundsvall, Sweden

² Södertörn University, 141 89 Huddinge, Sweden



2013; Odumeru 2012; Salhieh et al. 2011), while few negative emotions such as anxiety have been investigated (e.g. Anshari et al. 2021). Moreover, many of these studies of negative emotions have taken their point of departure from the computer anxiety concept applied in the technology adoption model (TAM) (Venkatesh 2000) and the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003). Reviews such as those by Shaikh and Karjaluo (2015), Tam and Oliveira (2017), and Souiden et al. (2020) find a lack of e-banking studies examining the effects of a broad range of negative emotions and suggesting more multi-perspective approaches, and Wu et al. (2017) recommended studies in financial contexts of affective factors such as negative emotions as predicting users' adoption behaviour. In the IT adoption context, two proposed categories of negative emotions, i.e. deterrence and loss emotions, are based on threat and the level of control perception (Beaudry and Pinsonneault 2010).

This study investigates whether consumers' deterrence and loss emotions towards e-banking technology influence their behavioural intention to adopt emerging e-banking technologies such as digital currencies and mobile wallets. The study contributes to the e-banking literature by elaborating on which categories of negative emotions might affect e-banking technology adoption and determining how negative emotions are related to consumers' behavioural intention through emotion-related factors according to the UTAUT model.

The remainder of the paper is organized as follows. The "Literature review" presents the UTAUT model and the role of emotions in the IT and e-banking contexts, and is followed by the "Conceptual model and hypothesis development" section. The next section, "Research method", addresses methodological issues, while the results of the statistical analyses are reported in the "Data analysis" and "Results" sections. The paper ends with the "Discussion and conclusion" and "Implications, limitations, and suggestions for future research" sections.

Literature review

The unified theory of acceptance and use of technology

The original UTAUT model was developed based on eight theories and models of technology adoption, and compressed 32 variables into four main variables (i.e. performance expectancy, effort expectancy, social influence, and facilitating conditions) and four mediated variables (i.e. age, gender, experience, and voluntariness of use). This model, created by Venkatesh et al. (2003), predicted approximately 70% of individuals' behavioural intention to use technology

and 50% of technology use. These percentages suggested a significant improvement over previous model (Dwivedi et al. 2019; Oye et al. 2014). The UTAUT model was then extended by adding three variables (i.e. hedonic motivation, price value, and habit) and dropped voluntariness of use as a mediating variable (Venkatesh et al. 2012), and it has been considered one of the most comprehensive theoretical frameworks for predicting consumer behaviour in the e-banking adoption context (Giovanis et al. 2019; Inder et al. 2022).

The role of emotions in technology adoption models

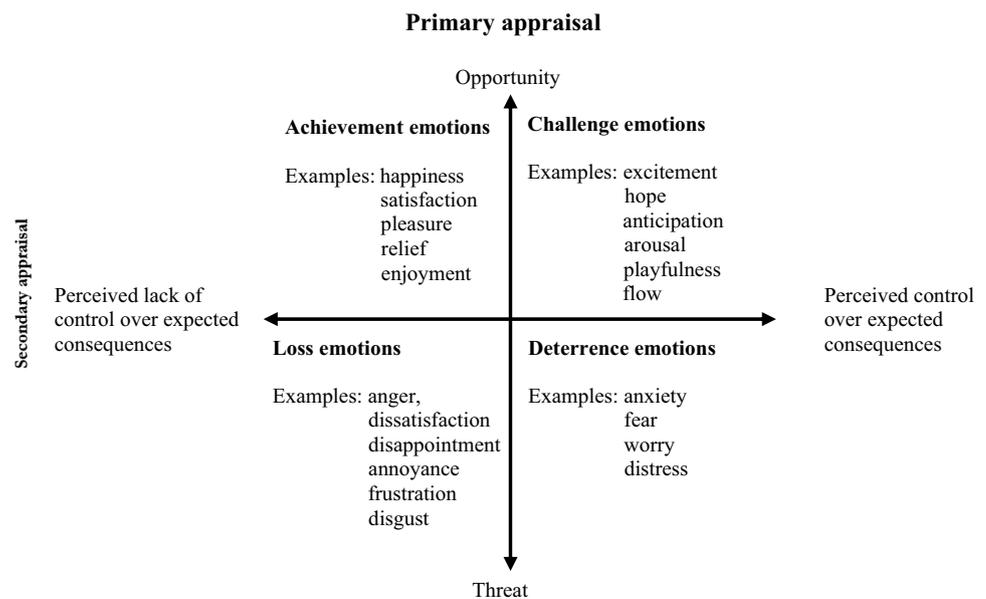
Emotion is defined as a mental state of readiness that cultivates behavioural actions and helps individuals organize their behaviour in response to stimuli (Bagozzi et al. 1999). Hence, emotions affect an individual's behaviour and are evoked in response to the appraisal of an event perceived as relevant or important. In the technology context, emotions such as anger and anxiety are results of individuals' routines being interrupted by new technological products or services (Beaudry and Pinsonneault 2010).

