The adoption of mobile payment services by consumers: An empirical analysis results

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Abstract:

This study considers the problems of distribution and adoption of mobile payment services in Russia and the factors of their perception by distribution network companies and consumers. To analyze the adoption of mobile payment services, in this article a model is suggested that includes both process-based and factor-based approaches. The model combines the user behavior analysis at different stages of the technology acceptance process and the analysis of the factors that influence this process. Factors are determined both by the features of the technologies themselves and by the characteristics of consumers. Within the framework of the process approach, the diffusion of innovation theory of Rogers (2003) and the technology acceptance model of Davis (1989) have been used. The factor analysis has been used to analyze the perception of mobile payment services by consumers and by distribution network companies. To analyze the factors influencing the decision-making by distribution network companies, the POER model, which allows analyzing internal factors, and the PEER model, which allows analyzing external factors, are used. The factors of perception of mobile payment services by consumers are analyzed using the Technology Acceptance Model (TAM) (Davis, 1989). When testing theoretical positions, the approach that comprises model testing at the qualitative stage of research (16 in-depth interviews with representatives of distribution network companies and 34 in-depth interviews with consumers) and subsequent empirical research (based on a sample of 128 distribution network companies and 429 consumer respondents) were applied. Based on the analysis results, conclusions were made about the impact of various factors on the acceptance of mobile payment services, and recommendations for companies that develop and implement mobile payment services have been worked out.

JEL Classifications: D12 D22 O33

Keywords: Mobile payment service, Models of innovations adoption, Perceived eReadiness model, Perceived external eReadiness

1. Introduction

The rapid technological progress, the global Internet penetration, and the development of the fiscal market in recent years have contributed to the development of a number of innovative payment services, including mobile payment services. The volume of transactions performed using such payment services constantly rises, which leads to an increase in the aggregate volume of domestic and cross-border retail payments.

The use of mobile payment services provides both the consumer and trade and service companies that use mobile payments with a number of advantages. Consumers save time and, in most cases, finances and can be more flexible in using fiscal services and make payments 24 hours 7 days a week. Distribution network companies improve the quality of service, provide their consumers with greater flexibility in the choice of means of payment, and receive additional profit from increasing sales volumes.

However, distribution network companies must be confident that their consumers are ready to use mobile payment means because their implementation is associated with

financial costs and are time consuming. Erroneous decisions on the adoption of a mobile payment service can be prevented if the reasons for using mobile payment services by consumers are understood. In this regard, the purpose of this article is to develop a methodology for studying the adoption of mobile payment services by consumers and distribution network companies as well as to analyze the factors for their acceptance and to develop recommendations for the practical implementation of mobile payment services.

2. Research background, research model and hypotheses

2.1. Mobile payment services: Concept, classification, and features

Mobile payments are transactions with money that are carried out with the help of a mobile telecommunications network device.

Mobile payments can be classified based on various criteria (see Table 1).

TABLE 1. CLASSIFICATION OF MOBILE PAYMENTS

GROUNDS FOR CLASSIFICATION	TYPES OF PAYMENTS
BASED ON ACCESS CHANNELS	*CONTACT AND CONTACTLESS*
In contact payments, the consumer and the trading company (and / or its equipment) are in the same place and exchange data with each other directly, using contactless radio transmission technologies (such as data transfer using the NFC technology).	
In contactless payments, the transaction is conducted over the networks of mobile operators or the Internet and can be performed regardless of the location of the payer (and / or his or her equipment).	
BASED ON PAYMENT OBJECTS	*PAYMENT FOR GOODS OR SERVICES*

Source: Own elaboration.

The growth in the number and the volume of mobile payments has led to the emergence of a variety of mobile payment services, which are a kind of technological interface between the company and the client and which are aimed at coordinating the payment process with the expectations of customers regardless of the location, the time, and the personnel.

Mobile payment services are perceived by consumers as innovations that bring economic benefits and satisfy needs, i.e. are considered as innovative products .

Mobile payment services are interactive technologies, i.e. the value of using this technology will grow along with the number of new users. Therefore, some minimal number of users or "a critical mass" is necessary for their propagation (Song, Parry, & Kawakami, 2009).

In addition, the mobile payment services market is a two-way market, i.e. it has two different types of users: consumers and enterprises of trade/services (or so-called distribution network companies). Consumers will want to use mobile payment service only if they allow for acceptance of payments by a sufficient number of distribution network companies; while distribution network companies will agree to connect to this

service only on condition that they are used by a sufficient number of consumers. Consequently, the main task in the two-way market is to reach a critical mass of users on both sides, i.e. these services should be accepted by both sellers and consumers (Plouffe, Vandenbosch, & Hulland, 2000). Consequently, the acceptance of a payment service by sellers depends on the acceptance of the payment service by consumers and vice versa. Thus, if a critical mass of users is not reached on both sides of the market, the implementation of such a service will be unsuccessful, as there will be no incentives for them to be unilaterally accepted by one of the market participants (Mallat, 2007).

These characteristics are of great importance for the formation of a model for analyzing the spread of mobile payment services. In this regard, it is necessary to consider what factors are determinant ones in the process of adoption of mobile payment services not only by consumers but also by distribution companies.

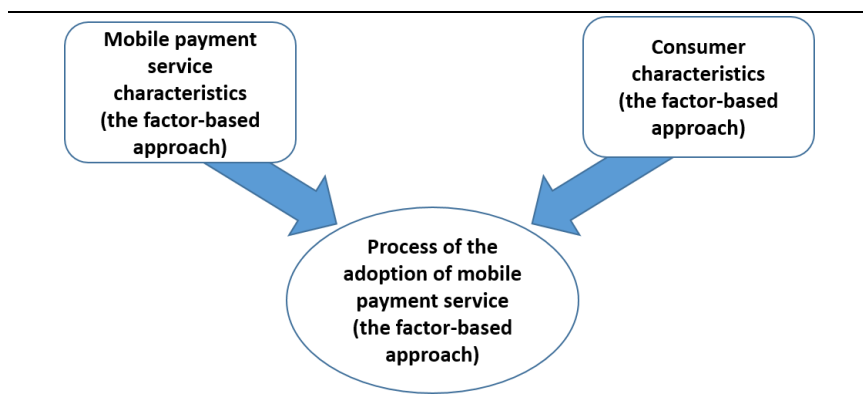### 2.2. Theories of adoption of mobile payment technologies by consumers

Consumers will use mobile payment services only when they are able to perceive them and are ready to use them. At the same time, acceptance or adoption is understood as the level of willingness of consumers to use a proposed technology in a specific situation (Mahler & Rogers, 1999).

The factor-based and process-based approaches

In the literature, two approaches are most often used to study consumer acceptance of new technologies:

- the factor-based approach, which is founded on the study of factors that contribute to and discourage perception of a new technology;
- the process-based approach, which is founded on the breakdown of the process of adopting a new technology into certain stages.

FIGURE 1. MODEL OF THE STUDY OF THE ADOPTION OF MOBILE PAYMENT SERVICES

Source: Own elaboration.
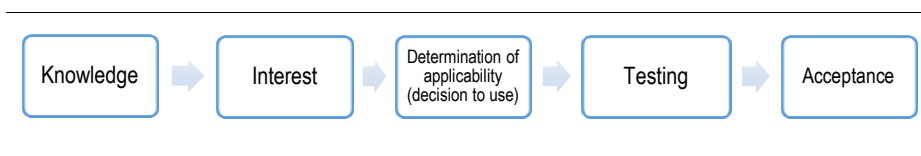
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In the framework of this study, we have formed an analysis model that combines the analysis of user behavior at different stages of the process of technology acceptance and the analysis of factors that affect this process (Figure 1). The model uses the factor-based approach to analyze the characteristics of a mobile payment service and consumer characteristics and the process-based approach to analyze the perception of a mobile payment service. Within the framework of the process approach, the diffusion of innovation theory of Rogers (2003) and the technology acceptance model of Davis (1989) have been used.

