Government Information Quarterly 33 (2016) 705–714

Contents lists available at ScienceDirect

Government Information Quarterly

journal homepage: www.elsevier.com/locate/govinf

Could on-line voting boost desire to vote? – Technology acceptance perceptions of young Hungarian citizens

András Nemeslaki [a,*], Márta Aranyossy [b], Péter Sasvári [a]

[a] National University of Public Service, 1118 Budapest, Ménesi út 5, Hungary
[b] Corvinus University of Budapest, 1093 Budapest, Fővám tér 8, Hungary

ARTICLE INFO

Article history:
Received 24 May 2015
Received in revised form 2 October 2016
Accepted 18 November 2016

Keywords:
On-line voting
Hungary
DeLone and McLean information system success model
Extended TAM
Partial least square method

ABSTRACT

In our paper we develop and test the argument that intent to i-vote (to use on-line voting systems) drives intent to vote, while intent to i-vote is influenced by four key attitudes: performance expectation, perception on ease of use, trust in the internet and trust in the government. We show that these findings contradict those which exclusively identified economical, legal, and cultural drivers to enhance democratic participation in the Central and Eastern European region. Rooted cardinally in the Technology Acceptance Model (TAM) six hypotheses were set, and then tested with partial least square (PLS) structural equation modelling. In the context of young, educated and internet-ready Hungarian voters the testing of the hypotheses has shown high level of on-line voting intent and that perception of on-line voting would enhance voting desire amongst young Hungarian internet users. Also, our findings show that performance expectation, perception on ease of use and trust in the internet are positively associated with i-voting intent.

1. Introduction

Scholars mostly identify macro economical, technological, legal and generally cultural impediments for internet use in political participation in the Central and Eastern European environment (Ifinedo & Singh, 2011), (Dányi & Galácz, 2005). In our paper we develop arguments, and show exploratory empirical data, that intent to i-vote amongst young citizens effect political participation, furthermore, trust in technology, expectations of performance improvement, and anticipation of user-friendly solutions drive this intention by overruling the above impediments.

Our research motivation is to contribute to the general discourse on how electronic platforms can change and transform participation behavior of citizens. Theoretically this issue has been raised by Susha and Grönlund who after surveying a large body of e-participation literature have come to the conclusion that research is lacking especially in the intersection of information technology, political science and sociology (Susha & Grönlund, 2012). In this research we not only analyze on-line voting technology's potential impact on voter turnout, but explore the key factors, possible incentives behind future i-voting technology acceptance by citizens.

The site of our study is Hungary, and we argue that this geographical area in Central and Eastern Europe (CEE) is interesting for several reasons. Firstly because of the relatively low interest in participation during elections which might have serious effect on European democratic representations on the long run. While EU average participation is stabilized at around 41–42% by 2014, CEE citizens' desire to vote in EU parliamentary elections has lowered way below this (Hungary 28%, Croatia 25%, Poland 23%, Czech Republic 18% and Slovakia 13%). So far this low turnout has been investigated by exploring political activities of voters, finding that participation in elections is correlating with generally active public behavior, but issue of technology acceptance has not been assessed (Novy, 2014).

Introduction of on-line or internet voting might seem to be an attractive solution to increase voting intention, not only amongst digital natives but in other segments of society as well. Technologically induced change might result in significant results in turnout. This has been shown and analyzed in (Germann & Serdült, 2014) using the Swiss case of expatriates voting. Similarly Estonian turnout in voting has been increased which is shown for instance using empirical data by (Bochsler, 2010). Specifically, Trechsel and Vassil had demonstrated in a simulation based on analyzing data of four Estonian elections that turnout in the 2009 Estonian local elections might have been up to 2.6% lower in the absence of internet voting (Trechsel & Vassil, 2010).

2. Review of on-line voting concepts, adoption and performance

Impact of modern technology and its adoption in voting has been widely discussed. For instance, access to internet and on-line news increased the probability of voting in the US 2000 election compared to

* Corresponding author.
E-mail addresses: nemeslaki.andras@uni-nke.hu (A. Nemeslaki), marta.aranyossy@uni-corvinus.hu (M. Aranyossy), sasvari.peter@uni-nke.hu (P. Sasvári).

http://dx.doi.org/10.1016/j.giq.2016.11.003
0740-624X/

1996 by an average of 12% and 7.5%, respectively (Tolbert & McNeal, 2003). The authors also found that the mobilizing potential of the internet in 2000 was also associated with increased participation beyond voting such as more intensive social media use. In our paper we turn our attention toward the impact and adoption factors of on-line voting.

In the following two subsection we clarify the related key concepts and arguments of e-voting literature as a necessary background for the next two subsections of literature review concerning our focal problem: factors of e-voting adoption.

2.1. E-voting and on-line voting

E-voting in its original form is defined as any type of voting that involves electronic means. (Svensson & Leenes, 2003). Although e-voting can be conceived in many different ways, a crucial distinction may be made between electronic machine voting (EMV) and electronic distance voting (EDV). EMV simply refers to the use of any electronic apparatus to record and count votes in a fixed public place. EDV goes a step further in the sense that it implies the electronic registration, culling and counting of votes cast from different locations. It typically allows voters to use a more generic technology such as interactive digital TV, telephone, Short Message Service (SMS) or the internet, to cast their vote from any preferred place (Svensson & Leenes, 2003). Throughout this paper we use the technological concept of EDV and its most advanced version the on-line or internet voting solution (i-voting and on-line voting as synonyms) (Alvarez, Hall, & Trechsel, 2009).

Technology foundations in ICT services provide considerable opportunities for the introduction of i-voting by combining usability and security (Zissis & Lekkas, 2011), and robust design of complex elections models (Fernandez, Red, & Peláez, 2013). On the other hand, development and success of on-line voting solutions differs greatly country by country (Serdült, Germann, Harris, Mendez, & Portenier, 2015). For instance, while the experience in the USA has been limited to individual trials in primary elections (Simons & Jones, 2012), in Estonia the entire electorate can vote on-line in national elections (Alvarez et al., 2009). In several Swiss cantons, pilot schemes were set up in the early 2000s to establish internet voting (Serdült et al., 2015). Norway, on the other hand, stopped its i-voting projects after several trials (Saglie & Segaard, 2016). Krimmer also gives an account of several experiences with on-line voting in different settings such as in Portugal, Italy and Brazil (Krimmer, 2006).

Although the introduction of this additional voting channel clearly has some advantages, such as reducing costs and simplifying the voting and vote counting processes, i-voting undeniably raises various technical, legal and especially political questions.

2.2. Performance expectations and the complexity of on-line voting adoption

Experiences with i-voting confirm the strong perception for a new way to reach the population and involve those underrepresented in the electorate in the political process. This argument is based primarily on the hope for increased participation of younger voters as they have a higher affinity for the internet compared to other age groups, but a generally low turnout rate (Serdült et al., 2015). On the other hand, in the e-voting context Vassil and Weber argued that there is a unique paradox in conceptualizing technology impact and use (Vassil & Weber, 2009). They show – on a sample of Estonian voters – that technology savvy or „digitally converted" citizens have high rate of on-line voting system use but this has a low impact on their behavior, since technology is seamless for them, it is neither a motivator nor an enabler (Vassil & Weber, 2011). This gives our research the motivation to explore the potential impact of technology on young voters' turnout in a Central and Eastern European context.

