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V. V. Babayan, A. V. Turobov

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NOT UNIQUE, NOT UNIVERSAL: RISK PERCEPTION AND ACCEPTANCE OF ONLINE VOTING TECHNOLOGY BY RUSSIAN CITIZENS

Valeria V. BABAYAN [1] *— Doctoral Student, School of Politics and Governance, Faculty of Social Sciences; Lecturer*
E-MAIL: vv.babayan@hse.ru
https://orcid.org/0000-0002-9192-0659

Aleksey V. TUROBOV [1] *— Research Fellow, Faculty of Social Sciences; Lecturer, School of Politics and Governance*
E-MAIL: aturobov@hse.ru
https://orcid.org/0000-0002-6809-8775

[1] HSE University, Moscow, Russia

Abstract. What is the connection between Russian citizens' perception of Internet voting and the context of its top down adoption with their readiness to use it? To investigate this question, we use Structural Equation Modeling (SEM) to account for both observed and latent indicators of technology adoption and their linkage with the Internet voting use intent. The authors use survey evidence from VCIOM (2020) and a national survey of Internet users conducted by Online Marketing Intelligence (OMI) company in 2021. This study provides some support to the application of theoretical expectations formulated in the context of Western democracies to the Russian population's voting technology attitudes. The findings indicate that the use of the Internet is not a robust measure of tech-

И НЕУНИКАЛЬНО, И НЕУНИВЕРСАЛЬНО: ВОСПРИЯТИЕ РИСКА И ПРИНЯТИЕ ТЕХНОЛОГИИ ОНЛАЙН-ГОЛОСОВАНИЯ ГРАЖДАНАМИ РОССИИ

БАБАЯН Валерия Витальевна — аспирант, аспирантская школа по политическим наукам, факультет социальных наук, преподаватель Департамента политики и управления, Национальный исследовательский университет «Высшая школа экономики», Москва, Россия
E-MAIL: vv.babayan@hse.ru
https://orcid.org/0000-0002-9192-0659

ТУРОБОВ Алексей Владимирович — научный сотрудник Факультета социальных наук, преподаватель Департамента политики и управления, Национальный исследовательский университет «Высшая школа экономики», Москва, Россия
E-MAIL: aturobov@hse.ru
https://orcid.org/0000-0002-6809-8775

Аннотация. Какова связь между восприятием россиянами голосования через интернет и готовностью его использовать? Для поиска ответа на данный вопрос применяется метод моделирования структурными уравнениями (SEM) с целью учета как наблюдаемых, так и латентных измерений принятия технологии (technology acceptance/adoption) и их связи с оценкой онлайн-голосования и намерениями ее использования. Авторы опираются на данные опроса ВЦИОМ за 2020 г. и национального опроса интернет-пользователей, проведенного компанией OMI (Online Marketing Intelligence) в 2021 г. Результаты построения моделей позволяют утверждать, что отношение населения России к технологиям голосования в значительной

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nology acceptance anymore, and a more nuanced approach to the experiences of Internet usage is needed. Internet users appear to be more concerned about privacy, the possibility of fraud, and external interference than the respondents drawn from the overall population. The authors suggest that it is due to acceptance of risks seeming inevitable and to bigger digital literacy and therefore awareness about the risks posed by voting online.

степени соответствует теоретическим ожиданиям, сформулированным в контексте принятия технологий в западных демократиях. Авторы показывают, что частота использования интернета больше не является надежной мерой принятия технологий. Пользователи интернета, по-видимому, больше озабочены конфиденциальностью, а также потенциалом мошенничества и внешнего вмешательства. Авторы связывают это различие в восприятии голосования через интернет с осознанием и принятием рисков, которые кажутся неизбежными, и с большей компьютерной (интернет-) грамотностью.

Keywords: online voting, internet voting, trust, technology adoption, perceived risk, structural equation modeling, Internet

Ключевые слова: онлайн-голосование, интернет-голосование, доверие, принятие технологий, воспринимаемый риск, интернет, моделирование структурными уравнениями

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Introduction

Despite heightened interest towards different forms of convenience voting caused by the COVID-19 pandemic, there is no evidence that higher costs of traditional voting improve voters' perception of its alternatives (e. g., Safarpour and Hanmer [2020] about voting by mail). There are also no reasons to believe that these circumstances eliminated potential apprehension concerning Internet voting. In this study, we focus on these particular perceptions as uncertainty about proper vote count may lead to absenteeism [Vorobyev, 2016] and undermine the legitimacy of the electoral process [Loeber, 2011]. Therefore, trust in Internet voting, not the technology itself, is key in its early implementation, in line with assumptions of the SCOT (Social Construction of Technology) theory [Bijker, 2006].

The consensus of the sparse research on the perception of online voting technology can be described as follows: even though voters perceive it as a simpler and more

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reliable voting channel in terms of accuracy of vote count, they continue to doubt the anonymity of their vote [Alvarez et al., 2013]. Meanwhile, the perceived usefulness of the procedure is associated with higher levels of trust in Internet voting [Carter, Campbell, 2012]. Significant predictors of its use intent include perceived usefulness and ease of use [Yao, Murphy, 2007], privacy protection and system accuracy [ibidem; Choi, Kim, 2012], attitude toward government, and perception of technology in its wider sense [Choi, Kim, 2012].