The application of this analysis model allows us to study not only the factors of acceptability of mobile payment services but also to analyze the actual readiness of the consumer and the distribution network company to use the service in a specific situation.

The process-based approach is founded on the assumption that the process of adoption of a new technology proceeds in several stages, each of which can be described using various consumer behavior patterns. Within the framework of the process-based approach, we have used the diffusion of innovation theory (DOI) according to Rogers (2003) and the technology acceptance model (TAM) according to Davis (1989).

Rogers characterized the diffusion of innovation as a set of key elements: innovation, people, communication channels, time, and the social system; as well as the stages of adoption of innovation: Awareness, Interest, Evaluation, Trial, and Adoption (Rogers, 2003) (Figure 2).

FIGURE 2. THE PROCESS OF CONSUMER ADOPTION OF INNOVATION: THE ROGERS MODEL

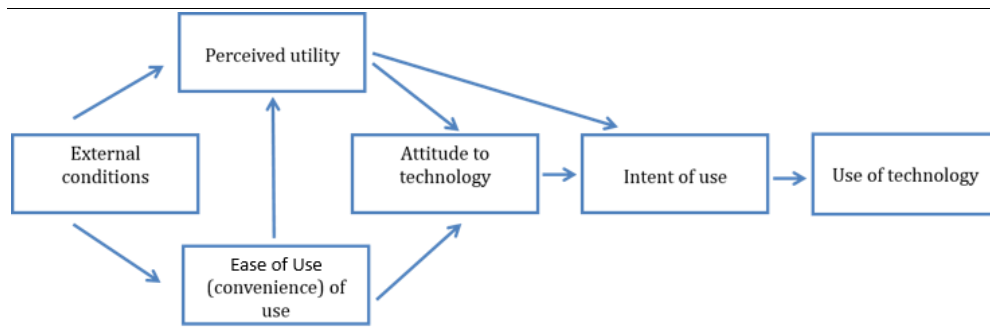

Source: (Rogers, 2003, p. 170).

First, a person learns information about an innovation and then forms an attitude toward it (shows interest) based on this knowledge; the adopted decision depends on the use of this innovation. If a person makes a positive decision, then the innovation testing stage follows, and its advantages and disadvantages are assessed. In case of a positive assessment result, the person accepts the innovation; in case of a negative one, refuses it.

The technology adoption model of Davis was originally developed to explain the reasons for the adoption of computers by employees in the workplace and proceeded from the assumption that the use of a specific technology was ultimately dependent on the person's attitude toward it, the purpose, and the possibilities of using it (Figure 3). Later, this model was used to study the acceptance of mobile phones (Lam et al., 2008; Wang, Wong, & Wang, 2008; Lei et al., 2009; Popescu, 2009; Kadambi et al., 2009), Internet banking (Lin & Chang, 2011; Lapierre & Denier, 2005), self-service technologies (Pezoldt et al., 2011), ATMs (Chen, 2008), mobile payments (Constantiou et al., 2006; Laukkanen & Kiviniemi, 2010).

The use of the factor-based approach for analysis involves studying the factors that have the greatest impact on the decision of consumers about acceptance of a new technology. At the same time, two groups of factors that influence the perception process are

distinguished: factors related to the characteristics of the innovation itself and factors related to the personal and demographic characteristics of the consumer (gender, age, income level etc.).

FIGURE 3. TECHNOLOGY ACCEPTANCE MODEL ACCORDING TO DAVIS (2003)

Source: (Davis, 1989, p. 985).

Characteristics of mobile payment services

There are two groups of technology characteristics, including mobile payment services: general and specific.

General characteristics of innovations were revealed by Rogers (2003) and comprise the following: specificity, the possibility of testing, perceptibility, comparative advantage, and complexity.

Davis determined the following specific characteristics of the technology (Davis, 1989): speed, reliability, the enjoyment of use, the control of the usage process, and the risk of use.

The characteristics of the factors are described in more detail in Table 2.

Let us consider the characteristics of consumers in terms of their degree of receptiveness of mobile payment services.

As noted earlier, demographic and personal characteristics of consumers are singled out.

The former includes the following factors:

- *the age of consumers.* The impact of age on the use of new technologies is rather ambiguous. Mallat (2007), Püschel, Mazzon, & Hernandez (2010), and Yang, Lu, Gupta, Cao, & Zhang (2012) show that the impact of age on the readiness to use is caused by the type of new technologies. On the other hand, Trachuk & Kornilov (2013), Mallat et al. (2009), Schierz et al. (2010), Shaw (2014) and Van der Heijden (2002) show that older people are less willing to use new technologies and start applying them later than others;

- *gender difference.* With regard to the use of payment services, it is also impossible to draw unequivocal conclusions: Plouffe et al. (2000), Schierz, Schilke, & Wirtz (2010), and Shin (2009) show that there are no significant differences in the behavior of men and women in the use of electronic payment services while Wu & Wang (2005) and Yang et al. (2012) state that men are more likely in general to use information and communication technologies (such as internet banking, mobile banking, and online shopping).

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TABLE 2. GENERAL AND SPECIFIC FACTORS OF PERCEPTION OF NEW TECHNOLOGIES

POSITIVE IMPACT ON THE PERCEPTION OF INNOVATION (+)		NEGATIVE IMPACT ON THE PERCEPTION OF INNOVATION (-)	
GENERAL CHARACTERISTICS OF ELECTRONIC PAYMENT SERVICES			
COMPATIBILITY	This factor shows the degree of correlation of a service with the existing experience, values, and desires of a user. There is a possibility that the payment service will be accepted faster if users have experience with similar technologies	COMPLEXITY OF USE	The degree of complexity when using technology for the consumer. In Davis's model, this factor corresponds to the concept of "the ease of use."
TESTING CAPABILITY	This factor reduces the uncertainty factor as a result of the possibility of understanding the principles of operation of the service and the benefits and capabilities of new technologies. It also increases the ability to perceive a new technology		
ADOPTION OF INNOVATION	This factor describes the extent to which the results of the application of new technologies are visible to other people. The ability to monitor the results of the application of new technologies helps to understand how much these technologies are better that the currently used ones and how they meet the needs of consumers as well as to understand their advantages		
COMPARATIVE ADVANTAGE	This factor describes the acceptance of new technologies as better than the traditional technologies, which are currently used. Comparative advantage can also be interpreted as "perceived utility" as used in Davis's model		
SPECIFIC CHARACTERISTICS OF ELECTRONIC PAYMENT SERVICES			
SPEED	This factor is characterized by the waiting time for the performance of the service (receipt of money).	AWARENESS OF THE RISK OF USING THE TECHNOLOGY	This factor indicates the uncertainty of possible consequences from the use of new technologies. In case of electronic payment services, this refers to the risk of the lack of reliability in making payments as well as to the fear of improper use or unauthorized access to data
RELIABILITY	This factor means the accuracy with which payments are made. Reliability is an important characteristic of the risk of using the technology		
ENJOYMENT OF USE	This is a perception factor that occurs when using a new technology		
CONTROL OF USE	This factor describes the ability of a user to monitor the process and the result of using a new technology. The possibility of monitoring reduces the risk of errors.		

Source: Compiled by the authors.

