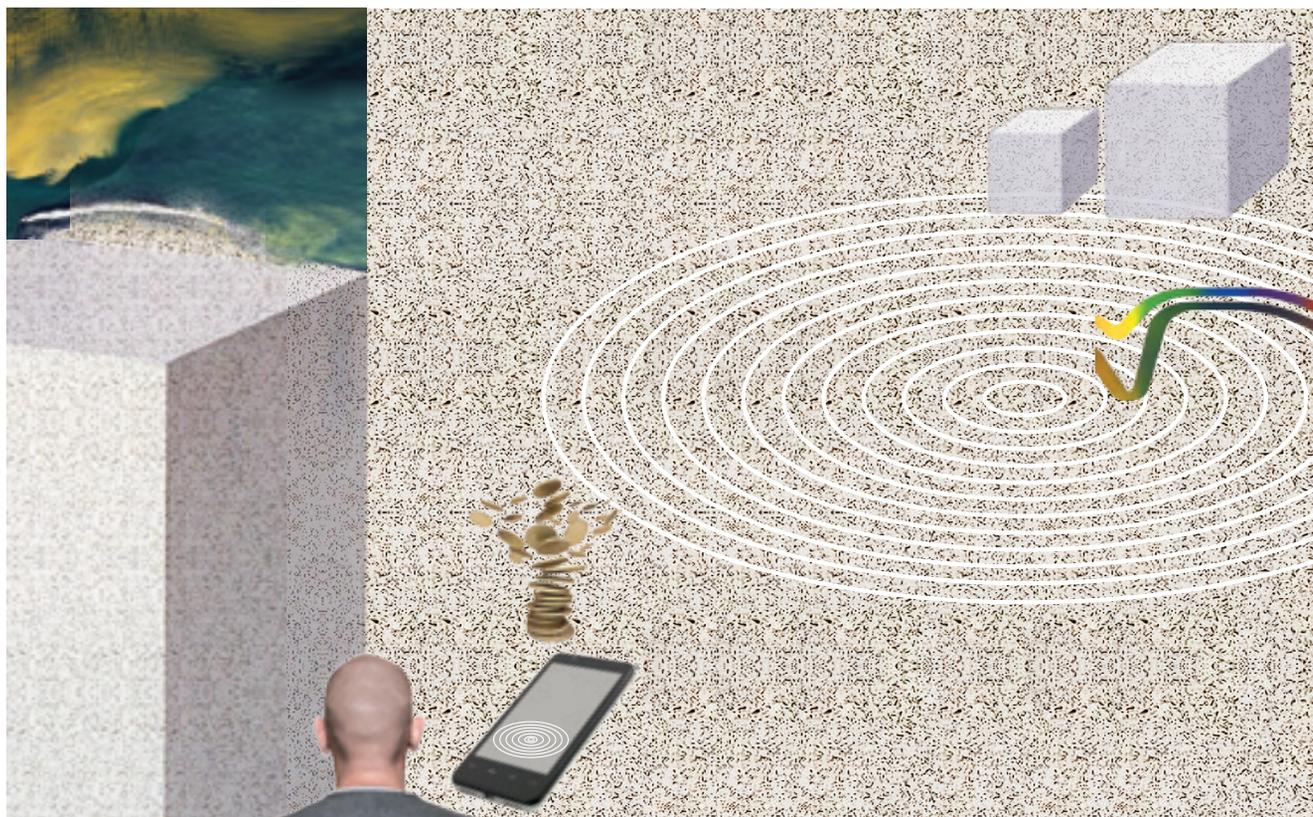


# Mobile Banking in Russia: User Intention towards Adoption

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## Abstract

Mobile banking is one of the most dynamic developing types of distance banking services. For the recent years in Russia, the amount of individual bank accounts with the ability of the distance access through mobile devices increased more than by 20 times. Every year more and more banks start to offer mobile banking services. Despite this, the popularity of mobile banking applications is lower than the popularity of other banking services. Thus the problem of mobile banking adoption by customers is still an extremely important problem.

The authors analyzed foreign surveys devoted to the exploration of the incentives to mobile banking usage. The model developed by the authors is

based on the well-known theoretical and empirical approaches and taken into account Russian peculiarity. As a theoretical basis, the most widespread theories describing technology acceptance and innovation diffusion were used. Using structural equation modeling (SEM) approach, the authors verified key incentives to use mobile banking by mobile Internet users i.a. perceived usefulness and perceived efforts.

These results are in accordance with most foreign surveys in this subject area. The findings also will be helpful for banks as they allow these financial institutions to highlight the cutting edge of mobile banking in Russia.

**Keywords:** mobile banking; structural equation modeling (SEM); acceptance of technology; perceived usefulness; effort expectancy; perceived risk  
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The ever-quickening pace of modern life has significantly increased the value of free time and has given rise to growing demand for remote services. In response to the global financial crisis in 2008, increasing competition in the ‘classic’ financial services segment has led banks to focus their attention on optimizing operating costs structure, in part through out-of-office cross-selling of deposits, loans and payments using information technology. Remote banking services today are more widespread than ever: they can be accessed via telephone, SMS or the Internet. Perhaps the leading remote banking service available today is mobile banking, which allows customers to access their accounts remotely using a special application for Internet-enabled mobile devices [Luo *et al.*, 2010; Shaikh, Karjaluoto, 2015]. In fact, what we are seeing is the transfer of the now widespread Internet banking to mobile platforms.