Collectively, the studies of Internet voting outline a critical role for technical, legal, and political issues arising from the introduction of this additional voting channel. Although legitimate, such focus attaches disproportionate importance to the macro-level factors of technology adoption leaving out the societal and political consequences of Internet voting implementation resulting from the transformation of established personal experiences of electoral participation [Kersting, Kersting, Baldersheim, 2004; Oostveen, van den Besselaar, 2004; Herrnson et al., 2008].

This paper is concerned with the connection of Russian citizens' perception of Internet voting and of the context of its adoption with readiness to use it. To investigate this question, we use Structural Equation Models (SEM)to account for both observed and latent indicators of technology adoption and their linkage with the evaluation of Internet voting and readiness to use it. The findings from the structural model based on VCIOM (Russian Public Opinion Research Center) 2020 data are compared with the national survey of Internet users conducted by the Online Marketing Intelligence (OMI) company in 2021[1].

Conceptual background

More than twenty years ago, Norris and Jones [1998] determined that political participation is a multidimensional phenomenon. Discussions about the changes brought about by the Internet and technology, and the specifics of online participation led to the emergence of the concept of e-democracy. E-democracy can be considered both in a narrow and in a wide context (e. g., [Kneuer, 2016: 669]). Nonetheless, an optimal understanding implies an overarching concept, namely the use of ICT (Information and Communication Technologies) by political actors (government, elected officials, media, political/societal organizations, and citizens) within political and governance processes in today's representative democracy [ibidem]. Implementing the concept of e-democracy is intended for the electronic government. Carrizales [2018: 15] argues that e-democracy is the final function of e-government; research by Lee, Chang, and Berry [2011] indicates that the development of e-democracy practices is related to e-government; Reddick [2004: 61] points out in his study that democracy is enhanced with the development and growth of e-government.

Electronic government encompasses all government roles and activities shaped by information and communications technologies [Brown, 2005]:

(1) the state's economic and social programs,
(2) its relationships with the citizen and the rule of law (e-democracy),
(3) its internal operations, and
(4) its relationship with the international environment.

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[1] The OMI survey was conducted with the support of the Faculty of Social Sciences, HSE University.

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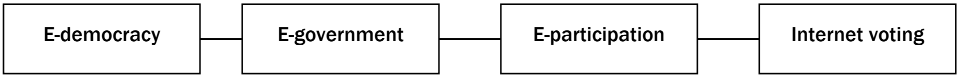
Four aspects of e-government have lasting impacts on public administration: citizen-centered service, information as a public resource, new skills and working relationships, and accountability and management models [ibidem]. However, things in this domain are not that unequivocally positive. For example, we know that authoritarian regimes also introduce e-government, but to legitimize authoritarianism, not for democratization purposes [Maerz, 2016].

It turns out that e-participation is a full-fledged part of e-democracy and is implemented through (with the help of) e-government. Much of the literature on e-participation points to the importance of political institutionalization and the degree of technological development (for discussion and analysis on the 125 countries, see [Jho, Song, 2015]). Yet, the forms of e-participation are varied. Each type of electronic participation is implemented in accordance with its demands for the quality and stability of political institutions. One of the key and significant forms of electronic participation is Internet voting (as a variety of electronic voting). It is worth noting that e-voting is regarded as one of the most important components of e-democracy [Yusifov, 2018].

Thus, we see a uniform theoretical model: from e-democracy to e-government, from e-government to e-participation and Internet voting (fig. 1).

Fig. 1. Logical diagram



The use of such a theoretical framework will allow considering the problem of Internet voting not only through the prism of the electoral process [Solop, 2001; Germann, Serdült, 2017; Willemson, 2018; Petitpas, Jaquet, Sciarini, 2021] and technical implementation [Moynihan, 2004; Alvarez, Hall, Trechsel, 2009; Yi, Okamoto, 2013; Joaquim, Ferreira, Ribeiro, 2013; Satizábal, Páez, Forné, 2021] but also from the standpoint of larger and “classical” issues of political science, such as trust and risk.

Trust plays a central role both at the technological level and at the level of social identity, as evidenced by the research of Warkentin and her colleagues [2018]. They show that citizens’ perceptions that they share the same values as the individuals affiliated with providing e-Government (and Internet-based voting) services contribute to the intention to vote electronically over the Internet. Conversely, another study showed that trust in the government was insignificant [Powell et al., 2012]. Moreover, the adoption of blockchain solutions might be related to the higher trust of the citizens in the technology rather than towards the government [Queiroz, Wamba, 2019; Hughes et al., 2019] even though the former is being introduced by the latter.

Risks are an inevitable part of the process of implementation of Internet voting. Nonetheless, this inevitability is intrinsic to the functioning of modern society, which increases security on a par with insecurity [Bechmann, 2010]. Risk is a tool for transforming the unknown into the computable [ibid.: 75]. A similar function is ascribed to trust ([Luhmann, 1979] cited in [Pieters, Becker, 2005]).

The risk perception is often seen as a component of trust: trust implies the presence of uncertainty and, therefore, the probability of failure, so in the absence of risks and

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possible negative consequences the need for trust can be questioned [Mayer, Davis, Schoorman, 1995]. On the other hand, trust can mean refusal to acknowledge the existence of risks [Sztompka, 1999: 31].

Trust in this case implies readiness to use the technology regardless of the perceived, or subjective, risk. In the United States, which has become a paradigmatic case of electronic voting machines failure in the 2000 Presidential elections in Florida, evaluation of risks of e-voting was similar among those who use this technology and those who prefer traditional voting [Stewart III, Dunham, 2020]. Thus, as the risks are always in place, it is the positive incentives and external risks, not those related to the possible systemic failure, that are supposed to matter.