However, demographic characteristics do not give a full understanding of the process of adoption of new electronic payment services; thus, it is necessary to consider the personal characteristics of users, which include the following:

- self-efficacy, which is the ability and at the same time the confidence of a user in his or her ability to use a new payment service (Chen, 2008; Duane et al., 2014; Gefen et al., 2003; Hsu et al., 2011; Kim et al., 2010). Whenever a technology is too difficult for the consumer to use, it is refused and is not used in the future. Self-efficacy affects the perceived utility of technologies and the consumer's acceptance of the new technology;

- fear of technology, which means the fear of using new technologies and is the most common obstacle to perceiving new technologies. Fear of technology adversely affects the acceptance of technologies and characterizes the reluctance of a consumer to use technical innovations (Arvidsson, 2014; Chen, 2008; Harrison et al., 2014; Hsu et al., 2011);

- social pressure, which characterizes the extent to which the social environment influences human behavior with regard to the use of new electronic payment services (Arvidsson, 2014; Mallat, 2007; Püschel et al., 2010);

- technological readiness, which describes the degree of readiness of a consumer to use new payment services; depending on this, the adoption process can accelerate or slow down instead (Kim et al., 2010; Luo, Zhang, & Shim, 2010; Mallat, 2007; Plouffe et al., 2000; Schierz et al., 2010; Shin, 2009).

TABLE 3. KEY FACTORS THAT HAVE A SIGNIFICANT IMPACT ON CONSUMER ACCEPTANCE OF RETAIL ELECTRONIC PAYMENTS

AUTHORS	COUNTRY	FACTORS	DIRECTION OF IMPACT
Arvidsson (2014)	Netherlands	Complexity of use	-
		Comparative advantage	+
		Awareness of the risk of using the technology	-
Duane et al. (2014)	USA	Complexity of use	-
		Awareness of the risk of using the technology	-
		Enjoyment of use	+
Luo et al. (2010)	USA	Awareness of the risk of using the technology	-
		Self-efficacy	+
		Enjoyment of use	+
Mallat (2007)	Finland	Complexity of use	-
		Awareness of the risk of using the technology	-
		Network effects, the absence of a critical mass of acceptors	-
		Compatibility	+
Trachuk & Kornilov (2013)	Russia	Complexity of use	-
		Awareness of the risk of using the technology	-
		Expenses	-
Apanasevic et al. (2014)	Sweden	Enjoyment of use	+
		Expenses	-
		Awareness of the risk of using the technology	-
		Network effects, the absence of a critical mass of acceptors	-
Schierz et al. (2010)	Germany	Awareness of the risk of using the technology	-
		Enjoyment of use	+
		Compatibility	+

Source: Compiled by the authors.

It is worth noting that individual characteristics of consumers and the factors that influence the process of accepting electronic payment services can be viewed from the point of view of consumer behavior patterns. For example, depending on the set of skills and knowledge that a consumer has for the consumption process, it is possible to identify certain patterns of consumer behavior in relation to electronic payment services and to analyze the process of perceiving new technologies. In numerous studies on the adoption of electronic retail payment instruments, researchers have combined the factors of the two models and have also expanded and supplemented these models with other factors. For example, Kim et al. (2010) demonstrate the significant role of the security factor for payment while Shin (2009), Kim et al. (2010), and Duane et al. (2014) supplement it with the "trust to the service provider" factor; Venkatesh, Thong, & Xu (2012) argue that the factors of habit and the payment price play the main role; and Mallat et al. (2009) and Apanasevic et al. (2014) attribute the main role to the context of using the payment.

In Table 3, we have attempted to identify factors whose relevance is corroborated by relevant studies in various European countries.

In our study, we will use the above factors to analyze the adoption of mobile payment services and will check the impact of a factor on perceptions using questionnaires.

Thus, the adoption of a new type of electronic payment service depends both on the characteristics of this payment service and on the personal and demographic characteristics of consumers. In this connection, the following hypotheses can be formulated.

Hypothesis 1. Consumer adoption of new mobile payment services is influenced by the general characteristics of the payment service: (a) compatibility, (b) the possibility of testing, (c) perceptibility, (d) comparative advantage, (e) complexity; as well as by their specific characteristics: (f) speed, (g) reliability, (h) enjoyment of use, (i) control of the usage process, (j) the risk of use.

Hypothesis 2. Consumer adoption of new mobile payment services is influenced by social and demographic characteristics of consumers: (k) the age of consumers, (l) gender differences; as well as their personal characteristics: (m) self-efficacy, (n) fear of technology, (o) social pressure, (p) technological readiness.

2.3 Adoption of payment service technologies by distribution network companies

To measure internal factors of acceptance of new technologies, we have used the POER (Perceived Organisational eReadiness) model. This model was proposed by Molla & Licker (2002) for the analysis of factors of the internal environment, including the personal characteristics of the company's employees, the internal help system in the company, and the attitude of employees toward innovation.

To analyze external factors, the PEER (Perceived External eReadiness) model proposed by Molla & Licker (2002; 2005) was used. The PEER model analyzes the factors of competitive pressure in the industry, the impact of regulators, and the technological changes in the industry.

In Table 4 we summarize the factors that influence the adoption of electronic payment services by companies and studies that have empirically proven the impact of these factors.

An important contribution to the study of the diffusion of electronic payment instruments is the attempt to determine the relative advantage of electronic payments for various market participants as a factor that stimulates the spread of electronic payment instruments. Most of the works indicate the following main factors that influence the intention to use electronic payment services: convenience and independence of location

and time (Frolick & Chen, 2004; Constantiou et al., 2006; Laukkanen & Kiviniemi, 2010). Mallat (2007) also considered these factors, but she added factors of economic benefit, cheaper services, and reduction of costs for the society as a whole.

TABLE 4. KEY FACTORS AFFECTING THE ADOPTION OF ELECTRONIC
PAYMENT INSTRUMENTS BY EUROPEAN COMPANIES

AUTHORS	COUNTRY	FACTORS	DIRECTION OF IMPACT
		INTERNAL FACTORS (THE POER MODEL)	
van der Heijden (2002)	Netherlands	Technical feasibility (integration, scalability, remote access, infrastructure, complexity etc.)	+
		Perceived risks (security, investment)	-
		Network effects, absence of "a critical mass" of users	-
		Ease of use	+
Mallat & Tuunainen (2008)	Finland	Technical feasibility (integration, scalability, remote access, infrastructure, complexity etc.)	+
		Perceived advantages and need for alternative payment systems	+
		Ease of use	+
Cotteleer et al. (2007)	USA	Availability of human resources	+
Mallat (2007)	Finland	Complexity of use	-
		Awareness of the risk of using the technology	-
		Network effects, the absence of a critical mass of acceptors	-
		Compatibility	+
Trachuk & Golembiovsky (2012)	Russia	Operating costs	-
		Awareness of the risk of using the technology	-
		Technical feasibility (integration, scalability, remote access, infrastructure, complexity etc.)	+
Harrison et al. (2014)	Malaysia	Network effects, the absence of a "critical mass" of users	-
		Expenses	-
		Technical feasibility (integration, scalability, remote access, infrastructure, complexity etc.)	+
		Perceived advantages and need for alternative payment systems	+
Venkatesh et al. (2012)	Hong Kong	Network effects, the absence of a "critical mass" of users	-
		Expenses	-
		Perceived advantages and need for alternative payment systems	+
		EXTERNAL FACTORS (THE PEER MODEL)	
Molla & Licker (2002)	USA	Changes in the market that affect the company's decision to use innovative products	+
		Decisions of regulators (authorities) that affect the decisions of companies about the use of new technologies	+
		Technological changes in the industry that affect the company's decisions	+
Harrison (2014)	Malaysia	Decisions of regulators (authorities) that affect the decisions of companies about the use of new technologies	+
Trachuk & Golembiovsky (2012)	Russia	Changes in the market that affect the company's decision to use innovative products	+
		Decisions of regulators (authorities) that affect the decisions of companies about the use of new technologies	+
		Technological changes in the industry that affect the company's decisions	+

Source: Compiled by the authors.