Mobile banking retains all the same advantages of Internet banking, both for customers and banks. However, banks have even greater opportunities through mobile banking to attract new customers [Aksenov *et al.*, 2010]. According to the International Telecommunication Union, although 96% of the global population use mobile telephones of varying types, about half of them have only limited access to traditional financial services [Shaikh, Karjaluoto, 2015]. However, by using mobile devices, users can now access banking services with virtually no temporal or geographical restrictions [Zhou *et al.*, 2010].

The mechanism by which Russian users access mobile banking is not well covered in the literature. However, it should be examined in more details for several reasons. According to the National Payment System Development Strategy, the Bank of Russia is interested in increasing the geographical and financial accessibility of retail payment services and promoting widespread use of technology in financial transactions, especially mobile devices [National Payment System Development Strategy, 2013, p. 32]. The attention paid to these studies by the academic community and consultancy firms is contingent, among other things, on banks’ preference for developing their own mobile applications as opposed to outsourcing. The emergence of new patterns of customer behaviour and factors that shape customer choices has helped banks to develop more economically profitable mobile services and effective strategies to promote mobile banking services for new and existing customers, especially among the younger generation.

The Russian mobile banking market is undergoing a period of extremely intensive development. This is complemented by the rapid progress in Wi-Fi and 3G networks, the penetration of smartphones and tablets into wide sections of the population, and the falling costs of devices and mobile data [Mail.ru Group, 2013]. According to data collected by analysts Marksw Webb Rank & Report, who carry out annual surveys among users of electronic financial and payment services in Russia, in 2014 17 million people in Russia actively used mobile banking. The top 30 Russian banks started to offer these types of services to private customers. In 2014, growth in this market reached 58%. This is slightly higher than the other dynamically evolving area of remote banking services — Internet banking (51%) [Marksw Webb Rank & Report, 2015].

The introduction of fundamentally new technological solutions is an equally important factor. Back in 2012, mobile banking was considered a lightweight version of the bank’s website or a Java-based application. From 2013 onwards, banks showed a distinct preference for more modern, functional, and user-friendly technologies [Marksw Webb Rank & Report, 2013]. Mobile banking started to establish itself in its current form in Russia during this period and it still experiencing dynamic growth. According to an expert survey carried out by *R-Style Softlab*, in early 2014, roughly 50% of Russian banks considered mobile banking a priority area for improvement in their remote services [Kostylev, 2014]. According to the bank *VTB-24*, of late potential customers have tended to pay attention to whether or not a bank offers mobile banking when choosing a bank [Shpyntova, 2012].

The target group for our survey was mobile Internet users with smartphones and tablets. Current trends in the mobile device and banking markets determined our choice of target group: the gradual replacement of conventional mobile phones with smartphones, the popularity of tablets, and the rejection of older mobile ser-

vices and versions of websites [Markswebb Rank & Report, 2014]. Research is yet to be carried out on these two types of mobile devices [Shaikh, Karjaluo, 2015]. This paper first analyses the most well-known empirical studies on the incentives for users to choose services and sets out the analytical model and operational hypotheses. It then describes the survey methodology, sampling process and data analysis, empirical model validation and results of the hypothesis testing. The conclusion summarizes the data obtained and proposes areas for further research.

### Empirical studies on user adaptation to mobile banking

Existing empirical studies make use of three theories of mobile banking user adoption depending on the level of their diffusion in the information technology sphere:

- the Technology Acceptance Model (TAM), developed in 1989 by Davis and Bagozzi [Davis *et al.*, 1989];
- the Innovation Diffusion Theory (IDT), proposed by Rogers in 1962 [Rogers, 2003];
- the Unified Theory of Acceptance and Use of Technology (UTAUT) [Venkatesh *et al.*, 2003].

The base version of the first model is an extension of Ajzen and Fishbein's Theory of Reasoned Action and is often formulated as an interlinked chain of cognitive elements: 'belief — attitude — intention — behaviour' [Hanafizadeh *et al.*, 2014]. In the model, 'belief' is understood to mean 'perceived usefulness' (the degree to which a person believes that using a particular system would bring him or her certain gains) and 'perceived ease-of-use' (the degree to which a technology will be free from or involve effort) [Davis, 1989].

IDT is based on the notion of diffusion and adoption of an innovation within a specific social system over time. Every innovative technology has a certain set of attributes, which influences a user's decision to use new technology. These attributes are broken down into five groups [Rogers, 2003]: relative advantage, compatibility, complexity, observability and trialability. The first two attributes are comparable with elements of the TAM model. Compatibility refers to the level of interoperability between the new technology and an individual's socio-cultural values, beliefs, and customs. Observability refers to other people's perception of the innovation's uses. The trialability of something new assumes that an individual has the means or opportunity to test the technology before choosing to use it.

The third approach (UTAUT) reviews and consolidates eight different theories and models [Venkatesh *et al.*, 2003] to identify four factors which affect a user's decision to use a particular technology: performance expectancy, effort expectancy, social influence and facilitating conditions (knowledge, customs, finances) [Zhou *et al.*, 2010].

Despite the recognized scientific importance of these models, each of them is limited in terms of its explanatory potential [Pushel *et al.*, 2010]. The TAM model is criticized often for its lack of attention to economic and demographic factors. It ignores factors such as trust, which is extremely important for remote banking services [Shaikh, Karjaluo, 2015]. The IDT model does not explain how the relationship between users and technology develops and what role the innovations play in this process. The model also assumes that the innovation is fundamentally beneficial and should be adopted by all members of society, which is fairly far from being the case in all instances [Laukkanen, Kiviniemi, 2010]. On the other hand, the UTAUT model does not take into account cultural factors [Shaikh, Karjaluo, 2015]. In view of these and other restrictions, the latest focus in studies of mobile banking is not just on empirical studies based on recognized theoretical models; instead, their attempt is to revise these models.