In the context of Russia, we are constrained to turn to research on related issues since only descriptive statistics from sociological services, which have conducted surveys on attitudes toward online voting, are yet available. The use of technology introduced as part of government programs in Russia is related to trust in government institutions at all levels. This is due to the need for trust in regulators and their personnel to ensure the safe functioning of the technology [Antonov et al., 2019: 62]. In addition, however, it should be borne in mind that technology can also be linked to the hope for a higher quality of service when it is provided in a digital environment [ibid.: 66].

Two leading sociological services of Russia conducted surveys regarding Internet voting attitudes almost simultaneously in July of 2020. In the Levada-Center* survey[2], all of the answers to the question about reasons for favoring technology were related in some way to convenience and reducing the cost of participating in voting. When asked what they dislike about online voting, 47 % of respondents mentioned some form of fraud. At the same time, the share of those who mentioned problems with anonymity and secrecy of voting was only 9 %. These results are consistent with those of the VCIOM[3] survey where fraud is the primary concern, too (among 33 % of respondents) and 14 % questioned the anonymity of the vote.

Through a systematic review of the e-government research area, the most commonly used explanatory theory is the technology acceptance/adoption model (TAM), with consistent results [Rana et al., 2012]. So why is the technology adoption model so popular, and how can it be applied to Internet voting issues?

According to one of the approaches to technology adoption, the use and perceived utility are critical to the sustainable diffusion of technology [Davis, 1989]. In the case of Internet voting, adopting technology could change voting habits and force citizens to switch from postal to Internet voting. The theory has been applied by researchers to Internet voting adoption [Choi, Kim, 2012, Christian Schaupp, Carter, 2005]. Based on the essence of the theory and expectations from the Internet-voting (including increasing voter turnout), it is logical to assume that the "adoption" of technology is more extended to the younger generation. Thus, the involvement of young voters takes place. On the other hand, a study of Swiss experience with Internet voting by Mendes

[2] Levada-Center* (2020) Attitudes towards Electronic Voting. URL: https://www.levada.ru/2020/08/31/otnoshenie-k-elektronnomu-golosovaniyu/ (accessed: 21.07.2021). (In Russ.)

[3] VCIOM (2020) Pioneers of Internet Elections. URL: https://wciom.ru/analytical-reports/analiticheskii-doklad/pionery-internet-vyborov (accessed: 21.07.2021). (In Russ.)

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and Serdült [2017] suggests that older voters, rather than “digital natives” (i. e., young voters), are more likely to remain faithful to Internet voting after experimenting with it.

Based on an analysis of eight electoral cycles of using Internet voting in Estonia, it is argued that the adoption of technology requires three electoral cycles with electronic support [Vassil et al., 2016]. However, the Estonian case is unique with regard to the early start of e-government adoption which imposes limitations on the applicability of its experience to other contexts. After all, more recent research illustrates that individual social capital factors (which are usually connected with the level of institutional trust) are more significant than those of technology adoption theory in explaining why some citizens use e-participation platforms while others do not [Choi, Song, 2020].

Moreover, studies based on the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) suggest that individuals may want to weigh the risks and benefits before deciding to use the technology. Thus, some people base their choice of participation in the electoral process on their perception of risk and benefits rather than the actual risk and benefits. At the same time, the increased perception of risk reduces the perceived benefits of the technology [Lean et al., 2009].

Thus, despite the particular popularity of the application of the TAM to the study of Internet voting and promising insights of different theories of technology adoption, we do not have unambiguous evidence about factors driving e-voting acceptance. It turns out that the usual theoretical framework requires supplementation or correction.

We propose to consider Internet voting at two levels from the standpoint of two theoretical foundations. On the one hand, as mentioned above, Internet voting is an element of e-participation, which means that it is carried out within the framework of e-democracy through e-government. On the other hand, modern Internet voting models are based on digital technologies[4], which implies digital transformation concepts only in the electoral process.

The “digital” context is critical in this case. The popularity of digital technologies has facilitated the development of many digital participation platforms that could help to boost the effectiveness of civil society participation in decision-making processes in an explicitly decentralized manner. The demand for such decentralized electronic participation services is increasing during the COVID-19 crisis [Kassen, 2021]. In turn, the algorithmic structures of the Internet voting system are essential for the understanding of voters, but awareness remains at the elementary level [Unver, 2017: 140].

At the same time, much attention is paid to Blockchain-based voting [Pawlak, Poniszewska-Marańda, Kryvinska, 2018; Dimitriou, 2020]. Blockchain, in turn, is one of the key digital transformation technologies. At this point, it is rather an umbrella term covering an almost “mystical” immutable mechanism ensuring anonymity. Nevertheless, blockchain is one of the many tools expected to deliver secure voting, and the presence of alternatives makes it more vulnerable to criticism concerning the possibility of undetected alteration or discarding of votes depending on the intentions of actors running it. Furthermore, technical implementation of the assumptions of blockchain in a real large-scale election appears impossible at least for now [Park et al., 2021].

[4] Digital technologies are knowledge, skills, technological and technical solutions for the creation, processing, transmission and use of digital data, as well as systems and procedures for their practical implementation [Lipsmeier et al., 2018].