2.3. Factors of e-voting adoption

Supposing that e-voting can have a positive impact on voters' turnout, it is important to see what factors affect the adoption of e-voting technologies. Contrary to the approach which has been applied so far to investigate voting intention – which has been age, income and education (Orviska, Caplanova, & John, 2005) – we argue that the TAM (Technology Acceptance Model) enriches our understanding more about on-line voting technology adoption in CEE.

In its original form TAM explains that behavior or attitude toward technology use is determined by the users' perceptions of usefulness and effort (Davis, 1986) and (Davis, 1989). The power of this theory is on the one hand its robustness: of 101 empirical studies based on the TAM model, 74 demonstrated the positive and significant relationship between perceived usefulness and use (Lee, Kozar, & Larsen, 2003). Meanwhile the same has been shown for "ease of use" in the context of internet applications, however it seems to be a necessary but not sufficient criterion of use in the case of non-interned based information systems (King & He, 2006). TAM has already been used as a theoretic framework in e-government (Carter & Bélanger, 2005) and also in e-voting research (Schaupp & Carter, 2005; Chiang, 2009; Choi & Kim, 2012) and found to have a significant explanatory power.

Furthermore, TAM's power lies in its flexibility for extension by other independent variables and thereby positioning it as an ancestor of other more general technology acceptance models such as the UTAUT (United Theory of Acceptance and Use of Technology) model (Venkatesh, Morris, Davis, & Davis, 2003). Although UTAUT has also been used in exploring the factors of e-government adoption (Gupta, Dasgupta, & Gupta, 2008) and e-voting as well (Powell, Williams, Bock, Doellman, & Allen, 2012), Colesca and Dobrica (2008) argue that UTAUT is less useful outside of the context of companies, as two of its six variables are related to technology adoption in organizations.

Diffusion of Innovation (Rogers, 1995) is also a popular model used in information technology adoption research, but e-government researchers argue that some of its core constructs are very similar and comparable to TAM factors (like relative advantage to perceived usefulness and complexity to perceived ease of use; Carter & Bélanger, 2005; Colesca & Dobrica, 2008), while TAM is much more prevalent (Davis (1989) has 30,807 citations while Rogers (1995) has only 540 in September 2016).

2.4. Trust as a major condition for e-voting adoption

Citizens' trust is conceived to be one of the predictors of whether or not, and to what extent citizens engage in participatory initiatives in general, and in e-participation specifically (Wimmer, Scherer, & Appel, 2015). However, Alharbi, Kang, and Hawryszkiewycz (2015) argue, that further research is needed on the impact of trust in the e-participation context.

Firstly, we consider trust in democratic institutions, which entails a subjective cognitive association toward the functioning of courts, municipalities, police, military etc., i.e. whether these institutions operate according to social expectations. Recent Hungarian empirical studies show that on a scale of −100/+100 only the military (+5), police (+3) and the court system (+2) enjoyed positive institutional trust in 2012 amongst Generation Y (the age group of 15–29) (Székely, 2013). The same study has shown a drastic decline in perceived trust in the Constitutional Court (from +24 to −12) and the President of the Republic (from +10 to – 18) in the period of 2008–2012.

Trust in e-government can be enhanced by higher perception of technological and organizational trustworthiness, the quality and usefulness of e-government services, and the internet experience (Colesca, 2009). Internet use and citizen satisfaction with e-government combined are positively associated with trust in government (Welch, Hinnant, & Moon, 2009). The similar logic of trust–technology relationship has been identified by (Tolbert & Mossberger,

2006), who showed that visiting a local government website led to enhanced trust in local government and this increased trust is further enhanced by regular interactions at the local level through e-channels. Based on four Estonian election cases it is also apparent that trust (whether or not one trusts the mechanism to take one's vote correctly into account and producing trustworthy results) has remained significant for all the elections during the procedure of e-voting (Trechsel & Vassil, 2010).

Trust related concepts are amongst the most common extensions of TAM in e-government research (see Carter & Bélanger, 2005). The finding of Carter and Bélanger (2005) indicates that not only perceived ease of use and compatibility, but also trustworthiness (trust of internet and trust of government) is a significant factor of intention to use an e-government service. Similar were the conclusions of Schaupp and Carter (2005) in case of e-voting adoption by young voters.

3. Research methodology

3.1. Research model and hypotheses

Our research model depicted in Fig. 1 is based on the DeLone-McLean Model of Information System Success concept (DeLone & McLean, 1992) and the Technology Acceptance Model (TAM) (Davis, 1986) and (Davis, 1989) – both from information system theory. With this we assess both the impact and the motivational factors of intent to use new technology, with models that have established history in the international context of e-government adoption (Lin, Fofanah, & Liang, 2011).

The vertical direction of the variables in Fig. 1 captures the DeLone-McLean Model of Information System (IS) Success concept (DeLone & McLean, 1992). This model describes the IS success concept as a "process", where the first step is the creation of IS, containing various features, exhibiting various degrees of system and information quality. The next step in the model is the use of the system and the satisfaction of the user. Given the difficulties in interpreting the multidimensional aspects of "use" – mandatory vs voluntary, informed vs uniformed, effective vs ineffective – DeLone and McLean suggested to include the concept of "intention to use" (DeLone & McLean, 2003), to allow the differentiation between behavior (use) and attitude (intention to use). Since there has been no actual experience with on-line voting systems and behavior in Central and Eastern Europe, therefore "use" cannot be measured, we focus on "intention to use" on-line voting systems, as a measure of attitude.

As the last step of the IS Success model system use impacts how work is conducted, and these individual impacts collectively result in organizational impact (together: net benefits) (DeLone & McLean, 1992). Considering the case of i-voting we conceptualize that intention to use on-line voting systems is a core element to achieve impact: to achieve more active democratic participation in the form of higher level of intention to vote, or in the end higher actual voter turnout. In examining our first hypothesis we focus on this possible impact, where the intention to use on-line voting increases intent to vote.

H1. A higher level of intent to use on-line voting systems has a positive impact on voting attitude.

With this impact in mind, we turn our attention to the construct of intent to vote on-line, as the central construct and dependent variable in our further investigation based on TAM. In relation to on-line voting this is what we described horizontally in Fig. 1.

The first element of TAM is the concept that users' attitude is driven by their belief that using the system will improve their performance, which is a representation of the perceived outcome of the experience. In the context of e-voting for example citizens might expect more convenient or less time-consuming voting. With respect to internet usage Trechsel and Vassil found that this has been an important predictor of the usage of e-voting in the phase of early adoption in 2005 and 2007 during the Estonian elections (Trechsel & Vassil, 2010). Other performance factors identified earlier in the Norwegian (MinID) or German