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Thus, we can formulate the third hypothesis of our study.

Hypothesis 3. The adoption of new mobile payment services by distribution network companies is influenced by the following internal factors: (a) technical feasibility, (b) availability of human resources, (c) perceived risks, (d) perceived advantage, (e) cost, (f) network effects, (g) expenditures, (h) ease of use; as well as by external factors: (i) market pressure, (j) pressure of the regulator (government), (k) technological changes in the industry.

3. Methodology

3.1 Sampling strategy

Within the framework of our analysis model, which combines the factor- and the process-based approach to analyzing the factors of acceptance of mobile payment services by both consumers and distribution network companies, we have used a consistent methodology that includes the following stages:

- conducting in-depth semi-structured interviews with both parties of the acceptance of mobile payment services: the adult population aged 19 to 67 years (429 people) in order to determine the relationship between the main components of F. Davis's model and further justification of development of questionnaires that allow analyzing the factors that are the most important for the adoption of payment services; and distribution network companies (128 companies) in order to determine the relationship between the main components of the POER and the PEER models and additionally to justify the development of questionnaires;

- determination of non-parametric Spearman correlation coefficients (ϱs) for ranked data in order to recognize the relationship between model components as significant; subsequent selection of general and specific characteristics of payment services (factors) for further testing;

- compilation of a questionnaire and online questioning of consumers (429 people) and distribution network companies (128 companies) of their perception of new payment services;

- formation of a regression model that makes it possible to determine the strength and the significance of the impact of the factors selected for the questionnaire on the acceptance of a new payment service by consumers and distribution network companies.

TABLE 5. CHARACTERISTICS OF INDIVIDUALS IN THE SAMPLE: CONTROL VARIABLES

Characteristic	Number of respond-s (persons)	Share in the sample (%)	Share by geographical distribution, %					
			Cities of Federal significance: Moscow, Saint Petersburg	Cities with more than 1,000 thousand people	Cities with 500 1,000 thousand people	Cities with 300 500 thousand people	Cities with 100-300 thousand people	Cities with less than 100 thousand people
GENDER								
Male	197	46	45	44	46	47	42	44
Female	231	54	55	56	54	53	58	56
AGE								
From 19 to 24 years old	60	14	16	16	15	11	15	13
From 25 to 34 years old	109	25.5	18	22	20	28	21	29

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			Cities of Federal significance: Moscow, Saint Petersburg	Cities with more than 1,000 thousand people	Cities with 500 1,000 thousand people	Cities with 300 500 thousand people	Cities with 100-300 thousand people	Cities with less than 100 thousand people
From 35 to 44 years old	73	17	14	20	18	18	18	16
From 45 to 54 years old	118	27.5	31	24	28	25	28	26
From 55 to 64 years old	39	9	9	11	10	9	10	8
Over 65 years old	30	7	5	7	9	9	8	7
EDUCATION LEVEL								
Secondary education	30	7	7	4	9	6	11	7
Specialized secondary education	137	32	29	42	17	23	28	28
Higher education (a bachelor's degree)	56	13	12	26	27	50	24	13
Higher (a master's degree)	197	46	51	28	46	21	37	52
Academic degree	9	2	2	-	1	-	-	-
INCOME LEVEL (PER MONTH IN RUSSIAN RUBLES)								
More than 90,000	9	2	5	1.6	-	-	-	-
70,000-90,000	26	6	3	-	-	1	-	-
50,000-70,000	77	18	27	12.4	2			-
40,000-50,000	133	31	24	30	4	6	3	2
30,000-40,000	142	33	21	36	33	21	17	23
20,000-30,000	30	7	12	13	36	38	43	34
Less than 20,000	12	3	8	7	25	34	37	41
EMPLOYMENT STATUS								
Temporarily unemployed	30	7	1	-	-	6	4	8
A housewife	17	4	-	2	5	-	8	12
Student	52	12	16	21	14	21	9	16
Pensioner	43	10	7	10	12	16	14	22
Employed	287	67	77	67	69	57	65	42

Source: Compiled by the authors.

In order to determine the factors that had a significant impact on the acceptance of payment services at the first stage, semistructured interviews of the adult population in

Russia were conducted on the basis of a multistage stratified probabilistic sample. The number of respondents was 429 people aged 19 to 67 years old. Table 5 shows the characteristics of individuals in the sample.

Table 6 presents the characteristics of distribution network companies in the sample.

TABLE 6. CHARACTERISTICS OF DISTRIBUTION NETWORK COMPANIES
IN THE SAMPLE: CONTROL VARIABLES

Characteristics of distribution network companies	Number of companies	Percent
SECTOR		
Trade	97	75
Services	31	25
Company life cycle		
Less than 5 years	66	52
5-7 years	24	19
7-10 years	17	13
More than 10 years	21	16
STAFF NUMBER		
Fewer than 10 people	32	25
10-50	74	58
50-250	13	10
More than 250 people	9	7
GOODS TURNOVER		
Less than 2 million rubles	49	38
2-9 million rubles	54	42
10-50 million rubles	19	15
More than 50 million rubles	6	5

Source: Compiled by the authors.

At the next stage the index for the main factors that affect the acceptance of payment services was calculated (for factors such as compatibility, testing capability, perceptibility, comparative advantage, complexity, speed, reliability, enjoyment of use, control of the usage process, risk of use) by summing individual items from the questionnaire (Table 7).

TABLE 7. FREQUENCY OF MENTIONING THE FACTORS OF ACCEPTANCE
OF MOBILE PAYMENT SERVICES IN THE DAVIS MODEL

№	Factors	Percent of mentions
	GENERAL	
1	Compatibility	34.2
2	Testing capability	61.9
3	Perceptibility	45.9
4	Comparative advantage	76.3
5	Complexity	64.1
	SPECIFIC	
6	Speed	42.4
7	Reliability	83.9
8	Enjoyment of use	61.3
9	Control of the usage process	73.7
10	Risk of use	93.3

Source: Compiled by the authors.

The factor mentioning frequency for distribution network companies is shown in Table 8.

TABLE 8. FREQUENCY OF MENTIONING THE FACTORS OF ACCEPTANCE
OF MOBILE PAYMENT SERVICES BY DISTRIBUTION NETWORK COMPANIES

№	Factors	Percent of mentions
	INTERNAL FACTORS (THE POER MODEL)	
1	Technical feasibility (integration, scalability, remote access, infrastructure, complexity etc.)	31.6
2	Availability of human resources	19.3
3	Perceived risks (security, investment)	45.9
4	Perceived advantages and need for alternative payment systems	76.3
5	Cost (operating costs)	74.1
6.	Network effects, the presence of "a critical mass" of users	83.9
7	Expenses	81.5
8	Ease of use	36.7
	EXTERNAL FACTORS (THE PEER MODEL)	
9	Changes in the market that affect the company's decision to use innovative products	44.2
10	Decisions of regulators (authorities) that affect the decisions of companies about the use of new technologies	96.3
11	Technological changes in the industry that affect the company's decisions	73.5

Source: Compiled by the authors.