Beaudry and Pinsonneault (2010) developed a framework of four categories of positive and negative emotions in the IT context to describe how emotions can be associated with the adoption and usage of new IT applications. The categories were labelled achievement emotions, challenge emotions, loss emotions, and deterrence emotions. This framework (see Fig. 1) was conceptualized based on the dimensions of primary and secondary appraisal. Primary appraisal refers to whether an individual regards a new IT as an opportunity or a threat, whereas secondary appraisal refers to an individual's perception of control over the expected outcomes of a new technology. In this study, the main focus is on the two categories of emotions perceived as threats, and the paper follows Beaudry and Pinsonneault's (2010) path in exploring negative emotions evoked by new technological products or services. Their study was conducted in an organizational context focusing on employees, investigating their emotions in the anticipation period. From the consumer perspective, negative emotions are not only perceived after a new technology product or service is launched in the market (i.e. the impact period), but may also arise before the presentation of a new product or service (i.e. the announcement time). In contrast to employees who must accept new technology, consumers have decision-making power and can accept or ignore new products or services.

Due to the competitive nature of markets, companies cannot reveal information about their new products or services before launching them. It would therefore seem that the meaning of the announcement period in this context is more similar to that of advertising, the idea being to encourage consumers to use a new technology. In the e-banking technology market, digital currencies and mobile wallets have



Fig. 1 The emotional framework in the technology adoption context (Beaudry and Pinsonneault 2010)



already been presented (Yusuf Dauda and Lee 2015). The vast majority of consumers can therefore recognize these new e-banking technologies because they have used or at least heard of them. This recognition can evoke consumers' negative emotions, providing a suitable opportunity to investigate these emotions towards emerging e-banking technology.

Emotions in e-banking technology adoption models

A limited number of emotions has been analysed in models of e-banking technology adoption, and results regarding the impact of these emotions varies. Most researchers have investigated the role of positive emotions in terms of enjoyment (Odumeru 2012; Pooya et al. 2020; Salhieh et al. 2011; Santini et al. 2019) and hedonic motivation (Alalwana et al. 2017; Farah et al. 2018; Gupta and Arora 2019; Kwateng et al. 2019; Makanyeza and Mutambayashata 2018; Oliveira et al. 2016; Raza et al. 2019; Yaseen and Qirem 2018). The argument for the role of positive emotions is as follows: When consumers find the usage of different e-banking channels an enjoyable experience, they will probably accept using e-banking services (Abbad 2013). Among the few studies focusing on negative emotions, Yuen et al. (2010) found no relationship between anxiety and behavioural intention to use IB in their samples of developed and developing countries, while Saprikis et al. (2022) discussed the significant negative effect of anxiety on behavioural intention to use MB applications among Greek users.

Conceptual model and hypothesis development

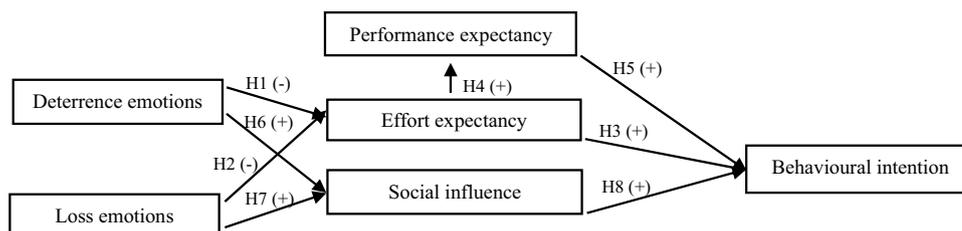
The conceptual model

To shed light on the association between consumers' negative emotions and their behavioural intention to adopt emerging e-banking technology, the proposed conceptual model excluded facilitating conditions; instead, it concentrated on the potentially most emotion-related factors of the UTAUT model based on the literature review, including the IT and e-banking context. The underlying motive for selecting these emotion-related factors of the UTAUT model goes back to the main arguments of Venkatesh (2000) and Venkatesh et al. (2003). They noted that the effect of emotions such as computer anxiety and perceived enjoyment on IT adoption behaviour is mediated by a cognitive process, and indicated that effort expectancy played a role in this. Similarly, Beaudry and Pinsonneault (2010) discussed the role of social influence as a turnaround mechanism allowing individuals to overcome their anxiety about adopting new IT events. As is seen in Fig. 2, the conceptual model illustrates how each of the deterrence and loss emotions affects two of the main variables included in the UTAUT model, i.e. effort expectancy and social influence. Effort expectancy has an impact on performance expectancy, and the three main variables in the conceptual model are expected to be positively and directly related to behavioural intention to use emerging e-banking technology.

Deterrence emotions such as anxiety, fear, worry, and distress can be perceived when people view a new technology event as a threat. In this case, the individuals feel some level of control over the consequences of using a new IT



Fig. 2 The theoretically based conceptual model



event (Beaudry and Pinsonneault 2010). Similarly, loss emotions such as anger, annoyance, dissatisfaction, frustration, and disgust may be experienced when people confront an IT event. Such emotions reflect “the perception of an IT event as a threat, and also the perception of a lack of control over its consequences” (Beaudry and Pinsonneault 2010, p. 694).

Performance expectancy emphasizes the individual’s belief about the degree of benefit obtained by using a particular technology for certain activities. Effort expectancy refers to the level of ease associated with the usage of a new technology. These two variables can be related to perceived usefulness and perceived ease of use, respectively, in the TAM model (Venkatesh et al. 2003). Social influence refers to the level to which an individual perceives others’ opinions or beliefs as important for the use of a new technology. Finally, behavioural intention is a well-established part of the UTAUT model used in predicting usage behaviour.