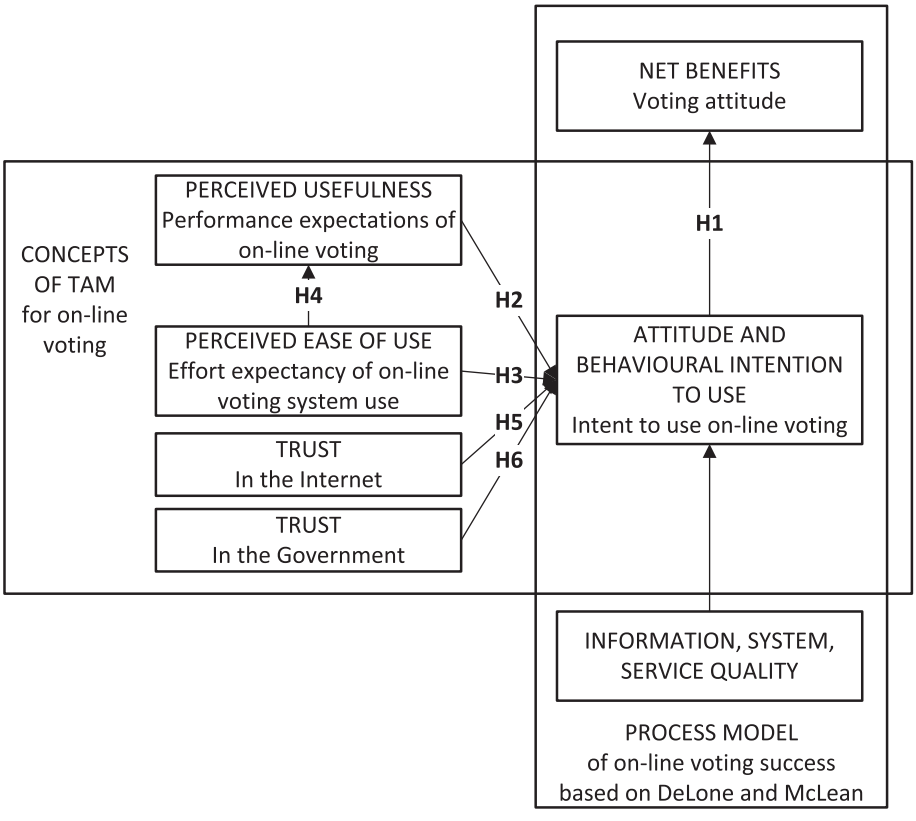

Fig. 1. General Model of e-voting adoption based on IS Success Modell (DeLone & McLean, 2003) and TAM (Davis, 1989).

(Polyas) experiments were the usage of identification systems, preexisting cryptographic and web development technologies and building on the experience of other e-governmental applications using the internet (Volkamer, Spycher, & Dubuis, 2011).

Performance expectancy could also capture the perceived potential improvement compared to other means of voting such as postal voting or going to consulates in the case of external voting (Kucsera, 2011). Some countries are testing and considering the introduction of remote e-voting especially, and sometimes even exclusively, for their citizens who are living or staying abroad. However, only a few countries allow external voters to cast their votes electronically (Braun, Ellis, & al, 2007).

H2. Performance expectancy has a significant positive effect on Hungarian citizens' intent to vote on-line.

Secondly, Davis defined perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320). In our context this entails the belief how easy to learn and use the functionalities of on-line voting.

H3. Effort expectancy has a significant positive effect on Hungarian citizens' intent to vote on-line.

Also, there might be a causal relationship between perceived ease of use and perceived usefulness. If the only difference between two systems is the ease of use, the system which is easier to use will be perceived more efficient, helping users to achieve higher level of performance. This relationship is also described and analyzed by (Davis, 1986, pp. 24–26. and 109). This direct effect of ease of use on perceived usefulness (and so the indirect effect on intent to use) might even be greater than the direct impact of ease of use on intent to use i-voting – this is the phenomenon we try to explore with H4.

H4. Effort expectancy has a significant positive effect on performance expectancy.

Hypotheses 2, 3 and 4 provide a different approach in voting and technology adoption research in the CEE setting, where determinants of adoption have been identified as macro level factors such as infrastructure, rule of law and human capital development (Ifinedo & Singh, 2011). Furthermore, we argue that these variables expand our understanding about drivers of intention to use internet in the election process in CEE, in contrast with other approaches which examine on-line technologies as part of the "political power game", neglecting the effects how technology might impact behavior through its use and potential performance improvement (Dányi & Galácz, 2005).

Finally, as we argued earlier in the previous section, that the concept of trust is an essential ingredient of voting and has already been used in e-voting intent research complementing the original TAM constructs (Powell et al., 2012). Powell et al. (2012) argued that trust in the internet and trust in the government might be decisive for e-voting intent, and they found in their US Midwestern sample, that internet trust had in fact a significant positive effect. Trust, as a determinant of technology adoption has been used earlier in on-line technology adoption studies (Gefen, Karahann, & Straub, 2003) and e-government research (Carter & Bélanger, 2005) alike, and it has also been found to be a relevant factor of Hungarian e-commerce and on-line payment adoption (Kis, Szalay, Takács, & Nagy, 2008).

H5. Trust in the internet has a significant positive effect on Hungarian citizens' intent to vote on-line.

H6. Trust in government has a significant positive effect on Hungarian citizens' intent to vote on-line.

The general model of the extended TAM is presented in Fig. 2 including the indicator structure, which is going to be discussed in the next section.

3.2. Research method

Our target subjects were voting-age Hungarian citizens living in Hungary (HU), Romania (RO) and Serbia (SR). Our main data collection sites were three universities: University of Miskolc and the National University of Public Service in Budapest, Hungary, and Sapienzia University, in Csikszereda (Miercurea Ciuc), Romania. In Serbia the required data were collected in the region of Vojvodina (with the help of the Association of Hungarian Ph.D. Students and Researchers) head quartered at the University of Novi Sad. This data collection methods made it possible to focus on younger citizens, who are not only the representatives of future voters, but also the most probable adopters of new technology. We based this sampling on the results of the log analysis of Estonian voting, which has shown that the most active voters are people of age 30–40 (Heiberg, Parsovs, & Willems, 2015).

A questionnaire-based approach was used where construct data was collected through validated instruments; the questions were formed based on the similar research of e-voting intent carried out by (Powell et al., 2012). The categories and lists of questions are summarized in Appendix 1. Regardless of using a validated questionnaire, in all three countries we were faced with the problem that respondents had to judge their own future hypothetical behavior and we had to take it as a face value. In order to minimize the error from this response bias, we used controlled classroom environments (in Hungary ourselves, in Romania and Serbia through research partners) where a detailed explanation was given about e-voting and its global status. Beyond that, respondents were motivated to conscientiously think through their answers by giving the time, and discussing the concepts in detail. In two cases on the Hungarian site we also reported rudimentary descriptive statistics of the initial findings and confirmed the general results through a second discussion. Despite of all these efforts the method of data collection calls for a warrant on assessing the results due to the difficulty to eliminate face value error.

Answers to the key construct questions were measured on a 7-point Likert scale, where 1 stood for "I do not agree at all" and 7 meant "I strongly agree". Compared to the original data collection, some of the indicators (USE1, USE2 and GOV4) were excluded from further analysis based on the validation results. Demographic data included gender, date of birth, the highest educational degree, region of living, country of residence and the respondents' declaration on Hungarian citizenship. As our data collection focused on the younger generation of voters, data were also collected about their technology skills and internet environment to justify our implicit assumptions about tech-savviness. General descriptive statistics (see Table 1 and Section 4.1) were used to explore our dataset and get a detailed picture about our sample population.

For testing the six hypotheses (H1–H6) we chose two different methods given the different nature of H1 and H2–H6. In case of H1 we run statistical tests to verify if there is a significant difference of intent and seriousness of voting through intentional use of on-line voting between those who voted during the last election and those who had not. By doing so we expected to explore if on-line voting could convert non-voters and impact politically disengaged citizens (Vassil & Weber, 2009). We especially expected high impact in the case of out-of-country citizens since traditional voting technology might be considered much more cumbersome for this population than a comfortable internet environment.