Among the other determinants integrated by the researchers into the basic model, one of the most important and widespread is the trust factor, which influences decision-making when it comes to adopting a new technology. Studying trust is particularly important in the case of mobile banking due to the lack of direct contact between a user and bank employees.

A Korean study on the subject serves as a good example of the TAM model in use [Gu *et al.*, 2009]. The model was expanded by redefining its key elements (for example, the relation between perceived usefulness and social influence was examined, etc.) and adding a new key factor: trust. In order to empirically evaluate the level of trust, the authors turned to one of Gefen's works [Gefen *et al.*, 2003], in which the trust factor covers four components: familiarity with mobile banking, situational normality, structural assurances and calculative based trust. Collectively, they form a holistic indicator of user trust making it possible to identify the two strongest channels that register intention to use mobile banking: 'self-efficacy — perceived ease-of-use — perceived usefulness — behavioural intention' and 'structural assurances — trust — behavioural intention.'

Another group of academics adopted a slightly different approach to study the same field: the Korean mobile banking market [Kim *et al.*, 2009]. Having analysed relevant studies in this field, they identified the following factors that affect trust: institutions (structural assurances), knowledge (relative benefits), inclination (personal propensity to trust), and a firm's characteristics (reputation). However, further analysis has shown that this last factor does not have a significant impact on user choice.

In the article [Lin, 2011], trust is viewed as a function of individual perception of the competence, benevolence, and integrity of mobile banking services. The combination of the trust factor interpreted in this way with the IDT model makes it possible to assert that aside from the attributes of an innovation, the perceived competence and integrity of a bank and its employees also affect significantly the behaviour of Taiwanese users towards mobile banking services.

The work [Zhou, 2012] uses the Elaboration Likelihood Model to study the trust factor. In this model, applied to mobile banking, a user changes his or her attitude towards a service through a central or peripheral route. The first route involves indicators reflecting the quality of information and a service offered to a user (reliability, personification, etc.). It also assumes certain intellectual and temporal costs in recognizing and analysing these indicators. The peripheral route is geared towards the quality of a system (speed, ease-of-use, etc.), the reputation of a bank, and structural assurances (user rights protection, etc.). It is less resource-intensive and less sustainable over time. However, empirical testing of the model has shown that both routes have a significant impact on trust in mobile banking.

Trust is such a popular factor when assessing the nature of mobile banking use because of both non-adoption of new technologies and the high-risk nature of this field. In this respect, sometimes studies analyse the trust factor, which reduces such risks [Gu *et al.*, 2009] as well as the risk factor itself. So, in [Chen, 2013], alongside the attributes of an innovation in the IDT model, the authors studied the influence of the risk factor in the context of banking services. He identified five forms of risk: financial, psychological, performance, time, and privacy risk, and empirically proved their relevance to the case of mobile banking. It confirmed the influence of an innovation's attributes on user behaviour.

Alongside trust and risk, a multitude of other factors are incorporated in the basic model. For example, it was discovered that alongside the standard factors set out in the TAM model, self-efficacy and perceived financial cost have a significant impact on behaviour [Luarn, Lin, 2005; Wang *et al.*, 2006]. A recent study on mobile banking in Iran revealed the likelihood of a change in user behaviour with regarding to its compatibility with the customs, lifestyle, and even registered a demand amongst users for real interaction and contact with bank employees [Hanafizadeh *et al.*, 2014]. In this case, the factor of compatibility to lifestyle was recognized as being the most significant.

The basic model frequently integrates not only individual factors, but also entire theories. In 2010, a study was published that supplemented the UTAUT model with the Task Technology Fit (TTF) model [Zhou *et al.*, 2010]. The idea was that a user decides to use a technology based on the relationship between the tasks the user needs to perform and the technology's capability to carry those tasks out effectively. In addition to proving the importance of this relationship, the greater explanatory potential of the 'synthetic' in comparison to the UTAUT and TTF models was also proved.

## Model and operational hypotheses

The authors developed a model drawing on the extensive international experience outlined above, in which the main variable was intention to use mobile banking now or in the future. Of course, intention cannot fully reflect real use, but this type of ‘substitution’ is used in empirical studies in almost 90% of cases [Shaikh, Karjaluoto, 2015].

The model takes into account three fundamental user incentives: expected usefulness, effort, and perceived risk.

### Expected usefulness

Expected usefulness is one of the key incentives taken into account by researchers [Shaikh, Karjaluoto, 2015]. In the TAM model and variations thereon it reflects the degree to which ‘mobile banking will be useful and helpful for the efficiency of their work’ [Gu *et al.*, 2009, p. 11609]. In the IDT models, usefulness is viewed as a relative advantage highlighting the value of mobile banking over other technologies that it replaces [Riquelme, Rios, 2010]. These advantages include ‘increased efficiency, economic benefits, enhanced status’ [Lin, 2011, p. 253]. Thus, despite the differing names, the essential usefulness of the innovation is a factor in both models [Kim *et al.*, 2009]. This incentive is interpreted in a similar way in models based on UTAUT [Zhou *et al.*, 2010].