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For its part, research in the field of computer-human interaction and human behavior generally considers full-fledged models of "digital voting" as a possible development of Internet voting (e. g., [Vlachokyriakos et al., 2014]. Worth mentioning, despite the digitization processes, the impact of digital technologies on political trust remains relatively insignificant [Lissitsa, 2021]. This, once again, actualizes research of the trust in Internet voting research, especially in a non-Western political context, as technology adoption theories tend to be Western-centric.

This study focuses on a context that is specific in two aspects. First and foremost, this study is less concerned with democratic elections in their widely accepted perception as a major prerequisite for the legitimacy of a political system. Second, although discussions about the large-scale implementation of online voting have been effectively abandoned in most countries due to the vulnerability of information systems, this study suggests the real possibility of online voting at the national level. Moreover, it is the very first attempt to compare the incentives of respondents of traditional and web-based surveys regarding the digital services provided by the government. Some national election studies (e. g., in New Zealand and Canada) allow research of attitudes towards Internet voting in dynamics and including responses acquired via different survey modes. However, they include these questions only in the web-based surveys. The latter (namely the comparison of results acquired from roughly similar models applied to two different samples) is more of methodological interest and drives us in the direction of theory-building rather than theory-testing. Despite the expectations that Internet surveys might increase social desirability bias as they do not assume the presence of the interviewer [Kreuter, Presser, Tourangeau, 2008; Heerwegh, 2009] (Ansolabehere and Schaffner [2014] disagree), this survey mode is far from being a "gold standard" in the social science research. Clear methodology and attempts to increase the validity of samples derived from online panels are a huge step towards such status of web-based surveys but uneven Internet penetration results in a skewed balance of rural and urban residents, their rates of digital literacy, age, etc., which can be most evident with smaller sample sizes.

For our structural model, we borrow from the theories of technology acceptance ideas about the structure of the decision to use technology — its comparative advantage over the traditional voting format and accessibility (perceived ease of use) on the one hand, and the risks associated with it on the other.

Empirical design and methodology

Research design

Proceeding from the theories discussed in the previous section, we construct latent variables of risk and positive factors of technology acceptance and adoption. We hypothesize the following relationships.

(H1) The "external" risks such as fraud and the possibility of interference are the key underlying measures of the perceived risk.

This expectation that these dimensions of risk load on the latent variable at a higher extent is based on the available survey data provided in the previous section (for example, people do not cite concerns about privacy as one of the primary sources of doubt). However, it is not purely descriptional as loading this observed indicator of

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risk on the latent variable depends on other dimensions of perceived risk and shows the explained variance of the latent variable. Furthermore, we anticipate this effect because reliability issues are inherent to all systems, not only technological ones, and it is the malicious intent that should matter.

(H2) Perceived risk has a negative effect on the attitude towards Internet voting.

Prior studies presented earlier indicate that people decide to participate in Internet voting based on their own experience and individual risk assessment. Given the level and extent of online fraud, it is logical to assume that negative perceptions will create an increased sense of risk that negatively impacts the perception of online voting.

(H3) Acceptance has a positive effect on the attitude towards Internet voting.

This hypothesis is based on a large number of theories examining technology adoption. We know that the adoption of technology increases the activity of participation in Internet voting (in fact, we are also talking about an increase in voter turnout, which is ambiguously illustrated by empirical studies).

(H4) Perceived risk prevails over acceptance factors in the formation of attitude towards Internet voting (in other words, explains a higher share of variance of that latent variable).

In this case, we rely on the theory that people pay more attention to the subjective perception of risk when making decisions. At the same time, the increased perception of risk reduces the perceived benefits of the technology.

(H5) Experience of participation in elections increases the intent to use Internet voting.

This hypothesis corresponds to findings of the importance of trust towards agencies responsible for technology implementation and basic assumptions about the nature of absenteeism (for a discussion on non-voters and Internet voting, see [Lindner, Aichholzer, Hennen, 2016]).

The hypotheses are tested using Structural Equation Modeling (SEM). This method enables researchers to build structural models representing relationships among different latent variables and linking them with observed indicators [Keil et al., 2000: 309], a feature that is particularly useful in the analysis of relatively new phenomena. Beyond combining latent variable modeling and regression analysis, SEM also allows including relations among variables, in contrast to the classic regression approach holding other variables at 0 while evaluating effects. Multiple regression is just one of the statistical techniques which can be implemented in SEM, alongside path analysis, confirmatory factor analysis, latent growth models, etc. While the latter helps deal with longitudinal data, we apply the combination of the first two. This approach is theory-driven: first, we construct latent variables and hypothesized relationships, then we estimate the models and compare their results.

We evaluate SEM models in the packages lavaan [Rosseel, 2012] and semTools [5] of the R software environment [6] using a diagonally weighted least squares (DWLS) estimator applicable to categorical data. Combining risk and technology acceptance

[5] Jorgensen T. D., Pornprasertmanit S., Schoemann A. M., Rosseel Y. (2021) semTools: Useful tools for structural equation modeling. R package version 0.5—4. URL: https://CRAN.R-project.org/package=semTools (accessed: 21.07.2021).

[6] R Core Team (2020) R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL: https://www.R-project.org/ (accessed: 21.07.2021).

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factors to build them into attitudes toward online voting and integrate into the willingness to use it appears reasonable, especially given the existing tradition of using this method in analyzing technology perceptions (see [Bart et al., 2005; Nemeslaki, Aranyossy, Sasvári, 2016; Fierro, Aroca, Navia, 2020]). Since the dependent variables of interest are binary, we estimate probit models.