The nonparametric Spearman's correlation coefficients (ϱs) for the ranked data were then calculated. To recognize the relationship between model components as significant, the correlation coefficient had to exceed the threshold value of 0.50. The correlation analysis showed that the acceptance of a new payment service is related to the general characteristics of the payment service: the ability to test a new service ($\varrho s = 0.63$), the comparative advantage ($\varrho s = 0.51$), and the complexity of using the service ($\varrho s = 0.54$). The specific characteristics of the payment service correlate with the reliability of use ($\varrho s = 0.62$), speed ($\varrho s = 0.54$), the control of usage ($\varrho s = 0.70$), and the level of the risk of using ($\varrho s = 0.84$). In general, the content analysis of interviews with consumers showed the relationship between the main components of the Davis model and provided additional justification for the developed questionnaire, which allows for analyzing the most important factors for the adoption of payment services.

The correlation analysis showed the acceptance of a new payment service by distribution network companies to be associated with the following internal factors:

- network effects (the presence of a critical mass of users) ($\varrho s = 0.88$);

- cost (operating costs) ($\varrho s = 0.71$);

- service launching costs ($\varrho s = 0.64$); cost (operating costs) ($\varrho s = 0.71$);

- perceived advantage ($\varrho s = 0.82$).

External factors correlate with the following:

- decisions of regulators ($\varrho s = 0.92$);

- technological changes in the industry ($\varrho s = 0.54$).

In general, the content analysis of interviews conducted with representatives of distribution network companies showed the interrelationship between the main components of models and provided additional justification for the developed

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questionnaire, which allows for analyzing the most important factors for the adoption of payment services.

3.2 Measurements

For the quantitative stage of the study, questions were formulated that measure the most significant factors identified as a result of content analysis: general (the possibility of testing a new service, the comparative advantage, the level of complexity of using the service) and specific (the reliability of use, the speed of payments, the control of use, and the level of risk of using a payment service). The questions were formulated as follows: "To what extent do you agree with the statements below?" and the answers were based on a 7-point Likert scale (1 being "I completely disagree," 4 being "I neither agree nor disagree," and 7 being "I completely agree"). The questions are described in Tables 9 and 10.

The "testability" factor was measured using a scale consisting of two questions that determine the acceptance of a new payment service with the help of testing tools, bringing them to the market, and competing on the basis of a free demonstration service for consumers. In order to assess the "comparative advantage" factor, questions were asked that assess the ability of the service output by the company to meet the needs better or cheaper than the services of other companies. The "complexity level" factor was measured using three questions that characterize the need for specific knowledge to effect payment or the need to perform additional actions that are not a part of other similar services.

The measurement of specific factors of service perception was based on four groups of questions. First, the reliability of use was measured in accordance with the answers to questions about confidence in the accuracy and the timeliness of payment as well as in the possibility of effecting the payment at any time. Secondly, the speed of payment was assessed. It was measured by estimating the time needed to transfer funds to the beneficiary's account. Thirdly, the monitoring of the process of use by consumers was determined by means of an assessment of the possibility to notify the bank of the payment and the level of satisfaction of service consumers. The fourth group of questions concerned the risk of using a payment service and was measured as the belief in the absence of unauthorized access to customer data and as the customer loyalty to this service.

The indicators of the number of consumers' bank cards and the number of non-cash payments (including mobile payments) were used as control variables.

TABLE 9. INDICATORS FOR MEASURING PAYMENT SERVICE CHARACTERISTICS FOR CONSUMERS

Factor	Designation	Measurement	Cronbach's alpha
		GENERAL CHARACTERISTICS	
Testing capability	TEST1	I'm sure that any new technology contains a significant risk that cannot be detected until there is a mass use of this technology, so time is required for product testing.	0.83
	TEST2	I must first check if the mobile app makes any mistakes in making the payments I need before I can use the new payment service.	
Comparative advantage	OPT1	Mobile payment services allow you to have better control over the payments made.	0.84
	OPT2	Advantages of mobile payment services are that they allow you to pay bills and to pay for purchases 24 hours a day.	
	OPT3	Mobile payment services allow me to spend less time paying bills	
	OPT4	I like that mobile payment services allow me enter custom settings	

TABLE 9. INDICATORS FOR MEASURING PAYMENT SERVICE CHARACTERISTICS FOR CONSUMERS

Factor	Designation	Measurement	Cronbach's alpha
		that will be convenient for me.	
Complexity	USE1	I think that mobile payment services are designed for use only by specialists who have training in computer technology.	0.81
	USE2	Acquiring knowledge about the use of a new technology is as useful as the technology itself.	
	USE3	I have no difficulty in studying the work of a new technology.	
		SPECIFIC CHARACTERISTICS	
Enjoyment of use	EASE1	I will accept a new mobile payment service if I like its interface.	0.84
	EASE2	I will accept a new mobile payment service if it allows me to be more efficient when paying for my daily purchases.	
	EASE3	I prefer to use the most advanced available technologies, so I prefer mobile services.	
Reliability	SEC1	I will accept a new mobile payment service if the technical support makes this service more reliable.	0.86
	SEC2	I am sure that the computer programs used in the creation of mobile payment services will perform the actions that are necessary.	
	SEC3	I believe that mobile payment services will allow the state to monitor my income and expenses.	
Control of the usage process	CON1	Mobile payment service should provide an opportunity for users to see their income and expenses.	0.88
	CON2	In order to be sure of the success of payments, I must see the status of my payment and have documentary evidence	
	CON3	I believe that using mobile payment services allows me to control the payment process.	
Risk of use	RISK1	I think that manufacturers can control my data and have access to my personal information when providing remote support	0.86
	RISK2	I do not feel confident when I have to deal with an electronic technology instead of people.	
	RISK3	I consider any kind of online business, including mobile payment services, to be unsafe.	

Source: Compiled by the authors.

A similar questionnaire was developed to analyse the perception of mobile payment systems by distribution network companies. Table 9 lists the questions for distribution network companies:

TABLE 10. INDICATORS FOR MEASURING PAYMENT SERVICE CHARACTERISTICS
FOR DISTRIBUTION NETWORK COMPANIES

Factor	Designation	Measurement	Cronbach's alpha
		IN-HOUSE CHARACTERISTICS	
Technical feasibility (integration, scalability, remote access, infrastructure, complexity etc.)	T1	Our company will connect to a new mobile service even if we already have a payment service system and have the technical ability to connect to a new payment facility	0.84
	T2	Our company will connect to a new mobile service if existing systems can be configured to use the new payment service and we do not need new additional equipment	
Perceived risks (security, investment)	RK1	Our company will connect to a new mobile service if payments are safe and we can recommend our customers to use them	0.87

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TABLE 10. INDICATORS FOR MEASURING PAYMENT SERVICE CHARACTERISTICS
FOR DISTRIBUTION NETWORK COMPANIES