The frequency with which the usefulness factor is used is contingent upon the economic gain for the user, as confirmed by multiple studies [Luam, Lin, 2005]. In particular, users point primarily to the lack of geographical restrictions, i.e. mobility, and the speed with which banking transactions can be carried out among the main economic advantages and gains of using mobile banking [Lin, 2011; Kim *et al.*, 2009; Chen, 2013]. Accordingly, the perceived usefulness determines the user’s desire to use mobile banking. This gives rise to the following hypothesis:

*H1: Expected usefulness has a positive impact on intention to use mobile banking.*

### Expected effort

Not all costs from the use of mobile banking can be attributed to direct financial expenses, such as fees or the cost of mobile Internet. The specific nature of using new technologies is also determined by the degree of user know-how, otherwise his or her interest in mobile banking may drop significantly despite obvious usefulness [Gu *et al.*, 2009]. In the TAM models there is an easy-of-use incentive, which reflects the effort required to use the technology [Hanafizadeh *et al.*, 2014]. In IDT models this incentive takes into account the impact of difficulties faced when using remote banking services on users’ choices. Both formulations of expected effort are extremely close to the characteristics of the corresponding incentive in the UTAUT model [Zhou *et al.*, 2010].

When building the model, the study took the following circumstances into account. Expected effort reflects the portion of the cost associated with learning how to use mobile banking and the direct application of this learning. First, users take into account low time costs and the effort needed to learn a new application as an incentive. Second, working on the small screen of a mobile device can require high levels of concentration [Riquelme, Rios, 2010]. Third, the small screen size increases the importance of a user-friendly interface: if it is difficult to navigate the application, the incentive to use the application decreases [Lin, 2011]. The impact of the incentive thus described on both intention to use and on certain other factors has been confirmed empirically for Iran [Hanafizadeh *et al.*, 2014], Singapore [Riquelme, Rios, 2010], Malaysia, Nigeria [Shaikh, Karjaluoto, 2015] and others. Based on this, three hypotheses can be formulated:

*H2: Expected effort has a negative impact on intention to use mobile banking*

*H3: Expected effort has a negative impact on the expected usefulness of using mobile banking*

*H4: Expected effort has a positive impact on the perceived risk in relation to mobile banking*

**Perceived risk**

Incentives which are somehow linked to trust are very popular in studies devoted to intention to use mobile banking [Shaikh, Karjaluoto, 2015]. It has been established that contactless services, which mobile banking also falls under, demand a higher degree of trust than those where the interactions between customer and bank take place face-to-face [Lin, 2011]. Two approaches can be used to study this phenomenon. The first makes direct use of the trust incentive, including the honesty and competence of the bank [Lin, 2011], its reputation and the extent to which it protects users’ rights [Kim et al., 2009]. The second allows an evaluation of this incentive from a different perspective: the expected level of risk [Koenig-Lewis et al., 2010]. We prefer the second variant which factors in the risk incentive into possible economic costs of using mobile banking. The following additional circumstances were also taken into account:

- the likelihood of errors during data entry or technical errors in the application resulting in the customer failing to achieve the desired result from mobile banking [Zhou, 2011]
- personal data transfer over the Internet requires high levels of protection. In the event of personal data theft, criminals can gain access to the customer’s banking transactions, which leads to financial losses [Koenig-Lewis et al, 2010; Chen, 2013];
- the loss of a mobile device could also allow third parties to gain access to the customer’s banking transactions [Riquelme & Rios, 2010; Hanafizadeh et al., 2014].

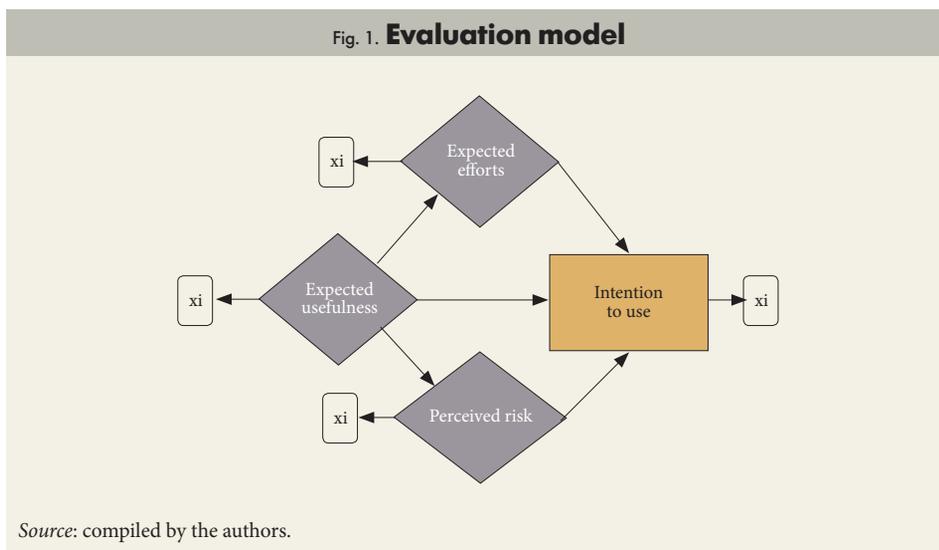
The more a customer views the likelihood of such circumstances and future costs occurring, the lower his or her incentive will be to use mobile banking. This results in the following hypothesis:

*H5: The perceived risk has a negative impact on intention to use mobile banking*

Thus, the developed model (Fig. 1) was used to empirically test the five hypotheses regarding the influence of the incentives described on the intention to use mobile banking and on one another.

**Research methodology. Data collection and analysis**

We tested the model using the survey method of data collection, which is commonplace in academic practice<sup>1</sup> [Koenig-Lewis et al., 2010; Luo et al., 2010; Zhou



<sup>1</sup> By way of example, in the Shaikh and Karjaluoto survey, they analysed 55 studies from different countries over the period 2005–2014. 45 of the works used the survey method, three used interviews, and five used both approaches simultaneously. Finally, two studies were entirely theoretical (conceptual in nature) [Shaikh, Karjaluoto, 2015, p. 133].

et al., 2010; Luarn, Lin, 2005; Gu et al., 2009, Wang et al., 2006; Hanafizadeh et al., 2014].