Hypothesis development

Beaudry and Pinsonneault (2010) argued that most IT events have the potential to trigger an array of positive and negative emotions in individuals. The role of anxiety—one subcategory of deterrence emotions—in the adoption of new technology is acknowledged in the IT context (Brown et al. 2004; Donmez-Turan 2019; Venkatesh 2000; Venkatesh et al. 2003). Venkatesh (2000) reported that anxiety is completely mediated by perceived ease of use. Similarly, using the first version of the UTAUT model, Venkatesh et al. (2003) conjectured that anxiety is not a direct determinant of behavioural intention, suggesting that effort expectancy plays a mediating role between anxiety and behavioural intention. Investigating the influence of system experience on perceived ease of use, Hackbarth et al. (2003) identified the full mediator role of computer anxiety. Saadé and Kira (2006) demonstrated that anxiety affects the perception of an online learning system through perceived ease of use. In the e-banking context, Yuen et al. (2010) found no relationship between anxiety and intention to use IB, while Ngugi et al. (2020) and Anshari et al. (2021) found a significant relationship between anxiety and behavioural intention mediated by effort expectancy.

Apart from anxiety, few studies address the influence of negative emotions, and the influence of negative emotions in the loss emotion category has hardly been investigated.

Among the few such studies, Cenfetelli (2004) discussed the influence of a set of negative emotions (representing both deterrence and loss emotions) involving unhappiness, worry, anger, nervousness, regret, disgust, fear, anxiety, and irritation on perceived ease of use. The authors found that negative emotions have a stronger impact than do positive ones.

Beaudry and Pinsonneault (2010) examined the influence of anxiety and anger as two examples of deterrence and loss emotions on IT use. Likewise, Guo et al. (2012) hypothesized that anxiety and anger are indirectly and negatively associated with IT use. Reviewing the results of these studies made it clear that deterrence and loss emotions could be associated with perceived ease of use (when using the TAM model) and effort expectancy (when using the UTAUT model).

If users find a technology easy to use, their willingness to use it will increase (Lewis et al. 2010). Tan and Lau (2016) explained that the millennial generation is more likely to adopt and use MB if they find it easy to learn and use. Rahi et al. (2019) and Ngugi et al. (2020) demonstrated that effort expectancy affects consumers’ intention to adopt IB. However, some results do not support this relationship. Yuen et al. (2010) showed that effort expectancy does not play an influential role in predicting consumers’ intention to adopt IB. Similarly, Zhou et al. (2010) and Saprikis et al. (2022) showed that effort expectancy did not have a significant effect on users’ MB adoption. Although previous results are not unequivocal, there seems to be a positive relationship between effort expectancy and behavioural intention to adopt a new technology. Taking all this together, the following three hypotheses are formulated:

H₁ Deterrence emotions are negatively associated with effort expectancy.

H₂ Loss emotions are negatively associated with effort expectancy.

H₃ Effort expectancy has a positive influence on consumers’ behavioural intention to adopt emerging e-banking technology.

Effort expectancy has also been identified as a significant determinant of performance expectancy in revised UTAUT models in the context of e-banking adoption. Zhou et al.



(2010) found that effort expectancy strongly influences performance expectancy in their proposed model of mobile user adoption. Likewise, Alalwana et al. (2017), Oliveira et al. (2016), Rahi et al. (2019), Tan and Lau (2016), and Wang et al. (2017) reported a significant effect of effort expectancy on consumers' performance expectancy in the adoption of IB and MB. Moreover, the positive influence of effort expectancy on behavioural intention to adopt new e-banking technology, mediated by performance expectancy, has been suggested by Ngugi et al. (2020), Tan and Lau (2016), Wang et al. (2017), Yuen et al. (2010), and Zhou et al. (2010).

Moreover, performance expectancy is found to be a vital concept in research into the acceptance of technological innovation in e-banking (Martins et al. 2014; Ngugi et al. 2020; Raza et al. 2019; Sánchez-Torres et al. 2018; Yang and Forney 2013). AbuShanab and Pearson (2007) found that performance expectancy was one of the main variables in explaining a significant amount of variance in consumers' intention to adopt IB. Yuen et al. (2010) examined and compared factors affecting consumers' IB adoption and found that performance expectancy was the most influential determinant of users' acceptance of IB. Similarly, Zhou et al. (2010) showed that performance expectancy has a significant influence on users' MB adoption. Hence, the following hypotheses are suggested:

H₄ Effort expectancy has a positive influence on performance expectancy.

H₅ Performance expectancy has a positive influence on consumers' behavioural intention to adopt emerging e-banking technology.

Beaudry and Pinsonneault (2010) emphasized that anxiety (in the deterrence emotion category) could indirectly and positively influence IT use through seeking social support. The authors elaborated that anxious people who seek social support use IT significantly more than those who do not seek social support, because such support can make them feel better and positively encourage them to use new IT services. It is also suggested that people who feel anger (in the loss emotion category) normally try to overcome unfamiliar situations by seeking social support (Bagozzi et al. 1999). Anger seems to be relevant when looking for social support, and it could indirectly influence the use of IT. Guo et al. (2012) suggested that anger is positively associated with IT use through a social support strategy. This means that social support plays a reverse role in negative emotional responses (Beaudry and Pinsonneault 2010), suggesting a positive relationship between deterrence and loss emotions, respectively, and social influence.

