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Review

E-participation adoption models research in the last 17 years: A weight and meta-analytical review

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ABSTRACT

This article explores the main factors that drive the adoption of e-participation. A weight and meta-analysis was carried out from previous quantitative research studies related to individual e-participation adoption published in journals and conferences over the last 17 years. A total of 60 studies were used for the weight and meta-analysis. We identify the 'best' and 'promising' predictors used in research models to study e-participation. The best predictors are: *trust, effort expectancy, perceived usefulness, attitude, trust in government* and *social influence* on *intention to use, perceived ease of use* on *perceived usefulness*, *perceived usefulness* on *attitude*, and *intention to use* on *use*. General public in urban areas account for the 69.78% of the respondents across all articles. Two thirds of all respondents belong to Asia and the Middle East. The countries with highest number of articles found are United States and Jordan. The article provides a wide view of the performance of the 483 relationships used in research models to study e-participation, which may allow researchers to identify trends, and highlights issues in the future use of some constructs. Implications for theory and practice, limitations and directions for future research are discussed.

Contents

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1. Introduction

E-participation is defined as "*the process of engaging citizens through ICTs* [Information and Communication Technologies] *in policy and decision-making in order to make public administration participatory, inclusive, collaborative and deliberative for intrinsic and instrumental ends*" (United Nations, 2014, p. 61). The definition provided by United Nations emphasizes the importance of citizen engagement and e-participation for sustainable development and for facing the current global challenges such as climate change, inequality, poverty, and the collaboration between governmental and non-governmental actors. E-participation is a strategic factor to improve citizen participation in digital governance (Sanford & Rose, 2007) and to promote a more efficient society (Sæbø, Rose, & Skiftenes Flak, 2008).

In recent years the availability of e-participation technologies has increased around the globe. For instance, by 2010 there was an estimate of 795–1469 implementations of participatory budgeting around the world (Sintomer, Herzberg, Allegretti, & Röcke, 2010), whereas by 2013 the estimate was updated to nearly 2700 implementations worldwide (Sintomer, Herzberg, Allegretti, Röcke, & Alves, 2013). Recently United Nations (2016) reported on the current situation of forms of e-participation worldwide. Of the 193 members states: 183 have implemented e-information by posting online information about education, health, finance, environment, social protection, and labour; 62 provide the option for citizens to subscribe to updates via SMS and e-mail about labour information; 152 use e-consultation through social network features; however, in only 38 of these 152 countries e-consultation resulted in new policies or regulations; and 120 countries have developed e-decision-making tools.

E-participation is considered a field of interdisciplinary nature (Macintosh, Coleman, & Schneeberger, 2009; Medaglia, 2012; Susha & Grönlund, 2012). Comparative and review studies on e-participation may help considerably to form a better picture of the research progress in this field. From the qualitative perspective, review studies such as Medaglia (2012), Sæbø et al. (2008), Sanford and Rose (2007), have contributed to the characterization of the field. However, Kubicek and Aichholzer (2016) identified that there is a lack of comparative studies analysing e-participation; instead, the body of research mainly consists of isolated case studies. They contributed by reviewing the major types of conceptual frameworks and evaluation criteria in the e-participation context. On the quantitative side, very few review and comparative studies address e-participation directly. This article fills the gap of quantitative review in the e-participation domain.

The main objective of this study is to perform a weight analysis (Jeyaraj, Rottman, & Lacity, 2006) and meta-analysis (King & He, 2006), which are strong alternatives to the narrative methods of literature review to synthetize findings presented in primary quantitative articles on e-participation technology adoption. Specifically, we analyse the performance of the constructs obtained from the assessment of the research models found in 60 articles published in the last 17 years. This article makes two contributions. First, according to Webster and Watson (2002) an effective review can serve as a strong basis for advancement of knowledge, facilitating the path for theoretical development and revealing gaps where more research is needed. Second, we offer a better understanding of the existing trends and patterns in the use of theoretical models and constructs, especially for the most widely used research models: the technology acceptance model – TAM (Davis, 1989) and the unified theory of acceptance and use of technology – UTAUT (Venkatesh, Morris, Davis, & Davis, 2003). The most frequently used constructs are identified as 'best' and 'promising' predictors (Jeyaraj et al., 2006). Besides the weight and meta-analysis, the article also examines trends on technologies used for e-participation and the type of sample population, with its distribution by country and by year.