To analyse each of the incentives to use mobile banking (factors), indicators adapted to the Russian-speaking audience were chosen. This ensured the relevance of the content reflected by the indicators [Zhou et al., 2010]. In total, 12 indicators were taken into consideration to evaluate the four factors in the model (three incentives and actual intention to use) — three indicators for each factor. All of the indicators were measured on a 5-point Likert Scale with response variants ranging from ‘completely disagree’ to ‘completely agree.’ To verify the intelligibility and readability of the wordings, the chosen indicators were tested on a small sample of seven individuals. Based on the pilot test, some of the wording was adjusted. The final list of indicators and their sources is shown in Table 1.

The survey also included two additional groups of questions. The first group allowed us to establish whether the respondent was part of the target audience, whether he or she uses remote banking services, and the frequency of such use. The second group contained a number of questions on the demographic and other standard characteristics of the respondent, grouped according to sex, age, education, region of residence, size of settlement, income, and type and area of employment.

The survey was carried out in March 2015 using the online survey tools Webanketa and ‘Anketolog’. The survey was distributed using several methods. First, based on British experience [Koenig-Lewis et al., 2010], the ‘snowball sampling method’ was used, where the invitation to take part in the study and complete the survey was distributed over social networks. This method was chosen due to the high popularity of social networks among younger generations, who constitute the majority of mobile Internet users. Second, a link to the survey was included in an e-mail distributed to students at the NRU HSE campuses. In total, 206 surveys were collected. After removing incorrectly completed or incomplete questionnaires and those completed by respondents not in the target group, the final sample was

Table 1. **Indicators, factors and sources used in the model**

Indicator	Indicator code	Factor (number)	Factor code	Main sources
I consider mobile banking a useful service	Use-1	Expected usefulness (1)	Use	[Chen, 2013; Gu et al., 2009; Hanafizadeh et al., 2014; Riquelme, Rios, 2010; Lin, 2011; Wang et al., 2006; Zhou et al., 2010]
Mobile banking makes banking transactions faster	Use-2			
Mobile banking makes it easier to access banking transactions	Use-3			
The interface of mobile applications is difficult to understand and makes it difficult to navigate in the application	Eff-1	Expected effort (3)	Eff	[Lin, 2011; Luarn, Lin, 2005]
Using mobile banking requires a high level of concentration due to the small screen	Eff-2			
Using mobile banking is made harder by the insufficient technical and information support from the bank	Eff-3			
Data sent over the Internet can be accessed by criminals	Risk-1	Perceived risk (4)	Risk	[Hanafizadeh et al., 2014; Chen, 2013; Koenig-Lewis et al., 2010; Luarn, Lin, 2005; Riquelme, Rios, 2010]
Technical errors and bugs in the mobile application will lead to financial losses	Risk-2			
Using a mobile device to carry out banking transactions is unsafe due to the high risk of loss/theft	Risk-3			
I already actively use mobile banking	Int-1	Intention to use (8)	Int	[Chen, 2013; Gu et al., 2009; Lin, 2011; Wang et al., 2006]
I plan to use mobile banking in future	Int-2			
I plan not only to use mobile banking, but will also recommend it to friends/relatives/colleagues etc.	Int-3			

Source: survey results.

Table 2. **Demographic characteristics of the survey sample and comparison with the 'Mobile Russia' sample (%)**

Characteristic	Sample segments	This study	'Mobile Russia' (Summer 2014)
Sex	Male	49	50
	Female	51	50
Age	up to 24 years	47	34
	25–34	34	29
	35–44	14	19
	45–54	5	12
	55 or more	1	6
Education	Secondary general	6	35
	Secondary specialist	4	36
	Higher (including incomplete)	91	x
	Higher (including degree)	x	29
Region of residence (by federal district)	Central	37	29
	Southern and North Caucasian	9	15
	Northwestern	15	11
	Far Eastern	3	4
	Siberian	6	12
	Ural	5	10
	Volga	26	19
Settlement size	Moscow and St Petersburg	14	15
	> 1 million inhabitants	21	11
	500,000 – 1 million inhabitants	13	12
	100,000 – 500,000 inhabitants	28	21
	< 100,000 inhabitants	24	41
Income	< 10 000 roubles	22	x
	10,001 – 20,000 roubles	31	x
	20,001 – 30,000 roubles	22	x
	30,000 – 50,000 roubles	14	x
	50,000 – 75,000 roubles	8	x
	75,000 – 100,000 roubles	2	x
	> 100,000 roubles	1	x
Settlement size	Student, unemployed	26	x
	Unemployed	8	x
	Full-time employment	38	x
	Part-time employment	26	x
	Other	1	x
Income	Unemployed	34	x
	Wholesale and retail trade / services	13	x
	Financial activity	10	x
	Other	26	x
	Education / health care / state administration / military service	8	x
	Agriculture / fishery	4	x
	Mineral extraction / manufacturing / industry	4	x

Source: survey results.

160 respondents. The distribution of respondents by demographic parameters is shown in Table 2.<sup>2</sup>

The final sample only included those respondents who replied in the affirmative to questions about mobile Internet use on a tablet or smartphone. 58% of respondents use devices running the Android operating system, 42% iOS, and 21% other operating systems. These results are in line with the findings of the company Mail.ru [Mail.ru Group, 2013], NewMR and OMI regarding the dominance of these two operating systems in the mobile banking market.

<sup>2</sup> For comparison, the table also shows the distribution using comparable characteristics obtained during the regular quarterly survey of the Russian mobile Internet consumer market 'Mobile Russia' carried out by the companies NewMR and OMI (OnlineMarketing Intelligence) [NewMR, 2015]. The study sample was based on data from the 'Public Opinion' Foundation. The last available data are from summer 2014.