Social influence has been included when modelling bank consumers to explain how they perceive others' beliefs as

affecting their acceptance and usage of e-banking services (Venkatesh et al. 2003; Yaseen and Qirem 2018). While some studies have failed to support the impact of social influence on consumers' behavioural intention (Alalwana et al. 2017; Makanyeza and Mutambayashata 2018; Yuen et al. 2010), Yaseen and Qirem (2018) identified social influence as critical in predicting people's behavioural intention to use e-banking services. The positive impact of social influence has also been suggested in other studies (Alam 2014; Martins et al. 2014; Yang and Forney 2013; Yu 2012; Zhou et al. 2010). Although there is no clear consensus regarding the role of social influence in the e-banking context, this paper considers this factor because of its potential role as a mediator between consumers' negative emotions and their behavioural intention. It is hypothesized that:

H₆ Deterrence emotions are positively associated with social influence.

H₇ Loss emotions are positively associated with social influence.

H₈ Social influence has a positive influence on consumers' behavioural intention to adopt emerging e-banking technology.

Research method

Population and sample

The population can be considered every person who not only uses e-banking services but also has sufficient technological knowledge to understand the function of new e-banking technology. Indeed, many people use online bank services or mobile bank applications and generally know about the meaning and function of these services (Nourallah and Öhman 2021). However, they would need more information to distinguish between current and emerging e-banking technology (Arias-Oliva et al. 2019). Research recognizes young consumers as the group showing the strongest preference for new e-banking technology (Tan and Lau 2016).

To ensure that the participants would be relatively young and have a reasonable understanding of new e-banking technology, university students were selected as the main study population. Since the study was conducted in Sweden, a country known for its advanced e-banking services (Chandana et al. 2020), Swedish universities were targeted. However, as the aim was to study both Swedish and foreign students, convenience sampling was used to reach this mix of students. This is a kind of non-probability or non-random sampling that considers geographical proximity, availability



at a given time, and easy accessibility when selecting participants from the target population (Etikan et al. 2016).

Table 1 presents the demographic profile of the participants. As can be seen, six out of ten were females. The vast majority was between 18 and 35 years old. The sample included students at the bachelor (38%), master (50%), and PhD (12%) levels. Over half of the participants (59%) were international students, and the vast majority had a monthly income less than SEK 10,000.

Measurement instrument and data collection

To test the theoretical constructs, an online questionnaire was developed based on constructs and items in the literature (see Appendix). The first part of the questionnaire covered demographic information. The second part consisted of general items related to e-banking technology. These items were included to find out how many participants had already heard of or used digital currencies and mobile wallets, and to exclude the other students. The third part consisted of items about negative emotions towards emerging e-banking technology and technology adoption.

Table 1 Profile of the participants

Demographic characteristic	<i>n</i>	Percentage
<i>Gender</i>		
Female	137	58.54
Male	95	40.59
Gender variant/not-conforming	1	0.42
Prefer not to answer	1	0.42
<i>Age</i>		
Under 18 years	1	0.42
18–25 years	97	41.45
26–35 years	113	48.29
36–45 years	21	8.97
Over 45 years	2	0.85
<i>Education</i>		
Bachelor's degree	89	38.03
Master's degree	118	50.42
PhD	27	11.53
<i>Citizenship</i>		
Domestic	97	41.45
International	137	58.54
<i>Income per month (SEK)</i>		
< 10,000	127	54.27
10,000–19,999	43	18.37
20,000–29,999	44	18.80
> 30,000	12	5.12
Prefer not to answer	8	3.41

N = 234; The percentage per category is not 100% because of rounding errors

Most Swedish universities have international students, and as the sampled population comprised domestic and foreign students at Swedish universities, both English and Swedish versions of the questionnaire were sent out. This helped to increase the number of participants and reduce language bias. A pilot survey with 30 participants (not included in the study) was conducted to test and strengthen the reliability and validity of the items and the whole questionnaire.

Online web surveys provided by Google Forms and SurveyMonkey are the most frequently used data collection tools in academic survey research (Gupta and Arora 2019). A hyperlink to the Google survey form was sent to the targeted students via email. The link was also posted in different social media channels and groups on Facebook, WhatsApp, Instagram, and Telegram that had students as members. Considering the numbers of social group members and the number of email addresses, the hyperlink to the Google survey was sent to 850 students. To ensure that only students participated, an alarm message was designed to ask people to ignore the post if they were not students at a Swedish university.

Data were obtained for 6 months from April to September 2020. In the first round, 112 responses were received. A postcard reminder was emailed to the selected participants after 1 month, and message reminders were sent every month to all online social media groups and channels. In total, this resulted in 252 responses, i.e. a 29% response rate. Of these, the responses of ten participants were removed because they responded that they had never heard of the e-banking technologies mentioned. Moreover, eight cases were excluded because the participants did not complete all items properly. Ultimately, 234 valid questionnaires were considered for further data analysis.