The paper is organized as follows. The next section describes the research methodology, this is, the definition of the problem, the criteria for selection or rejection of studies, the data extraction process, and merging the names of variables. Section 3 provide the results: (3.1) descriptive statistics, (3.2) weight analysis, (3.3) meta-analysis, and (3.4) analysis of publication bias. Then, a discussion of the findings with their implications for theory and practice is presented; and finally, the conclusions, and limitations and future research.

2. Research methodology

2.1. Criteria for selection of studies

The first step in a meta-analysis investigation is formulating the problem (Cooper, 2010). In our case, we are interested in analysing the overall performance of the relationships between independent and dependent variables, measured in theoretical models for adoption of e-participation over the last 17 years or research. We included all available electronic databases relevant to the topic: Science Direct, ISI Web of Science, ACM Digital Library, and Google Scholar. The search engines of the databases provide options to perform advance search using keywords and logical operators (AND/OR), within a specific timeframe.

The keywords for the queries are defined in four sets: (i) the keywords oriented to find articles where research models were evaluated, thus, 'model', 'survey', and 'questionnaire'; (ii) the context of the studies, thus, 'e-participation' and 'e-government' (with and without hyphen) (United Nations, 2016); (iii) the keywords about the most used methods used to assess the models, 'regression', 'PLS', and 'structural equation modelling'; and finally, (iv) the activities and levels of e-participation. We adopted the e-participation activities 'e-voting', 'e-democracy', and 'e-petition' from Medaglia (2012), and 'e-empowering' (Macintosh, 2004). To frame the levels of e-participation we adopt 'e-information', 'e-consultation', 'policy-making', and 'decision-making' from United Nations (2016). Please, see Table 1. Logical operators 'AND' and 'OR' connect the keywords for the query. The general conditions: articles published from year 2000 to present in journal and conferences. The studies must report the correlation coefficients, sample size, and be written in English language.

Initially, 779 publications were found ranging from year 2003–2017 across the databases used in the search. Some articles retrieved from the different databases were duplicates, which were excluded from the list. Even though the timeframe was set to [2000–2017], no articles were found between years 2000 and 2002. Most of the 779 initial publications had a qualitative approach, that is, they did not conduct any statistical evaluation

Table 1
Sets of keywords to query databases.

Theoretical model and evaluation	Context	Quantitative methods	Activities/Levels of e-participation
model survey questionnaire	e-government e-participation	structural equation modelling PLS regression coefficient	e-democracy e-voting policy-making e-petition e-informing e-consulting decision-making e-empowering

from which a sample size and correlation coefficients could be calculated. Consequently, qualitative articles were excluded from the list, leaving 76 quantitative studies. Those 76 articles received three independent reviews to verify whether the technological tools and activities studied comply with the conditions of our study and the list of predefined activities. As a result, 12 articles were excluded as not fitting our list of e-participation activities and levels (Table 1). Remaining 64 studies.

In these 64 studies, four were excluded for using the same dataset of respondents, because of the same dataset in more than one publication may bias the aggregate effects in meta-analysis (Wood, 2007). If two or more studies used the same dataset, we selected the one that contained the highest number of variables. On the other hand, the article of Seo and Bernsen (2016) contained four independent datasets, from which we consider only the one with biggest sample size for weight and meta-analysis. Finally, this article includes 60 studies and 63 useful datasets. Fig. 1 describes the workflow and conditions of the search.