97.5% of those surveyed declared that they knew it was possible to carry out banking transactions on a mobile phone. 70% of those surveyed used Internet banking from a desktop computer or laptop, only 32% through a browser on a mobile device, 47% SMS banking, and only 42% respondents used special applications for mobile devices. It is worth mentioning that 12.5% of those surveyed do not use one of the aforementioned types of remote banking services at all. Similar results were collected in the e-Finance User Index 2015 study (Marksw Webb Rank & Report), according to which 66% of surveyed Internet users use Internet banking and 48% use mobile banking [Marksw Webb Rank & Report, 2015]. The frequency with which respondents use each type of remote banking services is shown in Table 3.

This frequency distribution reflects the key advantage of banking applications: their mobility. More than half of users use banking apps several times a week. If we consider only those who use the remote banking services several times a week, the proportion of application users still appears as the highest: 40%.

Answers were coded into digital format for analysis, where 1 is ‘completely disagree’, 2 is ‘somewhat disagree’, 3 is ‘unsure’, 4 is ‘somewhat agree’ and 5 is ‘completely agree’. The analysis was carried out using the specialist software SmartPLS 2.0.M3.

### Multivariate analysis

Following the recommendations of [Hair et al., 2014], a PLS-SEM model analysis comprises three stages: PLS path model estimation, assessing the PLS-SEM results of the measurement model and assessing the PLS-SEM results of the structural model.

The research model can be expressed by structural equations 1–3:

$$\text{Use} = \beta_{10} + \beta_{11} * \text{Eff} + \varepsilon_1 \tag{1}$$

$$\text{Risk} = \beta_{20} + \beta_{21} * \text{Eff} + \varepsilon_2 \tag{2}$$

$$\text{Int} = \beta_{30} + \beta_{31} * \text{Use} + \beta_{32} * \text{Eff} + \beta_{33} * \text{Risk} + \varepsilon_3 \tag{3}$$

The measurement models can be expressed by equations in the form:

$$\text{Ind}_{ij} = \alpha_{ij0} + \alpha_{ij1} * \text{Fac}_i + v_{ij} \tag{4}$$

In equation (4)  $\text{Fac}_i$  — factor,  $\text{Ind}_{ij}$  — its indicators,  $i = 1 \dots 4$  (1 — Use ... 4 — Int, as per Table 1),  $j = 1, 2, 3$ . Within the PLS algorithm, the standard parameters recommended for such studies were chosen [Hair et al., 2014; Wong, 2013].

The results of the algorithm are shown in Fig. 2, where latent (unobserved) variables are in dark and their indicators are in light; the arrows indicate the links between variables. Three groups of indicators can be identified. First, there is the value of the coefficient  $R^2$ . Accordingly, the factor Eff explains 12.2% of the dispersion of the factor Use and 24.6% of the dispersion of the factor Risk, and all three factors Use, Eff, Risk together explain 36.6% of the dispersion of the variable Int.

Second, path coefficients in the structural model have been calculated (in Fig. 2 above the arrows linking the latent variables). Thus, the model has identified two positive (in decreasing order of influence:  $\text{Eff} \rightarrow \text{Risk} = 0.496$ ;  $\text{Use} \rightarrow \text{Int} = 0.441$ ) and three negative relationships (in decreasing order of influence:  $\text{Eff} \rightarrow \text{Use} = -0.349$ ;  $\text{Eff} \rightarrow \text{Int} = -0.215$ ;  $\text{Risk} \rightarrow \text{Int} = -0.099$ ).

Third, these are outer model loadings (in Fig. 2 above the arrows linking the latent variables with the indicators). Five iterations (instead of the set maximum value 300) were needed to generate the coefficients, which points to the high quality of the evaluation [Wong, 2013].

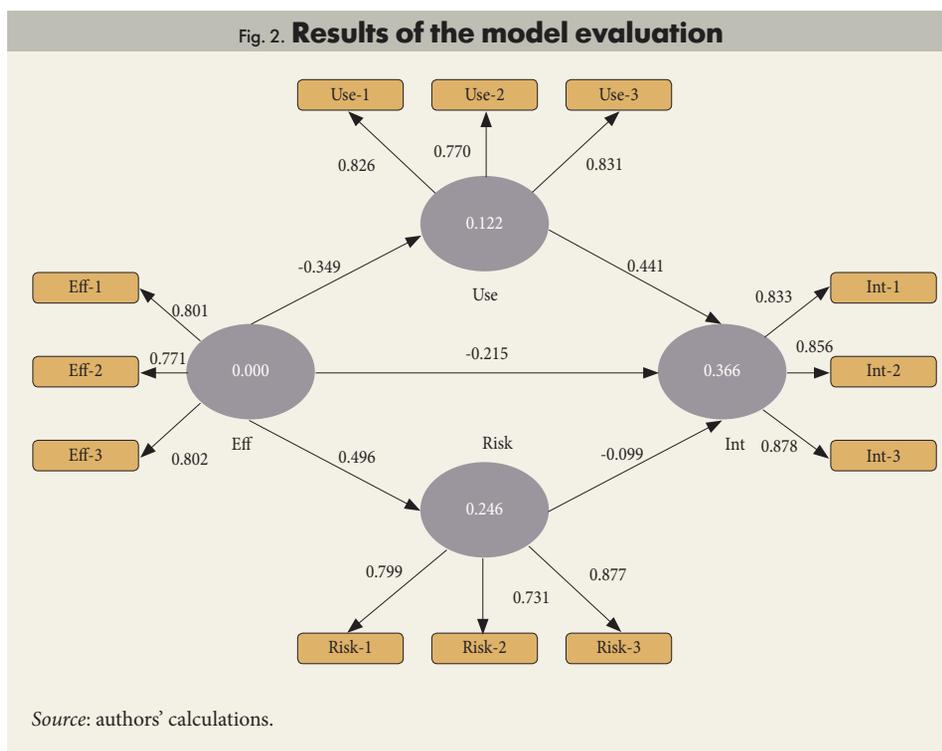
The significance of the structural model coefficients (hypothesis testing) was evaluated after testing based on individual indicator reliability<sup>3</sup> and internal consistency reliability.<sup>4</sup> The convergent<sup>5</sup> and discriminant validity<sup>6</sup> of the model were tested

<sup>3</sup> The value of the outer model loadings exceeds the threshold value of 0.7.