For testing H2–H6 partial least squares (PLS) analysis was conducted. PLS is a structural equation modelling (SEM) technique used to assess a structural model – a network of causal relationships linking multiple latent variables – together with its measurement model which links each latent construct with a set of observed indicators (Keil et al., 2000, p. 309). PLS is a component-based approach to SEM, maximizing the variance explained iteratively. Gelaldi and Kowalsky argue that PLS is a good alternative to classical multiple linear regression and principal linear regression models because of its robustness (Geladi & Kowalski, 1986, p. 1). PLS's distinctive methodological characteristics

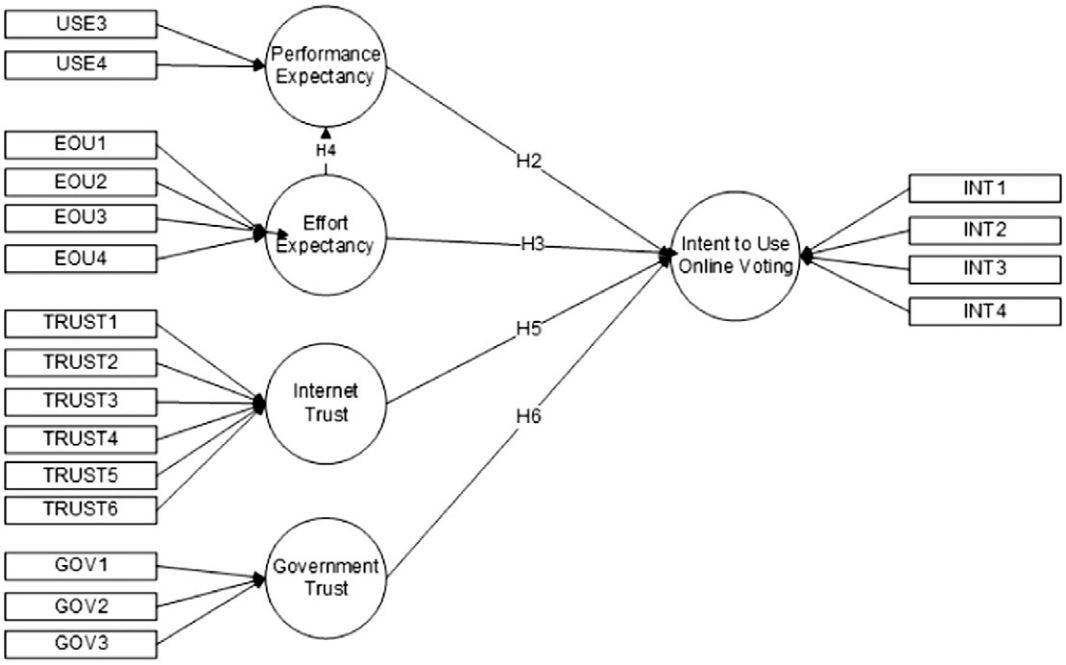

Fig. 2. Research Model based on TAM and (Powell et al., 2012) and variables in the PLS model.

also make it a viable alternative to the more widely used covariance-based SEM methods (Hair, Hult, Ringle, & Sarstedt, 2014), as it avoids the problems of inadmissible solutions and factor indeterminacy, while it has minimal demands on measurement scales, sample size and residual distribution (Chin, 1998, p. 295).

PLS has become a popular technique in general behavioral science (Lowry & Gaskin, 2011) and IS research (Marcoulides, Chin, & Saunders, 2009) as well, and common on the field of technology adoption (Venkatesh & Morris, 2000), (Hwang, 2005), or (Powell et al., 2012). Early on (Chin, 1995, p. 237) explicitly argued, that PLS modelling is a powerful tool to understand IS usage.

PLS analysis in our case was performed by using SmartPLS (Ringle, Wende, & Becker, 2015), a dedicated analytic software package.

4. Results and discussion

4.1. The sample: nationality, gender and ICT awareness

Table 1 shows a summary of descriptive statistics, including the geographic distribution of our sample. The majority of the respondents were Hungarian residents, while 10–11% of the respondents lived in Romania and Serbia at the time of the survey, the sample sizes roughly reflecting the ratios of Hungarians living in or out of the country. Table 1 also shows that 82% of the out-of-Hungary sample had Hungarian citizenship. 72% of the 440 citizens represented in the sample casted their votes during the 2014 Hungarian parliamentary elections, which was a 10% higher turnout than the nationwide 62% participation rate.

Given the fact that our sample consisted of mainly young college graduates and students, a high level of ICT awareness and technology use was expected. This assumption was justified: our respondents' perception was that internet and internet based services were part of the daily life where they lived (with a mean value of 6.39 on a 7-point scale). Commercial and standard media usage over the internet were also highly rated (mean: 6.3), but in the assessment of e-government services reached only a lower mean value of 5.54. This is in alignment with the findings of the Eurobarometer Survey, which scored Hungary, Romania and Serbia amongst the laggers of e-government adaptors (European Commission, 2014).

In summary our sample represents potential young, technologically savvy on-line voters, those who could be change agents of technology adoption.

4.2. Impact of on-line voting – can non-voters be mobilized by on-line voting?

Testing H1, the impact assessment of on-line voting is summarized in Table 2 based on one-way ANOVA and non-parametric median and distribution tests. (Although ANOVA assumes interval or ratio level dependent variables, if a Likert scale is symmetric and equidistant it will behave more like an interval-level measurement and therefore, can be viewed as an interval scale. See (Carifio & Perla, 2007).)

Table 1
Descriptive statistics of the sample.

Country of residence	Frequency	Percent	Hungarian citizenship (n)	Voted in 2014 (n)	Male/Female ratio	Average date of birth	Standard deviation year of birth
Hungary	454	74.7%	454	372	31%–69%	1983	11
Romania	64	10.5%	47	25	33%–67%	1993	3
Serbia	67	11.0%	58	28	55%–45%	1978	9
Missing	23	3.8%	22	15			
Total	608	100%	581	440	34%–66%	1983	11

Table 2
Impact assessment of on-line voting; difference of voters and non-voters.

Voted in 2014		I would use an on-line voting system	I could see myself using an on-line voting system	I would not hesitate to use an on-line voting system	I would prefer on-line voting to postal voting	Using on-line voting would make me more serious in voting	Accessing on-line voting system I would be voting more likely
Yes	Mean	4.7366	4.8631	4.5081	5.6462	3.1388	4.3783
	N	429	431	433	65	425	423
	Std. deviation	2.28528	2.24589	2.29745	1.95601	2.13286	2.28817
	Median	6.0000	6.0000	5.0000	6.0000	3.0000	5.0000
No	Mean	5.2250*	**5.3333***	4.9750*	5.8909	**3.9328****	**5.4463****
	N	120	120	120	55	119	121
	Std. deviation	2.07612	2.09173	2.16722	1.82242	2.37119	1.98305
	Median	6.0000	6.0000	6.0000	7.0000	4.0000	6.0000
Total	Mean	4.8434	4.9655	4.6094	5.7583	3.3125	4.6158
	N	549	551	553	120	544	544
	Std. deviation	2.24849	2.21989	2.27607	1.89203	2.20950	2.26622
	Median	6.0000	6.0000	5.0000	7.0000	3.0000	5.0000

Bold: significantly higher, based on nonparametric median test $p < 0.05$.
Underlined: significantly different, based on nonparametric distribution test $p \leq 0.05$.
* Significantly higher, based on ANOVA $p < 0.05$.
** Significantly higher, based on ANOVA $p < 0.01$.