The main limitations of SEM are connected with model fit measures: they are dependent on the sample size, data structure, and correlations among indicators [Schumacker, Lomax, 2015; Tarka, 2018]. For this purpose, a set of goodness-of-fit measures is presented to ensure the model quality (see [Denis, 2016: 660—666].

We aimed to make two models (one with secondary VCIOM and another with primary OMI data) as similar as possible. In the table below the specifications for both models are provided (see table 1). Latent variables and regressions are denoted by =~ and ~ signs respectively. Questionnaire items corresponding to observed indicators are available in Appendices 1 and 2, Appendix 3 provides recoded “Other” options mentioned by VCIOM respondents.

Table 1. ***Model specifications***

Model 1	**Model 2**
Risk =~ Lack of technical reliability Lack of anonymity Fraud	Risk =~ Security Lack of anonymity Fear of leaks Fear of fraud
Acceptance =~ Technical ability Comparative advantage Internet usage	Acceptance =~ Convenience Feeling of carrying out the civic duty Internet usage Quality of e-voting (“Active citizen” and analogs)
Attitude ~ Acceptance Risk Awareness	Quality ~ Acceptance Risk Awareness
DV: would agree to use ~ Attitude Voting habit	DV: would agree to use ~ Quality Voting habit

We utilize available observed indicators to build latent variables reflecting perceived risk and technology acceptance. While the basic elements of the two models are the same, there are some differences in specification necessitated by different questionnaires and the specifics of Internet users. We include the concerns about Internet usage (fraud and theft or leakage of personal data) in our second model as Internet voting is supposed to be implemented on the “Gosuslugi” platform, and we can assume that fears of fraud and personal data leaks on the Internet can be extended to

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its perception. The same logic is applied to the perceived quality of e-voting platforms (analogs of Moscow "Active citizen") that are the closest equivalent of Internet voting in elections. Moreover, before the first attempt of Internet voting implementation for the 2019 Moscow City Duma elections, the districts for technology trials were chosen via "Active citizen". Thus, considering the disputed results in one of the districts (No. 30, South and Central Chertanovo), evaluation of its quality is closely related to the perception of Internet voting in elections via political attitudes. These expectations are also in line with Internet voting "stickiness" expectations [Solvak, Vassil, 2018].

Another divergence in the acceptance factors is the absence of technical ability (which also includes digital divides associated with Internet connection) in the second model and convenience and civic duty instead of the comparative advantage. The question about technical abilities is trivial for the respondents of an Internet survey, and the comparative advantage includes relative convenience and the open ("Other") answers concerning such aspects of voting as "ritual", "tradition", "festive spirit", etc. (all answers are provided in Appendix 3).

The main difference in the regression models is the first-level dependent variable: in the first model, it is the attitude towards the implementation of Internet voting, and in the second one, it is the evaluation of its quality. Both variables are expected to predict the intent to use the technology [Delone, McLean, 1992, 2003; Nemeslaki et al., 2016]. Their different uses can be justified by survey timing. By June 2021, the Internet voting for the national elections was not an innovation, and some citizens have already acquired the experience of its usage. The right-hand side variables are also measured differently, and we implemented possible efforts to make them more comparable.

Data collection

Our reference model is applied to the secondary data from the representative survey of the Russian population conducted by VCIOM on May 19, 2020[7]. The survey involved 1,600 Russians aged 18 and over and was carried out using a stratified dual-frame random sample based on a complete list of landline and mobile phone numbers operating in Russia. The data were weighted according to selection probability and social and demographic characteristics.

Our primary data analysis was conducted on an online survey of 1,600 Russian residents carried out by the OMI Russia marketing company on June 24—29, 2021. Responses were collected via quota-based sampling of the volunteer online panel with more than 700,000 panelists recruited from various sources designed to be representative of Russian Internet users. OMI has passed a surveillance audit and received ISO 20252 and 20362 international certifications.

The table below provides some relevant descriptive statistics of two datasets obtained after removing missing values in the observed indicators included in the models (see table 2).

[7] VCIOM (2020) Electronic Voting: New Technologies Transform Electoral Habits. URL: https://old.wciom.ru/index.php?id=236&uid=10309 (accessed: 21.07.2021). (In Russ.)

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Table 2. ***Basic descriptive statistics***

Characteristics	Freq (VCIOM), *N* = 1,481	% (VCIOM)	Freq (OMI), *N* = 1,503	% (OMI)
Gender				
Male	627	42	718	47.7
Female	854	58	785	52.3
Age				
18—35	404	27	397	26.4
36—64	777	52	983	65.4
65+	300	20	123	8.2
Education				
Primary	2	0.1	11	0.7
Secondary	791	53.4	778	51.8
Incomplete and complete higher education	598	40.4	695	46.2
Two or more higher educations, academic degree	90	6.1	19	1.3
Occupation (the most relevant categories)				
Unemployed	146	9.9	246	16.37
Employee — public sector	398	26.9	222	14.8
Locality				
A city with more than 1,000,000 residents	381	25.7	367	24.5
A city with 500,000—1,000,000 residents	171	11.5	312	20.7
A city with 100,000—500,000 residents	282	19	436	29
A locality with 100,000 or fewer residents	647	43.7	388	25.8
Internet use frequency				
More than 4 hours daily	416	28.1	920	61
Every day, less than 4 hours daily	571	38.6	512	34
Several times a week	166	11.2	57	3.8
Several times a month	55	3.7	10	0.7
Occasionally	28	1.9	4	0.3
Do not use	245	16.5	—	—
Awareness about the use of remote electronic voting for elections				
Know well	644	43	542	36
Heard something about it	616	42	765	51
Hearing for the first time	221	15	196	13
DV: would agree to vote online if given the opportunity				
Yes	719	48.5	779	51.8
No	762	51.4	724	48.2

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Notably, despite some discrepancies in socio-demographic profiles (especially in terms of age, locality type, and Internet usage), common questions regarding Internet voting yield roughly similar results across two samples. This makes the examination of the differences in motivation between the two sets of respondents even more compelling.