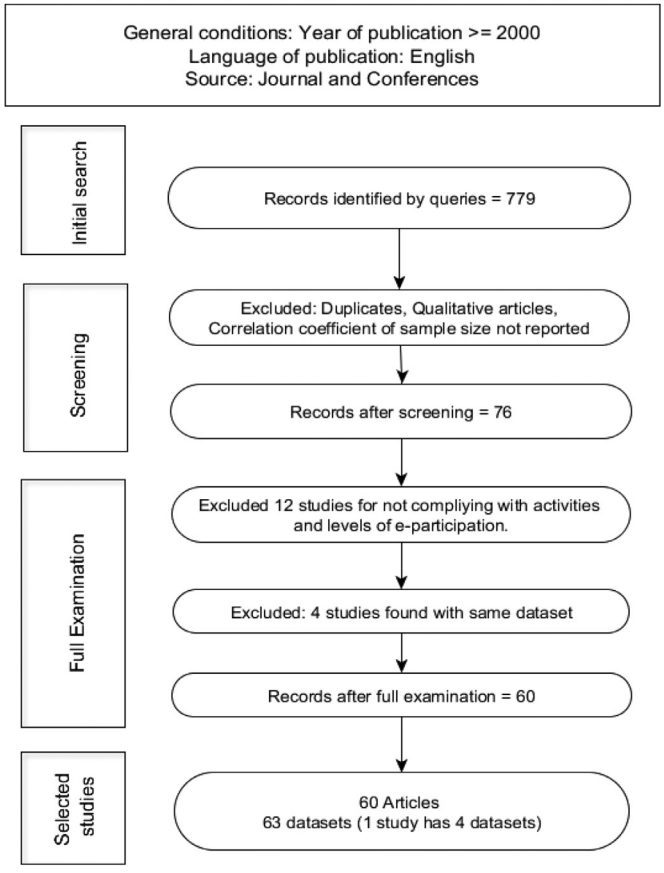

Fig. 1. Selection of studies.

2.2. Data extraction

Each article was examined and the following items were extracted: year of publication, source, theory, independent variable, dependent variable, correlation coefficient from relationships between constructs (independent variables moderating the relationship were not included), significance (yes or not), quantitative method, keywords, type of e-participation technologies (e.g., e-voting, online discussion forum, online services), type of survey, sample size, type of population, and nationality of the sample. The list of all useful datasets in individual studies is in Table 2.

2.3. Merging of variables

When data were extracted, the names of independent and dependent variables were collected as defined by their original authors. Among the plethora of variables, we faced the problem that many of those variables had different names, but likely stand for similar meanings. We identified two main scenarios: (i) some constructs were identified as synonyms (i.e.: *Internet Trust, Trust of the Internet*, and *Trust in Internet* were considered jointly as a single construct *Trust in Internet*); (ii) several constructs presented longer names (i.e.: *Intention to use online function*, and *Attitude toward using e-voting system* were reduced to *Intention to use* and *Attitude*, respectively). When the names of the constructs were of these forms: *Intention to use …* [Studied technology], *Attitude towards …* [Studied technology], or *Trust in …* [Studied technology], we considered them as *Intention to use, Attitude,* and *Trust*, respectively. For further details see the Appendix. After the merging process, we identified 24 relationships that have been used at least three or more times. This threshold has been used also in Baptista and Oliveira (2016) and Rana, Dwivedi, and Williams (2015). Those relationships are used for the weight and meta-analysis in the next section.

3. Results

3.1. Descriptive statistics

In these 60 articles, 483 relationships [independent-dependent variable] were identified to be useful for the weight analysis. For the meta-analysis 11 relationships were dropped because the articles did not report the correlation coefficient values when they were not significant. They only reported whether significant or not; therefore, 472 useful relationships were identified for the meta-analysis. The total number of individuals from the 63 datasets is 22,890. Based on the description provided in each article, we categorized the type of respondents to obtain a summarized view. General public in urban areas and University students were the most common description of the population in the articles (see Table 3).

In the analysis of distribution of respondents by country and year we take into account a total of 22,779 respondents, the dataset presented in the article of Zuiderwijk et al. (2015) is dropped for this particular analysis, because it reports individuals from various nationalities with a sample size of 111 (public in conferences). Few articles were found until year 2007, but from year 2008–2016 we observe a more regular number of publications per year (Table 4), 4.2 on average. The United States and Jordan are the countries that have contributed with the highest number of articles and respondents. Two thirds of all respondents belong to Asia and the Middle East. Given the limited number of datasets (63) for a global context study, there is not enough evidence to identify trends at

Table 2
List of useful datasets in studies (ordered by publication year, author).