Data analysis

Partial least squares structural equation modelling (PLS-SEM) was used to analyse the conceptual model and test the hypotheses. Hair Jr. et al. (2014) discussed how the PLS-SEM approach is appropriate for evaluating non-normal data, as are examined here. It is also suggested that PLS-SEM is suitable for predictive purposes when examining path models, typically with more than five constructs and using small samples (Sarstedt et al. 2015). As suggested by Ringle et al. (2015), SmartPLS v. 3.3.2 software was applied to evaluate the conceptual model.

Composite reliability and Cronbach's α were used to test the construct reliability. Table 2 shows that all the composite reliability and Cronbach's α values for all constructs are above 0.7, which is considered satisfactory (Hair Jr. et al. 2011). In addition, each item's factor loading should be higher than 0.7, and items with factor loadings between 0.4 and 0.7 should be removed from the scale if deleting them



Table 2 Construct reliability and convergent validity

Construct	Item	Factor loadings	Composite reliability	Cronbach's alpha	AVE	R ²	Q ²
Behavioural intention (BI)	BI1	0.955	0.949	0.919	0.861	0.507	0.424
	BI2	0.932					
	BI3	0.895					
Performance expectancy (PE)	PE1	0.899	0.913	0.857	0.777	0.275	0.210
	PE2	0.894					
	PE3	0.851					
Effort expectancy (EE)	EE1	0.891	0.943	0.919	0.805	0.060	0.044
	EE2	0.896					
	EE3	0.904					
	EE4	0.898					
Social influence (SI)	SI1	0.909	0.948	0.918	0.860	0.021	0.015
	SI2	0.956					
	SI3	0.916					
Deterrence emotions (DE)	Anxiety	0.858	0.916	0.880	0.734		
	Worry	0.873					
	Fear	0.917					
	Distress	0.770					
Loss emotions (LE)	Anger	0.818	0.885	0.765	0.794		
	Frustration	0.958					
	Annoyance	0.692					
	Disappointment	0.557					
	Disgust	0.532					
	Dissatisfaction	0.472					

AVE, average variance extracted; R², the coefficient of determination; Q², the predictive relevance

The overall fit of the structural model is estimated by the goodness of fit (GoF)

$$\text{GoF} = \sqrt{\text{AVE} \times R^2} = \text{GoF} = \sqrt{0.805 \times 0.215} = 0.416$$

would increase composite reliability above the threshold value or improve the validity (Hair Jr. et al. 2011). Except for the factor loadings of the four loss emotion items (i.e. annoyance, disappointment, disgust, and dissatisfaction), the values are satisfactory. Accordingly, the four loss emotion items were dropped. All items of constructs are statically significant at the $p < 0.05$ level. Overall, the instrument has good item reliability.

The convergent validity indicated that the dependent variable describes more than half of the variance of its items. The common criterion for estimating convergent validity is average variance extracted (AVE), which should be greater than 0.5 for all constructs to conclude that a measurement model has good convergent validity (Fornell and Larcker 1981). Table 2 shows that all constructs have an AVE higher than 0.5. The model's predictive accuracy was evaluated using the coefficient of determination (R²) and the predictive relevance (Q²). Hair Jr. et al. (2013) suggested measuring R², Q², beta, and the *t*-statistic for assessing the structural model. Moreover, the goodness of fit (GoF) provides an estimation of the overall fit of the structural model (Wetzels et al. 2009).

Reviewing the R² value of each dependent construct in the conceptual model indicates that the model explains 51% of the behavioural intention to adopt new e-banking technology (see Table 2). Analysing the remaining R² values shows that loss emotions explain around 6% of the variation in effort expectancy, while effort expectancy explains 27.5% of the performance expectancy. Table 2 also indicates the acceptable levels of the Q² values for each dependent construct based on the blindfolding procedure. Q² values higher than zero indicate acceptable predictive relevance and point out how well the data can be empirically reconstructed by applying the model and the PLS parameters (Hair Jr. et al. 2013). Moreover, Wetzels et al. (2009) suggested that a GoF value over 0.36 was strong, and a value of 0.416 (obtained by applying the GoF computation formula presented in Table 2) indicates that the model structure is appropriate.

Two criteria, i.e. the Fornell–Larcker criterion and cross-loading, were used to evaluate discriminant validity. According to the Fornell–Larcker criterion, the square root of AVE will be higher than all correlation coefficients between all pairs of constructs if the discriminant validity is fulfilled (Fornell and Larcker 1981). Table 3 shows the first criterion



of discriminant validity, namely the Fornell–Larcker criterion. The diagonal values are the square roots of AVE and the off-diagonal values are the correlations between the corresponding constructs. This illustrates that the square root of AVE for each construct is higher than correlation coefficients of all the other constructs. The second criterion for verifying discriminant validity is the cross-loading criterion. The discriminant validity of a scale is satisfied if the loading of each item is greater than all other cross-loadings (Chin 1998). As is seen in Table 4, the scale has a satisfactory level of discriminant validity. Overall, the measurement model results indicate that the reliability and validity of the constructs are sufficient.

The hypotheses were tested using the PLS-SEM bootstrapping approach with a resample of 5000 (cf. Hair Jr. et al. 2014). The *t*-statistic and *p*-value were considered together to evaluate the hypotheses and determine whether or not they were supported. The hypotheses were validated if the *t*-value was ≥ 1.96 and if the *p*-value was < 0.05 .