Factor	Designation	Measurement	Cronbach's alpha
	RK2	Our company will connect to a new mobile service if the offered mobile payment services have a sufficient degree of protection	
	RK3	Our company will connect to a new mobile service if mobile payment services are not more dangerous than other payments	
	RK4	Our company will connect to a new mobile service if the risks of using mobile payment services by customers are not high	
Perceived advantages and need for alternative payment systems	UR1	Our company will connect to a new mobile service if we are sure that this service is the most convenient for our customers	0.89
	UR2	Our company will connect to a new mobile service if the manufacturer provides us with additional services (for example, according to the profile of our customers)	
	UR3	Our company will connect to a new mobile service if its use allows us to improve the image of our company in the eyes of our customers in comparison with other alternative payment systems	
	UR4	Our company will connect to a new mobile service if the developers allow us to reduce the cost of purchases for customers as compared to paying in cash	
Operating costs	COST1	Our company will connect to a new mobile service if operating costs are lower than for other alternative options	0.94
	COST2	Our company will connect to a new mobile service if our customers use it and we are ready to pay operating costs regardless of their amount	
Network effects, the absence of a "critical mass" of users	C1	Our company will connect to a new mobile service if we know that our customers are ready to use them	0.96
	C2	Our company will connect to a new mobile service when we are confident in the presence of customers of this payment service	
	C3	Our company will connect to a new mobile service if it can be used by clients to pay for many purchases in different networks and this helps increase the number of impulsive purchases from our company	
		EXTERNAL FACTORS	
Market pressure	MARK1	Our company will connect to a new mobile service if our customers and business partners are willing to pay for goods and services with the help of the proposed mobile payment service	0.81
	MARK 2	Our company will connect to a new mobile service if most of the competitors operating in our market implement it and this can become a competitive advantage of the company	
	MARK 3	Our company will connect to a new mobile service if its implementation allows us to increase the number of our customers	
Technological changes in the industry	TR1	Our company will connect to a new mobile service if there are technological changes in the industry and this becomes a requirement of time	0.88
	TR2	Our company will connect to a new mobile service if the number of mobile devices of the population grows and it becomes more convenient for our customers to make payments using mobile services	

Source: Compiled by the authors.

3.3 Description of the data analysis procedure

During the analysis of all the variables measured on the basis of scales of several questions, the first ones to be assessed were reliability coefficients (Cronbach's alpha). The calculated coefficients corresponded to the recommended minimum level of reliability of 0.75 (Tables 9 and 10). At the next stage, a factor-based analysis was carried out by the

principal component method for 9 questions that describe three aspects of the general characteristics of payment services and for 13 questions that describe four aspects of the specific characteristics of the payment service.

An analysis of the factors that affect the acceptance of mobile services by distribution network companies was conducted for 14 questions that describe in-house factors and 5 questions that describe external factors.

In accordance with the recommendations for the factor-based analysis using the main component method (Hatcher, 1994), the main axis method and the orthogonal rotation that maximizes variation (varimax) were used. In accordance with the Kaiser criterion, the analysis revealed three factors with eigenvalues exceeding 1 for the perception of mobile services by consumers and four factors for distribution network companies. In general, three common factors and four specific factors explained 73.8% of variation in consumer responses, which is consistent with the recommendation to explain 70% of the variation in structural models (Stevens, 1986).

Thus, the conducted analysis has confirmed the existence of three common factors and four specific factors that affect consumers' perception of mobile payment services. The obtained values were then used for a subsequent regression analysis.

A similar factor-based analysis was carried out using the principal component method for five in-house factors and two external factors that affect the perception of mobile payment services by distribution network companies, which were also measured using 12 questions for in-house factors and 5 issues for external factors.

The factor-based analysis founded on the method of principal components with orthogonal rotation has revealed the presence of four in-house factors and two external factors, which described a total of 72.8% variation in questions. The values of the obtained factors were used to form the final set of factors that affect the acceptance of mobile payment services by distribution network companies, which were then included in the regression analysis.

Thus, the results of factor-based analysis were used to calculate the force of impact of factors on the perception of mobile payment services by consumers involved in the regression analysis using the following model:

$$Y_i = \beta_0 + \beta_1 * TEST_i + \beta_2 * OPT_i + \beta_3 * USE_i + \beta_4 * EASE_i + \beta_5 * SEC_i + \beta_6 * CON_i + \beta_7 * RISK_i + \varepsilon_i \tag{1}$$

Where Y_i - the indicator of the acceptance of a mobile payment service by consumers (a binary variable, where 1 means that the mobile payment service is accepted for use by the consumer; 0: not accepted); $TEST_i$ - the possibility of testing the mobile payment service; OPT_i - the consumer's perceived advantage of using the new mobile payment service; USE_i - the complexity of consumers' use of the mobile payment service; $EASE_i$ - the enjoyment of using the mobile payment service as perceived by the consumer; SEC_i - the reliability of using the mobile payment service as perceived by the consumer; CON_i - the ability of consumers to control the payment process when using the mobile payment service; $RISK_i$ - the risk of using the mobile payment service as perceived by the consumer.

Analysis of the impact of socio-demographic characteristics of consumers was analyzed using the following model:

$$Y_{dem_i} = \beta_0 + \beta_1 * Age_i + \beta_2 * Gender_i + \beta_3 * SELF_{EFF_i} + \beta_4$$
$$* FEAT_{TECH_i} + \beta_5 * SOC_{PRES_i} + \beta_6 * TEH_{READ_i} + \varepsilon_i \qquad (2)$$

Where Y_{dem_i} - the indicator of the perception of a mobile payment service by consumers (a binary variable, where 1 means that the mobile payment service is accepted for use by the consumer; 0: not accepted); Age_i - the age of the consumer; $Gender_i$ - the impact of gender differences of consumers on the use of a new mobile payment service; $SELF\_EFF_i$ - the consumers' perception of self-efficacy when using the mobile payment service; $FEAT\_TECH_i$ - the consumers' fear of a new mobile payment technologies; SOC_PRES_i - the social pressure of using a mobile payment service on consumers; TEH_{READ_i} - the technological readiness of consumers to use the mobile payment service.

The analysis of the factors of the perception of mobile payment services by distribution network companies was conducted according to the following model:

$$Z_i = \beta_0 + \beta_1 * T_i + \beta_2 * RK_i + \beta_3 * UR_i + \beta_4 * COST_i + \beta_5 * C_i$$
$$+ \beta_6 * MARK_i + \beta_7 * TR_i + \varepsilon_i \qquad (3)$$

Where Z_i - the indicator of acceptance of the mobile payment service by distribution network companies (a binary variable, where 1 means that the mobile payment service is accepted for use by the company; 0: not accepted); T_I - the possibility of technical feasibility for using the mobile payment service; RK_i - the risk associated with the use of mobile payment services as perceived by distribution network companies; UR_i - the advantages of using a mobile payment service and the need for alternative payment systems as perceived by distribution network companies; C_i - the network effects, the absence of "a critical mass" of users of the mobile payment service; $MARK_i$ - the market pressure that affect the acceptance of a mobile payment services by distribution network companies; $COST_i$ - the operating costs of the use of the mobile payment service; TR_i - the technological changes in the industry that promote the acceptance of the mobile payment service.

Using the maximum likelihood method, standardized and non-standardized regression coefficients were defined (Tables 11, 12, and 13). Non-standardized coefficients were used to test our hypotheses while standardized ones were used to determine the factors that had a greater impact on the perception of mobile payment services by consumers and distribution network companies.

4. Results

Tables 11, 12, and 13 show the results of the regression analysis, which demonstrate the impact of various factors on the acceptance of mobile payment technologies by consumers (general and specific factors) and the factors of acceptance of mobile payment

technologies by distribution network companies (internal characteristics and external factors). We have evaluated the impact of these independent variables on the acceptance of mobile payment technologies using the maximum likelihood method. In general, the results of the regression analysis have confirmed our study hypotheses. Models based on equations (1) and (2) were able to explain 67% of the variation of general and specific factors in the acceptance of mobile payment technologies by consumers and 58% of demographic characteristics of consumers while models based on equation (3) were able to explain 62% of variation in their acceptance by distribution network companies.