<sup>4</sup> The ‘composite reliability’ coefficients satisfy the value range 0.7–0.9.

<sup>5</sup> All average variance extracted (AVE) values exceed the 0.5 threshold.

<sup>6</sup> This was checked using the Fornell-Larcker criteria [Fornell, Larcker, 1981].



and it showed no multicollinearity.<sup>7</sup> From Table 4, it is clear that the structural model obtained satisfies all the necessary requirements [Hair et al., 2014].

To evaluate the significance of the structural model coefficients, we used a bootstrapping procedure. This verified the significance of the measurement model coefficients which were significant to a level of 1%. Regarding the significance of the structural coefficients and, accordingly, the hypothesis testing, hypothesis H5 was not corroborated, whereas hypotheses H1–H4 were accepted at 1% significance (Table 5).

As we have shown (cf. Fig. 2), expected usefulness has been identified (0.441) as a statistically significant effect prompting customers to use mobile banking to carry out everyday transactions. This means that simpler access to the full range of banking services at any time and in any place, as well as the increased speed with which they can be accessed, can be achieved through the special functionalities of mobile banking compared with Internet banking or debit and credit card payments. The development of mobile banking functionalities and its differences with Internet banking play a decisive role when banks attract new customers and try to retain

**Table 3. Frequency of use of remote banking services by respondents (proportion of respondents selecting the corresponding response, %)**

	Several times a week	Once a week	Once a month	Once every six months	Less than once every six months	Do not use
Internet banking on a desktop computer / laptop	12	27	26	8	3	24
Internet banking through the browser of a mobile device	8	6	15	5	3	63
SMS banking	19	14	13	3	4	47
Special mobile application on smartphone / tablet	26	12	5	2	0	55

Source: survey results.

<sup>7</sup> The VIF coefficients for the factor groups Use, Eff, Risk were significantly less than the recommended critical value of 5.

**Table 4. Indicators of the reliability and adequacy of the measurement model**

Variable	Outer loading coefficients			Composite Reliability	AVE*
Eff	0.801	0.771	0.802	0.8342	0.6265
Int	0.833	0.856	0.878	0.8913	0.7323
Risk	0.799	0.731	0.877	0.8458	0.6477
Use	0.826	0.770	0.831	0.8507	0.6554
<b>Permitted values</b>	0.7+			0.7–0.9	0.5+
	Eff	Int	Risk	Use	
Eff	0.7915				
Int	– 0.4176	0.8557			
Risk	0.4958	– 0.3519	0.8047		
Use	– 0.3493	0.5488	– 0.3329	0.8096	

\* The square root of the AVE is greater than the correlation of the variable with any other.  
 Source: authors' calculations.

existing customers. Thus, it confirms the hypothesis that undisputed advantages of mobile banking, such as round-the-clock and remote access to services, act as the main incentives for their use in the Russian market.

These findings are also characteristic of other countries.<sup>8</sup> Judging by the results of the 55 studies [Shaikh, Karjaluoto, 2015] carried out in various countries between January 2005 and March 2014, this effect was 38% on average, which is 7 percentage points lower than in the Russian market. Expected usefulness was the strongest factor in the American [Luo et al., 2010], German [Koenig-Lewis et al., 2010] and Chinese models [Zhou, 2011], as well as in the model developed for Taiwan [Wang et al., 2006]. This factor was also significant in the Korean [Gu et al., 2009; Kim et al., 2009] and Iranian cases [Hanafizadeh et al., 2014].

Another important and statistically significant effect in the model constructed by the authors is the demotivating influence of the expected effort factor. A higher anticipation of the effort required in using mobile banking, caused by complex navigation features, need for high concentration levels when working on the small screen of a mobile device, or insufficient technical and information support from the bank, serves as a major disincentive. Most studies encounter the 'opposite' incentive: ease-of-use [Gu et al., 2009; Luarn & Lin, 2005; Hanafizadeh, 2014; Shaikh, Karjaluoto, 2015]. Hence for commercial banks it is entirely justified to develop native, i.e. specially developed applications that help accustom clients to various mobile services, and regularly update them. Competing pressure from social networks and electronic money systems assign ever greater importance to regular online interactions with users. Banks are starting to attach special value to opportunities to inform customers of changes to legislation and tariffs, and cross-sell classic banking products even outside normal business hours.

**Table 5. Testing of the research hypotheses**

	Hypothesis	T-statistic	Accepted
H1	Expected usefulness has a positive impact on intention to use mobile banking	5.266	Yes*
H2	Expected effort has a negative impact on intention to use mobile banking	3.111	Yes*
H3	Expected effort has a negative impact on the expected usefulness of using mobile banking	4.615	Yes*
H4	Expected effort has a positive impact on the perceived risk in relation to mobile banking	8.971	Yes*
H5	The perceived risk has a negative impact on intention to use mobile banking	1.304	No

\* At 1% significance.  
 Source: authors' calculations.