The perception of on-line voting as a behavioral change trigger is higher amongst non-voters, than amongst voters.[1] Seriousness of voting is also slightly higher with the same level of significance amongst non-voters when on-line voting might be considered as an option. So the ones who did not vote at the last election can see themselves use on-line voting systems more, and agree more with the statements that using on-line voting would make them more serious in voting and more likely to vote. This positive impact of the availability of on-line voting on their voting intent is significant.

About one sixth of our sample (n = 98) constitutes of voters who would be more willing to vote, and have not voted in 2014 – reaching them would be a real impact. Although this 17% perceived impact is much higher than Trechsel and Vassil's 2,6% in their Estonian simulation (Trechsel & Vassil, 2010) we may still conclude that for the young, tech savvy and educated generations in Hungary introduction of on-line voting would result in attitude change toward participating in elections.

Interesting to note that preference between postal voting and on-line voting is not significant amongst the 65 out-of country respondents (Hungarian citizens in Romania and Serbia) who voted in 2014 national elections and the 55 who did not. So i-voting might seem more convenient, but our results suggest, that the replacement of postal voting with on-line voting does not have a significant impact in this population of out-of-country citizens (Table 2).

Since our data shows a positive association between on-line voting intent and general voting intent in accordance with H1, and this impact can only be reached through using such a system we turn our attention in the next sections to analyzing the drivers of use according to our extended TAM model.

4.3. Factors influencing e-voting intentions of Hungarian citizens

Before the PLS modelling, our data was also analyzed from the perspective of underlying latent factors. The measurement model and the constructs were tested for convergent and discriminant validity. Table 3 presents the results of the principal component analysis of the independent variables for the full sample. In the case of our sample size (over 600) factor loadings above 0.500 would reflect an acceptable level of convergent validity, while all of the factor loadings in our case are above 0.700. From a discriminant validity perspective, it can be seen that all of the variables relate most strongly to their own factor, and cross-loadings (with other latent variables) are more than the absolute value of 0.400 distant from the loading on the primary latent variable. The overall adequacy of the factor model can be described by a high (0.893) KMO statistics, while the Bartlett's Test of sphericity is also significant at 0.000 level. (See Tables 4 and 5.)

A similar factor analysis was carried out for the dependent construct – intent to use e-voting – and it is shown in Tables 4 that the four chosen indicators display sufficient convergent validity. The KMO value is 0.827, while the SMRM (standardized root mean square residual, which is a popular absolute fit indicator) is 0.048 lower than 0.800, the suggested upper limit for a good fit (Hu & Bentler, 1999).

Construct level validity (MacKenzie, Podsakoff, & Podsakoff, 2011) is shown by above 0.700 AVE (Average Variance Extracted) – see in Tables 5. The composite reliability measures are also all above 0.890, which is also true for the Cronbach's Alphas in the model.

Concerning our hypotheses H2, H3, H5 and H6, the relationships between the expected ease of use, expected usefulness of e-voting, trust in the internet and government and the intent to vote on-line were analyzed with a PLS model. The general results of the PLS analysis (Ringle et al., 2015) – modelled twice, with and without the indirect effect of effort expectancy – with bootstrapping[2] (Hair et al., 2014) are shown in Fig. 3. The traditional two TAM factors (Davis, 1989) of intent to use new technology have both significant and positive effects in our sample (confirming H2 and H3). While the performance expectancy (perceived usefulness) has the highest effect on intent to use on-line voting systems, the effort expectancy (perceived ease of use) has a lower but also significant direct effect. A plausible explanation for this difference is the "impact-use paradox" elaborated by Vassil and Weber (2011), according to which for technology savvy citizens real impact arises more from what they actually can do with the technology than what use-features they have, as long as those are in the mainstream technology paradigm.

Looking closer at this relationship and testing our fourth hypothesis, the model was analyzed including the indirect effect of effort expectancy on performance expectancy as well (see Fig. 3, results in brackets), as described and analyzed in (Davis, 1989, p. 109) and (Davis, 1989, p. 24). The PLS analysis[3] suggests similar results to the general model of Davis: while the ease of use has a smaller direct effect on the intent to use e-voting, it has a larger indirect effect through influencing users' perceived

[1] For the question "accessing on-line voting I would be voting more likely" non-voters' average answer has been 5.44 on a 7-point Likert scale, while voters' mean score was 4.38. This difference has proved significant with nonparametric median test ($p < 0.05$ and also by ANOVA, $p < 0.01$).

[2] Missing values excluded casewise, 5000 bootstrapping, two-tailed significance level 0.05, Bias-Corrected and Accelerated (BCa) Bootstrap.

[3] Missing values excluded casewise, 500 bootstrapping, two-tailed significance level 0.05, Bias-Corrected and Accelerated (BCa) Bootstrap.

Table 3
Rotated component matrix of the independent variables[a].

		Component			
		Internet trust 1	Ease of use 2	Government trust 3	Usefulness 4
USE3[b]	On-line voting would make me easier to vote	0.276	0.343	0.032	**0.764**
USE4	Accessing on-line voting system I would be voting more likely	0.321	0.249	0.066	**0.798**
EOU1	I think it is easy and clear how to use an on-line voting system	0.237	**0.847**	0.001	0.115
EOU2	I could quickly learn how to use an on-line voting system	0.085	**0.850**	0.034	0.133
EOU3	I could easily learn how to use and on-line voting system	0.152	**0.923**	−0.003	0.123
EOU4	It would be easy for me to use an on-line voting system	0.137	**0.872**	−0.001	0.253
TRUST1	I trust the internet provides enough safeguards for secure voting	**0.867**	0.132	0.117	0.263
TRUST2	I trust that legal and technical systems protect me at voting	**0.882**	0.117	0.128	0.236
TRUST3	I trust that they count the votes accurately	**0.775**	0.191	0.264	0.015
TRUST4	I think the internet is safe enough for secure on-line voting	**0.894**	0.159	0.064	0.252
TRUST5	I think I could trust an on-line voting system	**0.861**	0.176	0.138	0.258
TRUST6	I trust that nobody would tamper the on-line votes.	**0.748**	0.106	0.337	−0.030
GOV1	I can trust the local public administration in general	0.191	0.010	**0.919**	0.050
GOV2	I trust the institutions responsible for organizing elections	0.175	0.042	**0.937**	0.040
GOV3	I think the Hungarian administration system is trustworthy	0.225	−0.042	**0.887**	0.023

[a] Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. N = 465.
[b] USE1, USE2 and GOV 3 indicators were omitted from further analysis based on the statistical validation result.

usefulness heavily. We argue that this indirect influence should be further investigated, since it looks both conceptually and empirically as a critical element of i-voting adoption. In our case the direct and indirect effect of effort expectancy were 0.143 and 0.246 respectively.