When simulating the acceptance of mobile payment technologies by consumers (Table 11), we have discovered that the possibility of testing (β = 0.365, p <0.01) and the comparative advantage of using mobile payments (β = 0.271, p <0.10) have a positive impact on the acceptance of mobile payment technologies. However, the enjoyment of use does not have a significant effect on the growth in the number of users of mobile payment technologies (β = 0.084, p = 0.45). Variables of the level of risk of use and the complexity of mobile payment technologies also did not have a significant impact on the acceptance of mobile payment technologies by consumers. Thus, the testing capability for new technologies and the reliability of using mobile payment are the main factors in the growth of the number of mobile payment users in the studied sample, as the impact of general factors on acceptance of mobile technologies by consumers is higher than the impact of specific ones.

TABLE 11. ADOPTION OF MOBILE PAYMENT TECHNOLOGIES BY CONSUMERS:
THE IMPACT OF GENERAL AND SPECIFIC FACTORS

Independent indicators	Hypotheses	Non-standardized coefficients	Standardized coefficients
Constant (β_0)		0.182 (0.022)	
GENERAL FACTORS			
Testing capability ($TEST_i$)	Hypothesis 1b†	0.369 ***(0.024)	0.365***
Comparative advantage (OPT_i)	Hypothesis 1d	0,264*** (0.160)	0.271*
Complexity (USE_i)	Hypothesis 1e	- 0,278** (0.098)	-0.281***
SPECIFIC FACTORS			
Enjoyment of use ($EASE_i$)	Hypothesis 1g	0,086** (0.031)	0.084
Reliability of use (SEC_i)	Hypothesis 1h	0.316 ***(0.003)	0.309***
Control of the usage process (CON_i)	Hypothesis 1j	0,293** (0.076)	0.301***
Risk of use ($RISK_i$)	Hypothesis 1k	0,131*** (0.107)	0.128***
Corrected R-square		0.672	
Number of observations		429	

Source: Compiled by the authors.
Notes: † - hereinafter the designation of the hypothesis corresponds to its wording in the text; * - the significance of the coefficient p < 0.10; ** - the significance of the coefficient p < 0.05; *** - the significance of the coefficient p < 0.01. Standard errors are given in brackets.

Table 12 shows the results of the regression analysis of the impact of demographic characteristics of consumers on the acceptance of mobile technologies. All the demographic characteristics, with the exception of the "fear of technology" factor, had a positive impact on the acceptance of mobile payment technologies by consumers with an error probability p no more than 0.05. The coefficient β for the "age" variable was 0.262 (p <0.01); for the "social pressure" variable, β = 0.309 (p <0.05); for the technological readiness, β = 0.301 (p <0.05). Fear of technology adversely affected the acceptance of mobile payments by consumers (β = -0.184, p <0.10) while the self-efficacy factor (β = 0.088; p> 0.10) and gender differences (β = 0.031; p> 0.10) did not have a significant impact.

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TABLE 12. ADOPTION OF MOBILE PAYMENT TECHNOLOGIES: THE IMPACT OF DEMOGRAPHIC CHARACTERISTICS OF CONSUMERS

Independent indicators	Hypotheses	Non-standardized coefficients	Standardized coefficients
Constant (β_0)		0.293 (0.148)	
Age (Age_i)	Hypothesis 2k†	0.258 ***(0.044)	0.262***
Gender ($Gender$)	Hypothesis 2l	0,034* (0.096)	0.031*
Self-efficacy ($SELF\_EFF_i$)	Hypothesis 2m	0,092* (0.064)	0.088*
Fear of technology ($FEAT\_TECH_i$)	Hypothesis 2n	- 0,159* (0.121)	-0.184*
Social pressure (SOC_PRES_i)	Hypothesis 2o	0.316 ***(0.003)	0.319***
Technological readiness (TEH_{READ_i})	Hypothesis 2p	0,297** (0.076)	0.301**
Corrected R-square		0.581	
Number of observations		429	

Source: Compiled by the authors.
Notes:† - hereinafter the designation of the hypothesis corresponds to its wording in the text; * - the significance of the coefficient $p < 0.10$; ** - the significance of the coefficient $p < 0.05$; *** - the significance of the coefficient $p < 0.01$. Standard errors are given in brackets.

Table 13 presents non-standardized and standardized coefficients of regression of the internal organizational characteristics and external factors on the acceptance of mobile payment technologies by distribution network companies.

TABLE 13. ADOPTION OF MOBILE PAYMENT TECHNOLOGIES BY DISTRIBUTION NETWORK COMPANIES: THE IMPACT OF INTERNAL CHARACTERISTICS AND EXTERNAL FACTORS

Independent indicators	Hypotheses	Non-standardized coefficients	Standardized coefficients
Constant (β_0)		0.251 (0.109)	
INTERNAL CHARACTERISTICS			
Technical feasibility (integration, scalability, remote access, infrastructure, complexity, etc.) (T_i)	Hypothesis 3a†	0.121***(0.118)	0.123***
Perceived risks (security, investments) (RK_i)	Hypothesis 3c	0.218*** (0.225)	0.222
Perceived advantages and need for alternative payment systems (UR_i)	Hypothesis 3d	0.387** (0.098)	0.389**
Operating costs ($COST_i$)	Hypothesis 3e	- 0.319***(0.107)	-0.317***
Network effects, the presence of "a critical mass" of users (C_i)	Hypothesis 3f	0.616***(0.093)	0.615***
EXTERNAL CHARACTERISTICS			
Market pressure ($EASE_i$)	Hypothesis 3i	0.396** (0.228)	0.394**
Technological changes in the industry (TR_i)	Hypothesis 3k	0.102 ***(0.213)	0.104***
Corrected R-square		0.624	
Number of observations		128	

Source: Compiled by the authors.
Notes:† - hereinafter the designation of the hypothesis corresponds to its wording in the text; * - the significance of the coefficient $p < 0.10$; ** - the significance of the coefficient $p < 0.05$; *** - the significance of the coefficient $p < 0.01$. Standard errors are given in brackets.

The analysis has demonstrated that network effects and the presence of "a critical mass" of users had a positive impact on the acceptance of mobile payment technologies by distribution network companies ($\beta = 0.615$, p <0.001) within internal characteristics as well as the perceived advantages and need for alternative payment systems ($\beta = 0.389$, p <0.05). Among external factors, market pressure had a significant impact on the acceptance of mobile payment technologies by delivery network companies ($\beta = 0.394$; p <0.05).

Neither technical feasibility nor technological changes in the industry had a significant impact on the acceptance of mobile payment technologies. The results of hypothesis testing are provided below:

- according **to Hypothesis 1**, the adoption of new mobile payment services by consumers is influenced by general and specific characteristics of the payment service. This hypothesis was partially confirmed for the following general factors: (b) testing capability ($\beta = 0.365$, p <0.01); (d) comparative advantage ($\beta = 0.271$, p <0.10); and for the following specific factors: (g) reliability ($\beta = 0.309$, p <0.01); (i) control of the process of use ($\beta = 0.301$, p <0.01). The factor (e) "complexity" had a negative effect on the acceptance of mobile payment services ($\beta = -0.281$, p <0.01). The impact of factors (h) enjoyment of use ($\beta = 0.084$, p = 0.45) and (j) the risk of use ($\beta = 0.128$, p <0.01) was not confirmed;

- **Hypothesis 2**, which describes the demographic characteristics of consumers, was also partially confirmed for the following factors: (k) the age of consumers ($\beta = 0.262$, p <0.01); (o) social pressure ($\beta = 0.319$, p <0.01); and (p) technological readiness ($\beta = 0.301$, p <0.05). For the factors (l) gender differences ($\beta = 0.031$, p <0.10) and (m) self-efficacy ($\beta = 0.088$; p <0.10) the hypothesis was not confirmed;

- **Hypothesis 3**, which describes factors that affect the adoption of mobile payment technologies by distribution network companies, was also partially confirmed for the following internal factors: (d) perceived advantage ($\beta = 0.389$; p <0.05); (f) network effects (the presence of "a critical mass" of innovating consumers) ($\beta = 0.615$, p <0.01); and the following external factors: (i) market pressure ($\beta = 0.394$, p <0.05). The acceptance of mobile payment technologies was negatively impacted by (e) cost (operating costs) ($\beta = -0.317$; p <0.01). For the factors (a) technical feasibility ($\beta = 0.123$, p <0,01), (k) technological changes in the industry ($\beta = 0.104$, p <0,01), the hypothesis was not confirmed.