Table 3 Discriminant validity (Fornell–Larcker criterion)

Construct	BI	PE	EE	SI	DE	LE
Behavioural intention (BI)	0.928					
Performance expectancy (PE)	0.688	0.882				
Effort expectancy (EE)	0.486	0.524	0.897			
Social influence (SI)	0.310	0.351	0.197	0.927		
Deterrence emotions (DE)	−0.219	−0.135	−0.170	−0.133	0.856	
Loss emotions (LE)	−0.163	−0.196	−0.241	−0.023	0.541	0.891

The diagonal values are the square roots of AVE

Table 4 Discriminant validity (cross-loading criterion)

Construct	Items	BI	PE	EE	SI	DE	LE
Behavioural intention (BI)	BI1	0.955	0.505	0.515	0.275	−0.227	−0.314
	BI2	0.932	0.358	0.392	0.073	−0.230	−0.237
	BI3	0.895	0.307	0.298	0.203	−0.307	−0.210
Performance expectancy (PE)	PE1	0.518	0.899	0.437	0.423	−0.070	−0.242
	PE2	0.363	0.894	0.460	0.336	0.098	−0.270
	PE3	0.274	0.851	0.287	0.318	0.141	−0.077
Effort expectancy (EE)	EE1	0.434	0.373	0.891	0.067	−0.082	−0.346
	EE2	0.335	0.323	0.896	0.126	−0.078	−0.173
	EE3	0.420	0.424	0.904	0.112	−0.103	−0.333
	EE4	0.455	0.485	0.898	0.258	−0.072	−0.260
Social influence (SI)	SI1	0.121	0.284	0.147	0.909	0.089	0.058
	SI2	0.213	0.428	0.171	0.956	0.096	−0.057
	SI3	0.216	0.378	0.126	0.916	0.198	−0.019
Deterrence emotions (DE)	Anxiety	−0.187	0.043	−0.186	0.099	0.858	0.433
	Worry	−0.208	0.011	−0.092	0.166	0.873	0.401
	Fear	−0.216	−0.169	−0.245	0.017	0.917	0.461
	Distress	−0.156	0.105	0.083	0.101	0.770	0.402
Loss emotions (LE)	Anger	−0.305	−0.276	−0.267	−0.076	0.411	0.818
	Frustration	−0.240	−0.172	−0.319	0.031	0.513	0.958

Bold values refer to standard factor loadings

Results

The results of the PLS estimation are shown in Table 5. The results do not support the relationship between deterrence emotions and effort expectancy (*t*-statistic = 0.857; *p* = 0.392), rejecting H₁. H₂ concerning the relationship between loss emotions and effort expectancy is supported (*t*-statistic = 2.868; *p* = 0.004). The *t*-statistics and *p*-values further indicate support for the hypotheses referring to the relationships between effort expectancy and behavioural intention (H₃), effort expectancy and performance expectancy (H₄), and performance expectancy and behavioural intention (H₅). Although H₆, regarding the relationship between deterrence emotions and social influence, is supported (*t*-statistic = 2.165; *p* = 0.031), H₇ and H₈ are not. These hypotheses concern the relationship between loss emotions and social influence and between social influence and behavioural intention, respectively. Among the



Table 5 Structural model results

Hypotheses	Relationship	Original sample	Sample mean	SD	<i>t</i> -statistic	<i>p</i> -value	Remarks
H ₁	DE → EE	-0.056	-0.073	0.065	0.857	0.392	Rejected
H ₂	LE → EE	-0.211	-0.206	0.073	2.868	0.004	Supported
H ₃	EE → BI	0.173	0.139	0.062	2.198	0.028	Supported
H ₄	EE → PE	0.524	0.527	0.053	9.912	0.000	Supported
H ₅	PE → BI	0.540	0.539	0.054	9.933	0.000	Supported
H ₆	DE → SI	-0.170	-0.175	0.079	2.165	0.031	Supported
H ₇	LE → SI	0.096	0.074	0.088	0.789	0.431	Rejected
H ₈	SI → BI	0.070	0.072	0.055	1.275	0.203	Rejected

DE deterrence emotions, *LE* loss emotions, *EE* effort expectancy, *PE* performance expectancy, *SI* social influence, and *BI* behavioural intention

significant variables that explain the behavioural intention to adopt new e-banking technology, performance expectancy is the most important one ($\beta = 0.540$; $p < 0.01$), followed by effort expectancy ($\beta = 0.173$; $p < 0.05$).

Regarding the direct relationship between loss emotions and effort expectancy, H₂, effort expectancy and behavioural intention, H₃, effort expectancy and performance expectancy, H₄, and performance expectancy and behavioural intention, H₅, this study also reports the possible indirect relationship between loss emotions and behavioural intention. As is seen in Table 6, the results show two indirect relationships between loss emotions and behavioural intention: first via effort expectancy ($\beta = -0.035$; t -statistic = 2.012; $p = 0.044$), and second via effort expectancy and performance expectancy ($\beta = -0.065$; t -statistic = 2.756; $p = 0.006$).