The analysis of the full sample also shows the importance of the citizens' trust in relation to on-line voting intent; although not in terms of political trust in the government, but in the sense of trust in internet technology. While the government trust component does not have a significant effect on e-voting intent (disproving H6), internet trust seems to be a more important factor than the ease of use in this setting (confirming H5). Interestingly this was also the case in (Powell et al., 2012), where U.S. Midwestern subjects' e-voting intent was analyzed in a – slightly broader but – similar context.

This result, however, should be treated with concern in the CEE setting, both due to the face value sensitivity of the issue, but also due to the contradicting results of other studies which we referred earlier (Székely, 2013). At the same time, these exploratory findings might contribute to the emerging theoretical dilemmas of the expanding cyberspace, where trust in public institutions is viewed through the lens of information security and privacy protection (Bulgurcu, Cavusoglu, & Benbasat, 2010).

An important aspect of our findings is shown in Table 6, comparing our Hungarian results with the original TAM findings and U.S. e-voting research. We conclude that the comparable results concerning the role of performance expectancy, effort expectancy and trust are very similar across these studies regardless of geographic location, technology focus or time.

5. Conclusions and limitations

In this research rooted in the DeLone-McLean Model of Information System Success concept and the Technology of Acceptance Model (TAM) we set six hypotheses about e-voting intent amongst Hungarian citizens. The hypotheses were tested with non-parametric statistical tests and using partial least square (PLS) structural equation modelling.

After testing the first hypothesis we conclude that in the context of young, educated and internet-ready Hungarian voters introduction of on-line voting would result in a positive attitude change toward participating in elections. To achieve this impact theory and application can gain new insights by analyzing the drivers of use.

We remind the reader at this point to the limitations of these analyses, many of which have been shown during the survey design and data collection sections. Firstly, we applied a very broad and general vision of the on-line voting, neglecting several technical details and specifications which need to be refined in further studies. Secondly, our sample has not been representative in terms of the demographic characteristics of voters, instead it has focused on the internet savvy, young, educated and mostly female individuals. Thirdly, responses about the perception of some of the constructs might be distorted by social expectations, fear, or uncertainty about the anonymity (in case of voting behavior, reporting about government trust or even the status of citizenship). Being aware of these limitations, the validity of our findings is ensured by embedding it into the relevant literature, focusing on the CEE context, and by choosing SEM as an exploratory quantitative method which fits with the dataset.

The testing of hypotheses H2–H6 in our extended TAM model has shown significant positive association between i-voting intent and performance expectations, ease-of-use and trust in internet technology.

Table 4
Component matrix of the dependent variables[a].

		Intent to use 1
INT1	I would use an on-line voting system	0.945
INT2	I could see myself using an on-line voting system	0.944
INT3	I would not hesitate to use an on-line voting system	0.933
INT4	An on-line system would be somewhat intimidating to me (transfered value).	0.730

[a] Extraction Method: Principal Component Analysis.

Table 5
Construct validity and reliability.

Full sample	Average variance extracted	Composite reliability	Cronbachs Alpha	R^2
IntentToUse	0.790	0.937	0.907	0.642
PerformanceExpectancy	0.812	0.896	0.768	
EaseOfUse	0.817	0.947	0.925	
InternetTrust	0.784	0.956	0.944	
GovernmentTrust	0.879	0.956	0.932	

Table 6
International comparison.

	Our results (full sample)	Powell et al. (2012) (full sample)	Davis (1986)
Georgaphic focus	Hungarian citizens	US Midwest	Canada
Technology focus	e-Voting	e-Voting	e-Mail; XEDIT file editor
Sample size	452	566	112
Theoretic context	Extended TAM	UTAUT	TAM
Model coefficients			
Performance expectancy ≥ intent to use	0.465***	0.32***	0.651***
Effort expectancy ≥ intent to use	0.143***	0.10*	0.104 (ns)
Effort expectancy ≥ performance expectancy	0.528***	–	0.630***
Internet trust ≥ intent to use	0.342***	0.32**	–
Government trust ≥ intent to use	−0.005 (ns)	(ns)	–
Social influence	–	0.19***	–
Computer anxiety	–	0.65***	–

(ns) Not significant; — not part of the model.
*** p < 0.001.
** p < 0.01.
* p < 0.05.

These findings contribute to both the TAM and e-voting adoption literature by confirming earlier research but extending it to a special group of CEE group of voters. By also confirming the strong indirect effect of effort expectancy (ease of use on-line voting systems, in H4) described in the original TAM (proposed by Davis, 1986 and shown also by Chiang, 2009 in Taiwan) our results also deepen and strengthen the e-voting TAM research stream. More importantly, however, our exploratory findings reveal a more refined picture about the bottleneck of e-voting adoption (Vassil & Weber, 2009) from the voters' point of view: trust in the internet and expected performance gains of voting on-line.

In terms of practical implications our results reveal mechanisms to design policies for e-voting implementation (areas, priorities) and provides empirical evidence about how those young Hungarians view voting mechanisms whose desire to vote will be influential in future elections. Decision makers might consider including technology enablers into programs and policies to improve participation and democratic practices. Our findings related to trust indicate that policy makers should focus on ensuring technological reliability and security since young voters view things through technology; this issue has been significantly important in all the three countries of our study, trusting the internet is more relevant than trust in general political institutions.

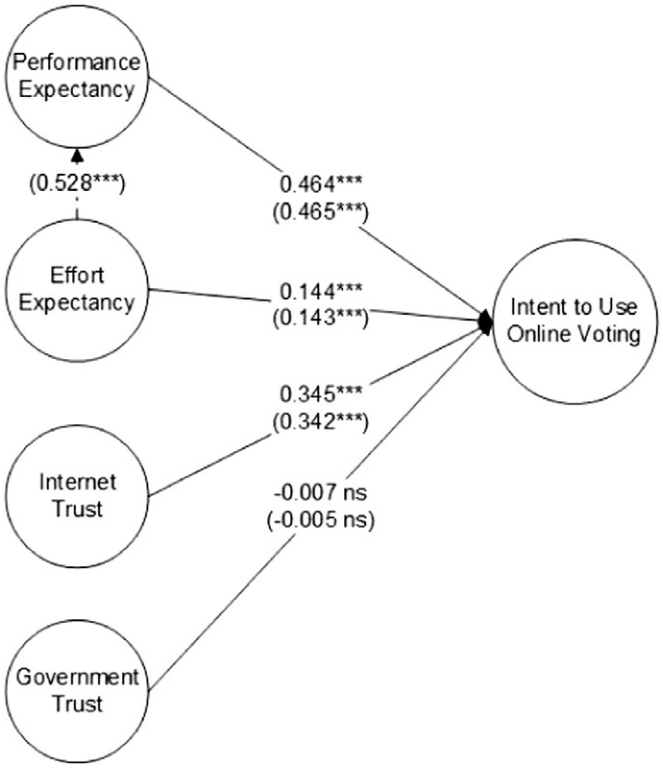

Fig. 3. PLS results (general model and PLS results with the indirect effect of effort expectancy in brackets). *** p < 0.001; ** p < 0.01; * p < 0.05; (ns) not significant.

Appendix 1. Indicators and questions used in the quantitative study.