Findings

Our analysis results indicate that the Russian population's voting technology attitudes are, to a large extent, in line with the theoretical expectations of technology acceptance models formulated in the context of Western democracies. However, the same cannot be argued about the overall Russian population and Russian Internet users even though these two groups overlap closely (according to various sources[8], more than 80 % of the Russian population uses the Internet). According to our findings (although limited in the explanatory potential due to peculiarities of latent variable modeling) Internet users seem to be less concerned about the risks of systems security possibly because it is an inherent part of their activity on the Web. Nevertheless, this difference seems to be temporary rather than a cross-group one. Although they draw from long experience of technology adoption, existing theories were applied in other countries, but what is probably more important here, in another period. Thus, the use of the Internet is not a robust measure of technology acceptance anymore, and a more nuanced approach to the experiences of Internet usage is needed.

Table 3. ***Path coefficients of the relationships in the Model 1***

№	Hypothesis	Coefficients	z-value	Significance	Supported
1	"external" risks are the key underlying measures of the perceived risk	0.845	12.861	0.000***	YES
2	perceived risk ↓ attitude	−0.945	−11.461	0.000***	YES
3	acceptance ↑ attitude	0.479	6.396	0.000***	YES
4	perceived risk > acceptance for attitude formation	∣−0.945∣ > ∣0.479∣			YES
5	experience of electoral participation ↑ Internet voting intention	0.242	1.969	0.049**	YES
Note	* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$				

8 See, for example, the statistical collection of Rosstat and HSE University (2020) Information Society in the Russian Federation 2020. URL: https://rosstat.gov.ru/storage/mediabank/lqv3T0Rk/info-ob2020.pdf (accessed: 21.07.2021). (in Russ.)

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Tables 3 and 4 provide results of testing our hypotheses across two models. The goodness-of-fit of the models are contrasted with the recommended values [Schermelleh-Engel, Moosbrugger, Mäüller, 2003: 52] in Table 5.

Table 4. ***Path coefficients of the relationships in the Model 2***

№	Hypothesis	Coefficients	z-value	Significance	Supported
1	"external" risks are the key underlying measures of the perceived risk	0.360	12.861	0.000***	NO
2	perceived risk ↓ attitude (quality evaluation)	−5.981	−11.461	0.004***	YES
3	acceptance ↑ attitude (quality evaluation)	0.304	2.307	0.021***	YES
4	perceived risk > acceptance for attitude formation (quality evaluation)	|−5.981| > |0.304|			YES
5	experience of electoral participation ↑ Internet voting intention	0.102	1.969	0.007***	YES
Note	* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$				

Both models indicate a good or acceptable fit that allows interpretation of the outputs. The discriminant validity of two latent variables (risk and acceptance) is low in both models (0.364 and 0.316 respectively) demonstrating that they capture different dimensions [Rönkkö, Cho, 2020] of Internet voting perception and its context.

Table 5. ***Models fit summary***

Measure	Model 1	Model 2	Good fit	Acceptable fit
p-value	0.000	0.001	>0.05 (hardly applicable to larger samples [Schumacker, Lomax, 2015: 113]	$.01 \leqslant p \leqslant .05$
CFI (Comparative Fit Index)	0.966	0.982	> = 0.97 –	$.95 \leqslant$ CFI < .97
RMSEA (Root Mean Square Error of Approximation)	0.069	0.067	< = 0.05	.05 < RMSEA $\leqslant$ .08
NNFI (Nonnormed Fit Index)	0.970	0.984	> = 0.97 –	$.95 \leqslant$ NNFI < .97

All in all, the reference model based on the sample drawn from the overall Russian population yielded expected results that are supported by the second model based on the responses of Internet users. The only hypothesis that was not supported is the H1 about key factors underlying perception of risk. In the second model, in contrast with previous surveys, the anonymity of vote loads on the risk to a larger extent (0.807) than security (possibility of external interference) does. Probably this is due to acceptance of risks seeming inevitable and to bigger computer literacy and therefore awareness about the risks posed by voting online.

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Discussion and implications

Beyond sole hypothesis testing, the models provide us with opportunities to update our conceptions about technology acceptance. For instance, one surprising finding is the insignificance of the relative advantage of traditional voting over Internet voting for the latent variable of Internet voting acceptance. Nonetheless, it is the case at first approximation only. Although relative advantage is a core of basic theories of technology adoption (e. g., DOI and TAM models), as technology is getting more widespread, it is not viewed as innovation and something to be compared with its analogs [Carter, Bélanger, 2005]. Nevertheless, the components of that advantage still matter for Internet users: feeling of carrying out civic duty and convenience loaded on acceptance highly and significantly. As expected, the frequency of Internet usage did not matter much for the respondents in the second model. The evaluation of the quality of e-voting platforms dedicated to issues of urban planning (analogs of Moscow's "Active citizen") loaded positively and significantly but was less important than the characteristics of Internet voting itself. It might imply that Internet users are more selective and rational in the choice of voting mode. Furthermore, these empirical findings do not imply a lack of connection between the perception of the comparative advantage of Internet voting and its acceptance. It is more informative in terms of the interaction of this indicator with technical abilities and Internet usage — another possible direction of further research.