Thus, the analysis model suggested by the authors, which combines the factor- and the process-based approach, successfully describes various factors in the acceptance of mobile payment services by both consumers and distribution network companies.

Standardized coefficients not only allow testing of hypotheses but can also be used to compare the impact of various characteristics of payment services, consumers, and distribution network companies on the probability of acceptance of mobile payment services.

4.1 Practical implications

Comparing the practice of applying mobile payment services in European countries and Russia, some differences between European and Russian consumers in the process of perceiving mobile payment services can be noted. According to obtained study results (Apanasevic, 2014; Arvidsson, 2014; Mallat & Tuunainen, 2008), the main factors that influence the adoption of mobile payment services for users of mobile payment services in European countries are such characteristics of the technology as the comparative advantage and the speed. Unlike Russian consumers, the compatibility factor can also play an important role since, by the time of our study, the level of penetration of various services is higher and therefore certain products and solutions already exist, and the

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compatibility factor is more important for European consumers. Thus, the different levels of socioeconomic and innovative development of countries affect the rate of distribution of mobile payment services.

According to the results obtained by us on a sample of Russian consumers, the main characteristic that slows down the process of introducing a new technology is its complexity (β = -0.278). Nevertheless, the availability of such characteristics of mobile payment services as the testing capability (β = 0.365) and the reliability of using a mobile payment service (β = 0.305) can serve as an incentive for the further spread of mobile payment services. An important role in the decision to use the mobile payment service is played by the factors of the control of the process of usage (β = 0.301) and the comparative advantage (β = 0.271).

Considering the characteristics of users, it should be emphasized that the level of technological readiness of European consumers is higher than that of Russian consumers. This factor adversely affects the adoption of mobile payment services in Russia at its earliest stages: at the stage of developing an attitude toward a new service in the E. Rogers model and at the stage of perception of Ease of Use in the Technology Acceptance Model (TAM) (Davis, 1989). For Russian consumers, it is still very important to have the opportunity to interact with the manufacturer when receiving a service (for example, a hotline phone number) due to rejection of new technologies. And, finally, it is necessary to mention the following features of consumer behavior in different countries that impact the development of payment services: the level of self-efficacy, which is higher for European consumers than for Russian consumers; at the same time, the social pressure on users when using mobile payment services is practically the same.

The results of acceptance of new technologies by Russian distribution network companies allow us to conclude that the main factor of success is, as expected, the presence of a critical mass of users (β = 0.615), which is due to the fact that when accepting a new payment service companies need to be sure that there will be consumers who will want to use it. The next important factor is the perceived advantage (β = 0.389). Technical feasibility is the least significant factor for the acceptance of a mobile payment facility by distribution network companies (β = 0.123). Factors that negatively affect the introduction of mobile payment services by distribution network companies are operating costs (β = -0.319).

In conclusion, the authors would like to note that certain recommendations have been formulated for companies that develop and implement new mobile payment tools on the basis of this analysis. The obtained information on the characteristics of these technologies and users of different countries can contribute to the improvement of the innovative process of companies aimed at enhancing the characteristics of mobile payment services and their promotion in Russia and in the European market.

Firstly, mobile payment services need to be presented to consumers in such a way that their most significant characteristics are perceived and assessed positively by both consumers and distribution network companies. In particular, we are talking about such features of technologies as the comparative advantage, the testing capability, the reliability, and the compatibility.

Secondly, a positive perception of a mobile payment service by both consumers and distribution network companies can be achieved by providing various additional services. These services can include, among others, notification of administrative fines and control of incurred expenses and received income (for consumers) and consumption analytics, analysis of incomes received from different user groups, and characteristics of consumers (for distribution network companies).

Thirdly, communication activities (such as loyalty programs, coupons, and discounts) should be aimed at developing a positive attitude toward the use of mobile payment services in the society in order to increase the level of acceptance.

Fourthly, positive perception can be achieved through the external design of the technological interface as well as through ensuring user-friendliness and operability. Availability of simple instructions, online help, and trial use of mobile payment means is of no small importance (especially for Russia) and will contribute to the development of a positive emotional background to the active behavior of the consumer.

For distribution network companies, mobile payment services should not require any additional hardware but should have low operating costs. Maintenance should include additional services. The use of the payment service should improve the company's image and encourage consumers to make impulsive purchases. And lastly, the price of purchase using the mobile payment service should be lower than the cash price.

4.2 Limitations

The authors would also like to indicate certain limitations of this study. We have not been able to interview the entire assembly of Russian distribution network companies and consumers due to limited data collection capabilities. Nevertheless, our sample of companies represents a representative part by sector, turnover, and size of companies. The sample is also revealing for consumers. However, researchers might want to analyze the factors for acceptance of mobile payment services by distribution network companies and consumers in a larger sample in the future.

5. Conclusions

The results of a sample survey of 429 consumers and 128 distribution network companies confirm the feasibility of an integrated assessment of the factors for the acceptance of mobile payment services based on the factor-based and the process-based approaches. Within the framework of this study, the identified factors (general and specific for consumers and internal and external for distribution network companies) have been measured empirically on the basis of the methodology developed by the authors and have been used to analyze the acceptance of mobile payment services by consumers and distribution network companies.

The qualitative stage of the study has enabled the authors to draw initial conclusions about the importance of certain aspects of acceptance of mobile payment technologies for both consumers and distribution network companies. For example, in accordance with the results of the analysis of the theoretical basis, it has been empirically confirmed that convenience and reliability of use are of the greatest importance for mobile payments by consumers. The majority of respondents at the qualitative stage of the study precisely referred to these aspects of acceptance as the most important.

Within the framework of factors for the acceptance of mobile payment services by distribution network companies, respondents were more likely to note the presence of a critical mass of users and the availability of additional services.

Finally, the practical significance of the results of the study for development companies of mobile payment services lies in understanding that the success of the commercialization of a new payment service requires them to build networks of consumers and distribution network companies. In addition, the analysis has demonstrated that mobile payment services must be safe and reliable, must provide additional services, loyalty programs, and coupons, and must be simple and convenient to use and that consumers must be able to control their transactions when using these services.

For distribution network companies, mobile payment services should not require any additional hardware but should have low operating costs. Maintenance should include additional services. The use of the payment service should improve the company's image

and encourage consumers to make impulsive purchases. And lastly, the price of purchase using the mobile payment service should not exceed the cash price.

These factors have proved to be the most significant for consumers and distribution network companies alike; at the same time, if a service requires additional hardware (separate hardware) or fails to meet the needs and expectations of consumers and distribution network companies, it will not be successful despite excellent technical work and availability of a high level of security.

Understanding the complex nature of factors in the acceptance of mobile payment services is becoming the key to creating a long-term competitive advantage for mobile payment service providers and contributes to the improvement of their innovative process while facilitating the promotion of mobile payment services in Russia and in the European market.

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