Indicator names	Questionnaire items
Intent to use on-line voting	
INT1	I would use an on-line voting system
INT2	I could see myself using an on-line voting system
INT3	I would not hesitate to use an on-line voting system
INT4	An on-line system would be somewhat intimidating to me
Performance expectancy	
USE1	I would find on-line voting useful
USE2	Using on-line voting would make me more serious in voting
USE3	On-line voting would make me easier to vote
USE4	Accessing on-line voting system I would be voting more likely
Effort expectancy	
EOU1	I think it is easy and clear how to use an on-line voting system
EOU2	I could quickly learn how to use an on-line voting system
EOU3	I could easily learn how to use and on-line voting system
EOU4	It would be easy for me to use an on-line voting system
Internet trust	
TRUST1	I trust the internet provides enough safeguards for secure voting
TRUST2	I trust that legal and technical systems protect me at voting
TRUST3	I trust that they count the votes accurately
TRUST4	I think the internet is safe enough for secure on-line voting
TRUST5	I think I could trust an on-line voting system
TRUST6	I trust that nobody would tamper the on-line votes.
Government trust	
GOV1	I can trust the local public administration in general
GOV2	I trust the institutions responsible for organizing elections
GOV3	I think the Hungarian administration system is trustworthy
GOV4	I trust the Hungarian institutions responsible for elections
Technology skills	
SKILL1	Internet is part of my everyday life
SKILL2	I regularly use e-business and media services on-line
SKILL3	I am aware and use e-government services where I live
Voting options	
POST1	I would prefer on-line voting to postal voting

References

Alharbi, A., Kang, K., & Hawryszkiewycz, I. (2015). *The influence of trust and subjective norms on citizens' intentions to engage in E-participation on E-government websites* (pp. 1–11)Australasian Conference on Information Systems. Adalaide: ACIS (2015 Nov. 30 – Dec. 04).

Alvarez, M. R., Hall, T. E., & Trechsel, A. H. (2009). Internet voting in comparative perspective: The case of Estonia. *PS: Political Science & Politics*, *42*(3), 497–505.

Bochsler, D. (2010). *Can Internet voting increase political participation? Remote electronic voting and turnout in the Estonian 2007 parliamentary elections* (pp. 1–24)-Presentation on the Conference 'Internet and Voting', Fiesole, Italy, 3–4 June 2010.

Braun, N., Ellis, & al (2007). "E-voting" and external voting. Chapter 10. *Voting from abroad: The international IDEA handbook* (pp. 217–233). Stockholm, Sweden: International Institute for Democracy and Electoral Assistance.

Bulgurcu, B., Cavusoglu, H., & Benbasat, I. (2010). Information security policy compliance: An empirical study of rationality-based beliefs and information security awareness. *MIS Quarterly*, *34*(3), 523–548.

Carifio, J., & Perla, R. (2007). Ten common misunderstandings, misconceptions, persistent myths and urban legends about Likert scales and Likert response formats and their antidotes. *Journal of Social Sciences*, *3*(3), 106–116.

Carter, L., & Bélanger, F. (2005). The utilization of e-government services: Citizen trust, innovation and acceptance factors. *Information Systems Journal*, *15*(1), 5–25.

Chiang, L. (2009). Trust and security in the e-voting system. *Electronic Government, an International Journal*, *6*(4), 343–360.

Chin, W. (1995). On the use, usefulness and ease of use of structural equation modeling in MIS research: A note of caution. *MIS Quarterly*, *19*(2), 237–246.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. Chapter 10. In G. A. Marcoulides (Ed.), *Modern methods for business research* (pp. 295–336). London: Lawrence Erlbaum Associates.

Choi, S. O., & Kim, B. C. (2012). Voter intention to use e-voting technologies: Security, technology acceptance, election type, and political ideology. *Journal of Information Technology & Politics*, *9*(4), 433–452.

Colesca, S. E. (2009). Understanding trust in e-government. *Economics of Engineering Decisions*, *2009*(3), 7–15.

Colesca, S. E., & Dobrica, L. (2008). Adoption and use of e-government services: The case of Romania. *Journal of Applied Research and Technology*, *6*(3), 204–217.

Dányi, E., & Galácz, A. (2005). Internet and elections: Changing political strategies and citizen tactics in Hungary. *Information Polity*, *10*(3/4), 219–232.

Davis, F. D. (1986). *A technology acceptance model for empirically testing new end user information systems: Theory and results*. Cambridge, MA: MIT Sloan School of Management (Doctoral Dissertation).

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–340.

DeLone, W. H., & McLean, E. R. (1992). Information system success: The quest for the dependent variable. *Information Systems Research*, *3*(1), 60–95.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information system success: Ten-year update. *Journal of Management Information Systems*, *19*(4), 9–30.

European Commission (2014). Scoreboard 2014 – Developments in eGovernment in the EU 2014. (Date of downloading: 2014. 11 26, Source: Digital Agenda for Europe:) https://ec.europa.eu/digital-agenda/en/news/scoreboard-2014-developments-egovernment-eu-2014

Fernandez, E. B., Red, D. L., & Peláez, J. I. (2013). A conceptual approach to secure electronic elections based on patterns. *Government Information Quarterly*, *30*(1), 64–73.

Gefen, D., Karahann, E., & Straub, D. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly*, *27*(1), 51–90.

Geladi, P., & Kowalski, B. R. (1986). Partial least-squares regression: A tutorial. *Analytica Chimica Acta*, *185*, 1–17.

Germann, M., & Serdült, U. (2014). Internet voting for expatriates: The Swiss case. *JeDEM – eJournal of eDemocracy & Open Government*, *6*(2), 197–215.

Gupta, B., Dasgupta, S., & Gupta, A. (2008). Adoption of ICT in a government organization in a developing country: An empirical study. *The Journal of Strategic Information Systems*, *17*(2), 140–154.

Hair, J. F., Hult, G. T., Ringle, C. M., & Sarstedt, M. (2014). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Thousand Oaks: Sage.

Heiberg, S., Parsovs, A., & Willems, J. (2015). Log analysis of Estonian internet voting 2013–2014. In R. Haenni, R. Koenig, & D. Wikström (Eds.), *E-Voting and Identity Proceedings 5th International Conference VoteID 2015, September 2–4, 2015* (pp. 19–34). Bern, Switzerland: Springer old.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55.

Hwang, Y. (2005). Investigating enterprise adoption: Unceartainty avoidance, intrinsic motivation, and the technology acceptance model. *European Journal of Information Systems*, *14*(2), 150–160.

Ifinedo, P., & Singh, M. (2011). Determinants of eGovernment maturity in the transition economies of central and Eastern Europe. *Electronic Journal of e-Government*, *9*(2), 166–182.

Keil, M., Tan, B. C., Wei, K. K., Saarinen, T., Tuunainen, V., & Wassenaar, A. (2000). A cross-cultural study on escalation of commitment behavior in software projects. *MIS Quarterly*, *24*(2), 299–325.

King, W., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information Management*, *43*(6), 740–755.

Kis, G., Szalay, K., Takács, N., & Nagy, P. (2008). Az on-line vásárlás vevői elfogadottsága Magyarországon (Adoption of on-line commerce in Hungary). *Vezetéstudomány (Budapest Management Review)*, *39*(12), 16–26.

Krimmer, R. (2006). Electronic Voting 2006 – Overview. In R. Krimmer (Ed.), *Electronic voting 2006 2nd International workshop co-organized by council of Europe, ESF TED, IFIP WG 8.5 and E-Voting.CC (old.: 9–12)*. Castle Hofen, Bregenz, Austria: Gesellschaft für Informatik.