Another source of divergence between the two samples is the awareness connection with attitude towards Internet voting or its quality assessment. We acknowledge that these are different concepts, but their joint consideration seems plausible for the first glimpse on the issue. Awareness is a significant predictor of both dependent variables of the first level of our models but worsens attitude (Model 1) and improves quality evaluation (Model 2). This might be an additional argument for the claim above about a more rational approach to voting channel selection. Another possible explanation is the time when the surveys were taken. While Internet voting was an initiative, awareness was high among more politicized groups of the population with a more skeptical attitude towards the Government (an assumption made from the earlier context of online voting adoption). On the other side, those inclined to trust the Government and its initiatives, do not need to be aware of details as trust lowers cognitive costs in attitude formation [Jones, 1996].

As we mentioned above, model goodness-of-fit should be considered with caution. This is particularly important when dealing with ordered categorical data: e. g., DWLS estimator might produce over-optimistic results on large-N samples [Xia, Yang, 2019]. Notwithstanding, with a limited choice of estimators and a relatively new phenomenon, this is instead a challenge if researchers stay cautious and do not make far-reaching conclusions. A good fit does not necessarily mean that the model makes sense theoretically, as well as poor fit does not imply that the model is wrong (especially bearing in mind the legendary quote by George Box that "all models are wrong" (regardless of their fit measures) "but some are useful".

The results give rise to reflections of the opposite logic about the possibilities of using technology to increase trust in the electoral process. In the literature, it is conventional to rely on the current level of trust in the authorities / electoral process in research on Internet voting. Yet, what if, by introducing technologies, the state is pursuing the goal

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of "resetting" people's attitude to the electoral process and, in general, increasing trust? Technology acceptance theory is quite supportive of this assumption. This study did not deal with this topic, but the results can indirectly serve as the basis for further research in technology as a tool for increasing trust. However, to assess trust, clearer attribution of responsibility in Internet voting is needed, which is not the case at this point when its implementation is diffused between federal and regional electoral management bodies, tech companies (e. g., Rostelecom), and bodies managing information technologies at regional level (e. g., Department of Information Technologies of Moscow).

A further study could assess the potential for mobilizing voters with the help of big data technology (both at the level of data collection and the level of their analysis using the Hadoop platform) and sophisticated algorithms (including the use of Machine Learning methods).

Conclusion

Structural equation modeling has demonstrated a sufficiently high potential for further analysis of such a complex phenomenon as the perception of Internet voting (and the electoral process in general) using latent variables. This method also allows for comparisons of different categories grouped by age, gender, education, etc. At the same time, studies of Internet voting, despite the set of common problems inherent in working with the data of sociological surveys, have some advantages. For example, the problems of discovering inverse causal relations are not as acute here because Internet voting is a relatively new phenomenon that is not overly politicized, and political and personal attitudes are formed earlier than attitudes toward Internet voting. It is worth bearing in mind that relatively recently people did not choose between technologies for voting, but rather whether to use a cell phone [Leung, Wey, 1999] and the Internet [Wyatt, 2003], and despite the key role of the digital divide, even then affiliation with social groups and the availability of traditional alternatives were independent predictors of the decision to use technology.

Furthermore, non-use of technology can be either "resistance" or "refusal" [Miles, Thomas, 1995: 256—257]. The former is associated with the initial decision not to use the technology, the latter with voluntary withdrawal after its use. Although the lack of a dichotomy between those who use technology and those who do not was pointed out more than a quarter-century ago, the "gray area" between these two categories remains neglected [Oudshoorn, 2019: 171]. Thus, further research could draw from the incentives of non-users, not solely the motivation to use. It is self-evident that maximization of the factors driving intent to use the technology will never lead to an absolute acceptance of the technology.

To make the findings more compelling, it is worth considering political attitudes in further research. Nevertheless, VCIOM and Levada Center's* analyses show that political support and attitude toward Internet voting are highly correlated. A more nuanced approach to the operationalization of political attitudes is needed to get more insights from the data, including support, trust, and approval. All mentioned indicators are subject to the social desirability bias, which can be reduced by applying experimental research via survey and list experiments. The comparison of responses obtained from almost identical phone and web-based surveys is also of substantial interest.

The potential of comparative research should be separately noted, especially in the context of regime differences. Of interest are the differences among people in perceived risk based on their socio-cultural background and what the political environment "produces". In other words, given the close relationship of political behavior and political culture with the regime, the perception of risk and trust among people is supposed to differ depending on the regime and the electoral environment in which they live. The issues of risk in Internet voting in a democracy are most likely more significant than in autocracies and cause particular concern. It is also worth keeping in mind the traditional values that accompany political behavior, and as a result, the decision on trust in the Internet form of voting. Of course, this is just an assumption for further research. Notwithstanding, the experience of experiments with Internet voting in the USA, Germany, France, Great Britain, and the Scandinavian countries suggests that such an expectation is quite tenable and can be verified empirically.