Discussion and conclusion

Beaudry and Pinsonneault's (2010) distinction between various categories of negative emotions based on the degree of control seems to be important in the e-banking technology context. Our empirical results highlight the importance of consumers' loss emotions for their behavioural intention to adopt emerging e-banking technology. Consumers feel anger and frustration because they not only perceive emerging e-banking technology as a threat but also foresee a lack of control over its consequences. Whatever the reasons for these perceptions, these negative emotions are suggested to affect effort expectancy and, in turn, performance expectancy, as well as consumers' behavioural intention to adopt new emerging e-banking technology.

The results indicate two relationship paths between loss emotions and consumers' behavioural intention. The first

one shows that loss emotions are associated with consumers' behavioural intention through effort expectancy. The second path suggests that loss emotions are associated with behavioural intention through the influence of effort expectancy on performance expectancy. The findings also indicate that performance expectancy is a salient determinant of consumers' behavioural intention to adopt emerging e-banking technology and that effort expectancy explains a high percentage of the variation in consumers' performance expectancy. Thus, consumers seem to consider new e-banking technology a tool that can improve their financial performance, a perception supported by their effort expectancy.

In addition, the results emphasize the dominant role of loss emotions over deterrence emotions in the adoption of emerging e-banking technology. In most previous studies, deterrence emotions (typically anxiety) have indirectly been associated with the behavioural intention to adopt new technology through effort expectancy (Brown et al. 2004; Donmez-Turan 2019; Saprikis et al. 2022; Venkatesh 2000; Venkatesh et al. 2003). However, this study shows that deterrence emotions are unrelated to effort expectancy. This unexpected finding can be explained by looking at the deterrence emotion concept that this study derived from appraisals of e-banking technology (cf. Beaudry and Pinsonneault 2010), while the anxiety concept in the above studies was mainly associated with using new IT or e-banking technologies. Although the finding of the current study is in line with Yuen et al.'s (2010) finding that anxiety is not a factor influencing consumers' behavioural intention in the IB context, it is worth considering that consumers who adopt an emerging e-banking technology can feel various negative emotions, even if they might not play a determining role.

Our empirical results further indicate that there is no significant relationship between loss emotions and social

Table 6 Indirect relationship

Relationship	Original sample	Sample mean	SD	<i>t</i> -statistic	<i>p</i> -value
LE → EE → BI	-0.035	-0.035	0.018	2.012	0.044
LE → EE → PE → BI	-0.065	-0.065	0.023	2.756	0.006

LE loss emotions, *EE* effort expectancy, *PE* performance expectancy, *BI* behavioural intention



influence, meaning that consumers who feel a lack of control are reluctant to seek social support. This is in contrast to Guo et al. (2012), who suggested that anger is related to a social support strategy. Moreover, the current study found that four emotions in the deterrence emotion category (i.e. anxiety, worry, fear, and distress) are negatively related to social influence. This finding is in contrast to Beaudry and Pinsonneault (2010), who found a positive relationship between a loss emotion (i.e. anger) and social support; they also found that a deterrence emotion (i.e. anxiety) increased the willingness to contact other people. These contradictory results can be explained by considering the difference between contexts. The research of Beaudry and Pinsonneault (2010) was conducted in an organizational context. It seems that seeking social support helps employees who have to accept new IT events in such a context to work on their problems and adapt to the event. However, consumers have decision-making power and do not have to accept changed conditions. When consumers feel deterrence emotions, they likely do not consider others' opinions because they can easily ignore the emerging e-banking technology. A similar disregard seems to hold when consumers feel loss emotions, because anger and frustration do not make them seek contact with other people.

The empirically based model also indicates that the effect of social influence on consumers' behavioural intention to adopt an emerging e-banking technology is not significant. This means that the participants in this study are not concerned about what surrounding people think about their usage of emerging e-banking technology. This result is in contrast to the UTAUT model but has been observed in previous research (Alalwana et al. 2017; Gupta and Arora 2019; Kwateng et al. 2019; Makanyeza and Mutambayashata 2018; Raza et al. 2019; Yuen et al. 2010).

Implications, limitations and suggestions for future research

The focus, from an emotion-based perspective, on consumers' behavioural intention to adopt emerging e-banking technology helps improve the cognitive-based model of e-banking adoption. It also provides an integrated picture of negative emotions—considering deterrence and loss emotions to be two categories—arising from an appraisal of emerging e-banking technology, and their direct and indirect relationships with cognitive factors such as effort expectancy, performance expectancy, and behavioural intention. This adds to the e-banking adoption literature by contributing a multi-perspective approach (Souiden et al. 2020). The suggested relationships between consumers' negative emotions, effort expectancy, and performance expectancy indicate a more thorough focus on consumers' negative emotions than has been suggested in previous studies. In particular,

bank consumers' perceptions of the ease of using upcoming e-banking technologies may be jeopardized by negative emotions such as anger and frustration. Therefore, as Cenfetelli (2004) suggested, it is beneficial to design technology that is not frustrating, and it might be cheaper to avoid creating negative emotions than to ensure positive ones from a technology investment perspective.