Kucsera, B. (2011). *A külképviseleti választások problematikája (Issues of external voting) – in Hungarian*. Budapest: Bachelor Thesis Corvinus University of Budapest.

Lee, Y., Kozar, A. K., & Larsen, K. (2003). The technology acceptance model: Past, present, and future. *Communications of the Association for Information Systems*, *12*(50), 752–780.

Lin, F., Fofanah, S. S., & Liang, D. (2011). Assessing citizen adoption of e-government initiatives in Gambia: A validation of the technology acceptance model in information systems success. *Government Information Quarterly*, *28*(2), 271–279.

Lowry, P. B., & Gaskin, J. (2011). Partial least squares (PLS) structural equation modeling (SEM) for building and testing behavioral causal theory: When to choose it and how to use it. *IEEE Transactions on Professional Communication*, *57*(2), 123–146.

MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioural research: Integrating new and existing techniques. *MIS Quarterly*, *35*(2), 293–334.

Marcoulides, G. A., Chin, W. W., & Saunders, C. (2009). A critical look at partial least squares modeling. *MIS Quarterly*, *33*(1), 171–175.

Novy, M. (2014). Electoral and non-electoral participation in the Visegrad countries: Complements or substitutes? *Eastern European Politics and Societies: EEPS*, *28*(4), 863–886.

Orviska, M., Caplanova, A., & John, H. (2005). Intended electoral participation in transition countries. *Economics of Governance*, *6*(3), 211–228.

Powell, A., Williams, C. K., Bock, D. B., Doellman, T., & Allen, J. (2012). e-Voting intent: A comparison of young and elderly voters. *Government Information Quarterly*, *29*, 361–372.

Ringle, C. M., Wende, S., & Becker, J. M. (2015). SmartPLS 3. Retrieved from Boennigstedt: SmartPLS GmbH.:) http://www.smartpls.com

Rogers, E. (1995). *Diffusion of innovations*. New York, USA: The Free Press.

Saglie, J., & Segaard, S. B. (2016). Internet voting and the secret ballot in Norway: Principles and popular understandings. *Journal of Elections, Public Opinion & Parties*, *26*(2), 155–169. http://dx.doi.org/10.1080/17457289.2016.1145687 (May 2016).

Schaupp, C. L., & Carter, L. (2005). E-voting: From apathy to adoption. *Journal of Enterprise Information Management*, *18*(5), 586–601.

Serdült, U., Germann, M., Harris, M., Mendez, F., Portenier, A., & Tambouris, a. (2015a). Who are the Internet voters? *Electronic governement and electronic participation (old.: 27–41)*. Amsterdam, Berlin, Tokyo, Washington: IOS Press. http://dx.doi.org/10.3233/978-1-61499-570-8-27.

Serdült, U., Germann, M., Mendez, F., Portenier, A., & Wellig, C. (2015b). In L. Terán, & A. Meier (Eds.), *Fifteen years of internet voting in Switzerland: History, governance and use* (pp. 126–132)ICEDEG 2015: Second International Conference on eDemocracy & eGovernment, Quito, Ecuador, 8–10 April 2015. IEEE Xplore CFP1527Y-PRT. http://dx.doi.org/10.1109/ICEDEG.2015.7114482.

Simons, B., & Jones, D. W. (2012). Internet voting in the US. *Communications of the ACM*, *55*(10), 68–77.

Susha, I., & Grönlund, Å. (2012). eParticipation research: Systematizing the field. *Government Information Quarterly*, *29*(3), 373–382.

Svensson, J., & Leenes, R. (2003). E-voting in Europe: Divergent democratic practice. *Information Polity*, *8*(1/2), 3–15.

Székely, L. (2013). *Hungarian youth 2012 – Research report (in Hungarian)*. Budapest: Kutatópont.

Tolbert, C. J., & McNeal, R. S. (2003). Unraveling the effects of the internet on political participation? *Political Research Quarterly*, *56*(2), 175–185.

Tolbert, C. J., & Mossberger, K. (2006). The effects of E-government on trust and confidence in government. *Public Administration Review*, *66*(3), 354–369.

Trechsel, A., & Vassil, K. (2010). *Internet voting in Estonia: A comparative analysis of four elections since 2005*. Italy, Florence: European University Institute Robert Schuman Center for Advanced Studies – Report for the Council of Europe.

Vassil, K., & Weber, T. (2009). A bottleneck model of E-voting. Why technology fails to boost turnout. *Paper presented at the Annual Meeting of the American Political Science Association (old.: 1–45)*. Toronto, ON, Canada: ASPA.

Vassil, K., & Weber, T. (2011). A bottleneck model of E-voting. Why technology fails to boost turnout. *New Media & Society*, *13*, 1336–1354 (December).

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop ask for directions? Gender social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly*, *24*(1), 115–139.

Venkatesh, V., Morris, M. G., Davis, F. D., & Davis, G. B. (2003). User acceptance of information echnology: Toward a unified view. *MIS Quarterly*, *27*, 425–478.

Volkamer, M., Spycher, O., & Dubuis, E. (2011). Measures to establish trust in internet voting. In E. Estevez, & M. Janssen (Eds.), *ICEGOV '11 Proceedings of the 5th International Conference on Theory and Practice of Electronic Governance (old.: 1–10)*. New York, NY, US: ACM.

Welch, E. W., Hinnant, C. C., & Moon, J. M. (2009). Linking citizen satisfaction with E-government and trust in government. *Journal of Public Administration Research and Theory*, *15*(3), 371–391.

Wimmer, M. A., Scherer, S., & Appel, M. (2015). The role of trust in E-participation: Predictors, consequences, and design. In Tambouris, & al (Eds.), *Electronic Government and Electronic Participation (old.: 3–10)*. Amsterdam, Berlin, Tokyo, Washington D.C.: IOS Press.

Zissis, D., & Lekkas, D. (2011). Securing e-government and e-voting with an open cloud computing architecture. *Government Information Quarterly*, *28*(2), 239–251.

Andras Nemeslaki is a professor of Information Systems at the National University of Public Service. He is the head of the E-government Institute and his research interest is ICT enabled business and service models in organizations, ICT driven innovation and social change. He has published in the international journals of Society and Economy (Hungary), International Tourism Review (Czech Republic), International Journal of Advanced Computer Science and Applications and the Journal of Sociology and Social Anthropology (RU). Professor Nemeslaki regularly presents his findings at the European Group of Public Administration (EGPA) and NISPACee conferences.

Márta Aranyossy is an assistant professor at the Department of Enterprise Finances, Corvinus University of Budapest, Hungary. Her current focus of research includes IT business value, e-government value, IT project success and failure as well as valuation of e-commerce and technology firms. She published articles in the International Journal of Advanced Computer Science, Budapest Management Review and in the proceedings of NISPAcee Annual Conference, Annual Conference of the European Decision Sciences Institute and Bled eConference.

Peter Sasvari, is an associate professor of the Institute of the E-Government Institute at the National University of Public Service in Hungary. He is supervising one Ph.D. student's thesis, and has supervised >150 bachelor's and master's theses. Professor Sasvári authored >30 international publications, and he also serves as the associate editor of 3 international journals. Recently, the analysis of information systems has been the focus of his research. With the co-operation of local universities, he has conducted primary research amongst organizations in Austria, Bosnia-Herzegovina, the Czech Republic, Croatia, Poland, Portugal, Hungary, Germany, Italy, Spain and Slovakia.