<sup>8</sup> It is important to note that the national specifics of certain countries are outside the scope of this study, namely the structural and institutional developmental circumstances of their banking sector and science, technology and innovation spheres.

One of the most significant findings of the model was the negative influence of the expected effort incentive on the expected usefulness incentive. The simpler the features of mobile banking, the more useful it would seem to the customer. This relationship has already been established through studies of users in Germany [Koenig-Lewis *et al.*, 2010], Korea [Gu *et al.*, 2009] and Singapore [Riquelme, Rios, 2010]. If using mobile banking requires a greater effort, then the speed advantage for transactions predictably falls. Banks should see increasing the convenience of specialist mobile applications as a priority. This refers not only to the design (fonts, structures), but also the ability to personalize the interface according to the customer's needs, which in turn may relate to strategic management of small business and household finances.

It is also worth noting the influence of the expected effort incentive on the risk incentive as one of the most significant effects. Banks are mindful of the advantages of phone technology applications such as geolocation, fingerprint recognition, cameras, and scanners optimal, as these options allow them to tie in a customer's financial management with their lifestyle, and costs with needs and current consumption. However, as our survey shows, it is becoming fundamentally important for banks to observe a certain balance: the more difficult a user finds mobile banking services, the less transparent their interaction with the bank is, leading them to perceive a higher risk of technical errors or personal data theft.

Although studies in Germany [Koenig-Lewis *et al.*, 2010], Iran [Hanafizadeh *et al.*, 2014], Singapore [Riquelme, Rios, 2010] and the US [Luo *et al.*, 2010] have shown that the risk incentive is significant, the hypothesis regarding its negative influence on intention to use mobile banking has not been corroborated. Perhaps this result was shaped by the specific nature of the sample. For example, mobile Internet users are less inclined to experience misgivings regarding the use of a mobile device which has become customary for them, and are less inclined to think about the threat of loss (theft). Many experts suggest that the current risks involved in mobile banking may be significantly lower than, for instance, Internet banking. In reality, in Russia the number of users of mobile banking falls behind those using Internet banking, and so interest among swindlers in mobile banking is lower. The main target of criminal attacks are companies which, as a general rule, do not use mobile applications [Kostylev, 2013]. Users themselves often consider security measures redundant and even see them as shortcomings of mobile banking applications [Deloitte, 2014].

## Conclusion

Our research was devoted to studying the preferences of mobile banking customers in Russia. Special attention was paid to which of the specific features of this service (the functional content of the application, the convenience of the interface, ease-of-navigation, and difficulties in use) have an impact on users' intentions in making regular use of mobile banking. Expected usefulness turned out to have the greatest impact. Thus, this paper recommends that banks focus primarily on increasing the perceived usefulness of their mobile banking amongst customers. For consumers, the speed and ease with which their banking transactions can be accessed are important; they demand broad functionality that is comparable with other forms of banking services. The key question is whether users themselves consider using mobile banking worthwhile. Banks could offer various bonuses and partner programmes and conduct a targeted marketing campaign to further explore this area.

The level of awareness regarding mobile banking could be raised through measures to increase a population's financial literacy, primarily focusing such instruction on school pupils, students, and their parents.<sup>9</sup> The second factor in terms of its impact on motivation to use mobile banking was expected effort. This means that

<sup>9</sup> Successful examples include the project 'Development of additional educational programmes to promote financial literacy among students at general education establishments and primary and secondary professional education institutions', carried out in 2012–2014 by the Russian Ministry of Finance with support from the World Bank (<http://www.minfin.ru/ru/om/fingram/>, accessed: 21/08/2015) and the measures planned jointly by the Bank of Russia ([http://www.cbr.ru/press/pr.aspx?file=02062015\\_105534if2015-06-02f10\\_53\\_01.htm](http://www.cbr.ru/press/pr.aspx?file=02062015_105534if2015-06-02f10_53_01.htm), accessed: 21/08/2015) and the Ministry of Finance ([http://www.minfin.ru/ru/press-center/?id\\_4=33224](http://www.minfin.ru/ru/press-center/?id_4=33224), accessed 21/08/2015) to raise the population's financial literacy.

in order to promote mobile banking services, banks should strive to simplify the application software. Complex interfaces and navigation within the application reduce incentives to use the application, devalue the advantages of the service, and increase the potential risks in the eyes of the user. Therefore, banks need to ensure that their mobile application interface is as amenable and simple as possible, adapted to the small screens offered by mobile devices, and provide technical and IT support for users.

Banks may find it useful to review, consolidate, and approve the results of foreign studies on the mobile banking market in relation to the Russian context. As a result, prospective areas to develop these products such as their relative advantages as a means to access bank accounts, allow customer-bank interactions and cross-sell payment, and deposit and credit products, will become clear.

Our study has revealed several restrictions. The need to overcome these restrictions inevitably shapes future areas of development. The survey sample is only representative of the group of mobile Internet users, so the model requires additional testing on a larger sample covering a cross-section of social strata. Moreover, intention to use was the main variable rather than actual mobile banking use. It would only be possible to move over to a new variable when running longitudinal studies. Some indicators in the model might be reformulated and new factors could be included. A number of works have established that the expected financial cost factor has a negative impact on intention to use mobile banking [Shaikh, Karjaluoto, 2015; Zhou et al., 2010; Hanafizadeh et al., 2014], while in the US [Luo et al., 2010] and Korean [Gu et al., 2009] mobile banking markets, the studies identified self-efficacy as a factor with a positive impact. Analysing these and other new factors makes it possible to increase the explanatory potential of the model and evaluate new incentives to further propagate mobile banking services. **F**

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