From the e-banking perspective, and in line with the emotional framework in the technology adoption context developed by Beaudry and Pinsonneault (2010), managers and policy-makers should put effort into improving consumers' effort expectancy by considering the reasons for consumers' negative emotions towards emerging e-banking technologies, i.e. the threat perception and the feeling of lack of control over the consequences of using unknown technologies. Generally, providing high-security platforms and networks, user-friendly interfaces, convenient and accessible solutions, and emphasizing the benefits and advantages of using emerging e-banking technology will probably help practitioners in the e-banking context (AbuShanab and Pearson 2007; Raza et al. 2019; Tan and Lau 2016). The current findings suggest that such activities can decrease the impact of consumers' negative emotions on their intention to accept technological developments, and show them how they can gain comprehensive control over their financial activity by using new e-banking technologies.

While this study enhances our knowledge of the banking industry, it does have limitations. The participants were young and educated individuals, and it is possible that old or less educated individuals might possess fewer technical skills and thus feel different emotions. Considering the possible influence of education on consumers' negative emotions, also considering consumers' experience and gender could be useful. Moreover, investigating the relationship between consumers' negative emotions and other potential determinants of behavioural intention in the e-banking context, such as perceived risk, would be of interest. Based on the literature review and the results of this study, a suggestion for further research is not to focus on negative emotions in general but on loss emotions in particular.

Results would probably differ between societies with different cultures and different levels of technological usage. The data for this study were gathered in Sweden, a developed country with a high level of technology adoption (Chandana et al. 2020). Although the study also included foreign students conducting their university studies in Sweden, consumers' perceptions and emotions towards new e-banking technology in other countries, especially developing ones, could provide results of interest, comparable to those reported here. A final suggestion for further research is to conduct further tests of the conceptual model of the relationship between consumers' emotions and their behavioural intention in various e-banking settings.



Appendix: Measurement items

Part one: Demographic information

<p>Gender</p> <p><input type="radio"/> Female</p> <p><input type="radio"/> Male</p> <p><input type="radio"/> Transgender male</p> <p><input type="radio"/> Transgender female</p> <p><input type="radio"/> Gender variant/not-conforming</p> <p><input type="radio"/> Not listed</p> <p><input type="radio"/> Prefer not to answer</p>	<p>Age</p> <p><input type="radio"/> Under 18</p> <p><input type="radio"/> 18–25</p> <p><input type="radio"/> 25–35</p> <p><input type="radio"/> 35–45</p> <p><input type="radio"/> 45 or more</p>	<p>Education</p> <p><input type="radio"/> Bachelor</p> <p><input type="radio"/> Master</p> <p><input type="radio"/> PhD student</p>
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Income (SEK)

1000–10,000 10,000–20,000 Over 20,000

Citizenship

Domestic student International student

Part 2: General questions

Have you ever heard of emerging e-banking technology such as digital currencies (e.g., Bitcoin) and mobile wallets?

Yes No

Have you ever used any kind of emerging e-banking technology such as digital currencies (e.g., Bitcoin) and mobile wallets?

Yes No

Part 3: Main items

Constructs	Items	Sources
Loss and deterrence emotions	Please rate the degree to which you feel each emotion when you encounter emerging e-banking technology such as digital currencies and mobile wallets.	(Beaudry and Pinsonneault, 2010)
Performance expectancy	<p>PE1: I think using emerging e-banking technology such as digital currencies and mobile wallets would be useful in my daily life.</p> <p>PE2: Emerging e-banking technology such as digital currencies and mobile wallets would help me to accomplish things more quickly.</p> <p>PE3: Emerging e-banking technologies such as digital currencies and mobile wallets would increase my productivity.</p>	(Venkatesh et al., 2003)
Effort expectancy	<p>EE1: It's easy for me to learn how to use emerging e-banking technology such as digital currencies and mobile wallets.</p> <p>EE2: Using emerging e-banking technology such as digital currencies and mobile wallets is clear and understandable for me.</p> <p>EE3: It is easy for me to become skilful at using emerging e-banking technology such as digital currencies and mobile wallets.</p> <p>EE4: Using emerging e-banking technology such as digital currencies and mobile wallets is easy.</p>	(Venkatesh et al., 2003)
Social influence	<p>SI1: If people who influence my behaviour think I should use emerging e-banking technology such as digital currencies and mobile wallets, I will use them.</p> <p>SI2: If people who are important to me think I should use emerging e-banking technology such as digital currencies and mobile wallets, I will use them.</p> <p>SI3: If people whose opinions I value think I should use emerging e-banking technology such as digital currencies and mobile wallets, I will use them.</p>	(Venkatesh et al., 2003)
Behavioural intention	<p>BI1: I intend to use emerging e-banking technology such as digital currencies and mobile wallets in the future.</p> <p>BI2: I plan to use emerging e-banking technology such as digital currencies and mobile wallets in the future.</p> <p>BI3: I predict I will use emerging e-banking technology such as digital currencies and mobile wallets in the future.</p>	(Venkatesh et al., 2003)



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Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Masoom Abikari is a PhD student in Business Administration at Mid Sweden University and the Centre for Research on Economic Relations. Her research focuses on models of technology adoption in the digital financial innovation context.

Peter Öhman (Ph.D.) is a Professor of Business Administration at Mid Sweden University and the Centre for Research on Economic Relations. His research focuses on accounting, auditing and financial issues.

Darush Yazdanfar (Ph.D.) is a Professor of Business Administration at Mid Sweden University and the Centre for Research on Economic Relations. His research focuses on financial issues.