Notes

* Levada Analytical Center (Levada-Center)[9] is a Russian non-governmental research organization. In 2016, the Russian Ministry of Justice placed the Levada-Center on the register of NGOs performing the functions of foreign agents.

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Appendix 1. Description of the Model 1

Latent/ dependent variable	Survey item	Question	Response options
Risk	Lack of technical reliability	Why would you not vote inan election over the Internet? You can give up to three answers.	I do not believe in the technical reliability of this system
	Lack of anonymity		I do not believe that the secrecy of the vote will be preserved
	Fraud		I admit that there may be deliber-ate manipulation, fraud
Acceptance	Technical ability		No technical capability (do not have Internet/computer/smart-phone) and Can't use (Internet/computer/smartphone)
	Comparative advantage		Inconvenient
	Internet usage	How often do you use the Internet?	0. Do not use 1. More than 4 hours daily 2. Every day, less than 4 hours daily 3. Several times a week 4. Several times a month 5. Occasionally, but no less than once every half year
Attitude	Attitude	How do you feel about the pro-vision of the opportunity to vote in elections remotely, via the Internet?	Rather approve / rather do not approve
Attitude ~	Awareness	Do you know, have you heard something or are you hearing for the first time that the State Duma passed a law last week that allows citizens to vote via the Internet?	1. I know this issue well 2. I've heard something about it 3. I'm hearing this for the first time
Intent to vote online	Would agree to use Internet voting	If you were given the opportunity to vote online in elections over the Internet, would you agree to vote online?	Yes, why not / No, would not vote
Intent to vote online ~	Voting habit	Do you usually go or not go to the polls?	Yes / No (for options "do not go as a matter of principle" and "never voted")

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Appendix 2. Description of the Model 2

Latent / dependent variable	Survey item	Question	Response options
Risk	Security	If we speak about traditional voting by going to a polling place and electronic voting on dedicated platforms (e. g., Gosuslugi), which of these two types of voting is best characterized by the following features?	Anonymity (1 for options including only traditional voting, otherwise 0)
	Lack of anonymity		Possibility of external interference into the voting procedure (1 for options including Internet voting, otherwise 0)
	Fear of leaks	Generally speaking, how concerned are you about the following situations occurring during your everyday use of the Internet?	Theft or leakage of my personal data (1—7)
	Fear of fraud		Fraud (1—7)
Acceptance	Convenience	If we speak about traditional voting by going to a polling place and electronic voting on dedicated platforms (e. g., Gosuslugi), which of these two types of voting is best characterized by the following features?	Convenience (1 for options including Internet voting, otherwise 0)
	Feeling of carrying out civic duty		Feeling of carrying out civic duty (1 for options including Internet voting, otherwise 0)
	Internet usage	How often do you use the Internet?	1. More than 4 hours daily 2. Every day, less than 4 hours daily 3. Several times a week 4. Several times a month 5. Occasionally, but no less than once every half year
	Quality of e-voting (“Active citizen” and analogs)	Please, evaluate the quality of the services delivered by the government in your region via the following digital platforms.	Active citizen and analogs (1—7)
Quality	Quality	Please evaluate the quality of systems for online voting for public officials.	1. Very poor 2. Poor 3. Somewhat poor 4. Neither poor, nor good 5. Somewhat good 6. Good 7. Very good
Quality ~	Awareness	In Russia, technologies for remote voting are increasingly used in elections at different levels. Please tell us, are you hearing about this use of technology for electronic voting for the first time?	1. I know this issue well 2. I’ve heard something about it 3. I’m hearing this for the first time

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Latent / dependent variable	Survey item	Question	Response options
Intent to vote online	Would agree to use Internet voting	If you were given the opportunity to vote online in elections over the Internet, would you agree to vote online?	1. I absolutely would agree 2. I would agree 3. I would likely agree 4. Maybe I would agree, maybe not 5. I would likely not agree 6. I would not agree 7. I would definitely not agree.
Intent to vote online ~	Voting habit	Mark out of the listed facts only those that apply to you	Mean of voted in the last federal / regional / local election

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Appendix 3. Recoded "Other" options added to the Model 1

Observed indicator	Added "Other options"
Lack of technical reliability	Technical failures and disruptions
Lack of anonymity	I do not believe that the secrecy will be kept
Fraud	Possibility of interference It is a lie There is no objectivity I do not trust it I do not trust the Internet. There will be falsifications I do not believe in the transparency of such voting I do not believe in votes how the people will vote There may be violations For me, to get to the polling station is close enough, and the less technical means, the harder it is to falsify the result
Technical ability (reversed)	I'm not always in an area with internet coverage, I'm often on the road Poor Internet connection I don't have a computer and Internet Novice computer user Transfer of personal data, there may be Internet network failures I will not be able to
Comparative advantage (reversed)	Cannot ask if a question arises I don't want to deal with it I would rather vote at the polling station, if possible I want to go I want to vote as always at the polling place I want to take a walk, feel the atmosphere of the elections It's not interesting I am accustomed to traditional voting I am accustomed to paper ballots Accustomed to the usual way of voting I prefer to vote in person I prefer to vote traditionally The feeling of the result of my voting I like coming, checking a box, and casting it in the ballot box, the atmosphere is festive There are no problems with paper voting Inhumanly Not interesting I like traditional voting People should vote in person It is better to go to the polling station Better voting at the polling station I trust paper voting The opportunity to go out in public is a holiday for me