No.	Author	Model	Technologies	Sample size	Country
1	Lee, Braynov, and Rao (2003)	TAM	Online services	158	United States
2	Carter and Bélanger (2004)	TAM, DOI	Online services	136	United States
3	Carter and Bélanger (2005)	TAM, DOI	Online services	105	United States
4	Schaupp and Carter (2005)	TAM, DOI, and web trust	e-voting	208	United States
5	Phang and Kankanhalli (2006)	CVM, GIM	Online discussion forum	121	Singapore
6	Yang, Li, Tan, and Teo (2007)	TRA	Online discussion forum	183	Singapore
7	Yao and Murphy (2007)	TAM, UTAUT	e-voting	453	United States
8	Bélanger and Carter (2008)	Trust of the Internet, Trust of government	Online services	214	United States
9	Colesca and Dobrica (2008)	TAM	Web portal	481	Romania
10	Tan, Bembasat, and Cenfetelli (2008)	SERVQUAL, TAM, Trust	Online services	647	United States
11	Van Dijk, Peters, and Ebbers (2008)	UTAUT	Online services	1225	Netherlands
12	Wang and Liao (2008)	DeLone and McLean	Online services	119	Taiwan
13	Wangpipatwong, Chutimaskul, and Papasratorn (2008)	TAM	Web portal	614	Thailand
14	Chiang (2009)	TAM	e-voting	281	Taiwan
15	Lean, Zailani, Ramayah, and Fernando (2009)	TAM, DOI	Online services	150	Malaysia
16	Tang, Chung, and Se (2009)	TAM, TRA	Online services	385	China
17	Teo, Srivastava, and Jiang (2009)	DeLone and McLean, Trust	Online services	214	Singapore
18	Y.-S. Wang and Shih (2009)	UTAUT	Information Kiosks	244	Taiwan
19	Kollmann and Kayser (2010)	UTAUT, CVM	E-democracy	232	Germany
20	Alathur, Ilavarasan, and Gupta (2011)	Empowerment	Online discussion forum	360	India
21	Al-Hujran, Al-dalahmeh, and Aloudat (2011)	TAM, Hofstede	Online services	197	Jordan
22	Al-Sobhi, Weerakkody, and El-Haddadeh (2011)	UTAUT	Online services	624	Saudi Arabia
23	Lin, Fofanah, and Liang (2011)	TAM	Online services	167	Gambia
24	Rokhman (2011)	DOI	Online services	751	Indonesia
25	Shyu and Huang (2011)	TAM	Online services	307	Taiwan
26	Styvén and Wallström (2011)	Trust	Online services	422	Sweden
27	Alomari, Woods, and Kuldeep (2012)	DOI, TAM	Online services	400	Jordan
28	Alshehri, Drew, Alhussain, and Alghamdi (2012)	UTAUT, Web quality,	Online services	400	Saudi Arabia
29	Belanche, Casaló, and Flavián (2012)	TAM	Online services	416	Spain
30	Carter and Bélanger (2012)	TAM, DOI, Political Factors	e-voting	372	United States
31	Choi and Kim (2012)	TAM	e-voting	228	United States
32	Lee and Kim (2012)	TAM, Social Networks	Online discussion forum	1076	South Korea
33	Khan, Moon, Swar, Zo, and Rho (2012)	Self-developed	Online services	360	Afghanistan
34	Rehman, Esichaikul, and Kamal (2012)	TAM, DOI	E-informing	138	Pakistan
35	Wang and Lo (2012)	TAM, TBP	Online services	200	Taiwan
36	Winkler, Hirsch, Trouvilliez, and Günther (2012)	TAM	Mobile Reporting Service	200	Germany
37	Alawneh, Al-Refai, and Batiha (2013)	Customer satisfaction	Web portal	206	Jordan
38	Hung, Chang, and Kuo (2013)	TPB	Mobile government	331	Taiwan
39	Mou, Atkin, Fu, Lin, and Lau (2013)	Self-developed	Online discussion forum	181	China
40	Persaud and Persaud (2013)	Self-developed	Web portal	437	Canada
41	Abu-Shanab (2014)	TRA, Trust Antecedents Model	Online services	759	Jordan
42	Al-Hujran, Al-Debei, and Al-Lozi (2014)	TAM, TPB	E-democracy	189	Jordan
43	Aloudat, Michael, Chen, and Al-Debei (2014)	TAM	Mobile government	290	Australia
44	Cegarra-Navarro, Garcia-Perez, and Moreno-Cegarra (2014)	TAM	E-informing	307	Spain
45	Liu et al. (2014)	TAM	Mobile government	409	China
46	Park, Choi, and Rho (2014)	Self-developed	Online social networks	491	South Korea
47	Abu-Shanab (2015)	Self-developed	Open government data	869	Jordan
48	Al-Quraan and Abu-Shanab (2015)	Self-developed	Web portal	248	Jordan
49	Alharbi, Kang, and Hawryszkiewycz (2015)	TBP, Trust	Web portal	770	Saudi Arabia
50	Alrashedi, Persaud, and Kindra (2015)	Self-developed	E-informing	200	Saudi Arabia
51	Dahi and Ezziane (2015)	TAM	Online services	845	Abu Dhabi
52	Rabaa'i (2015)	TAM	Online services	853	Jordan
53	Rana and Dwivedi (2015)	SCT	Online public grievance redressal system	419	India
54	Zuiderwijk, Janssen, and Dwivedi (2015)	UTAUT	Open government data	111	Several countries
55	Cai Shuqin, Mastoi, Gul, and Gul (2016)	Self-developed	Online services	200	Pakistan
56	Piehler, Wirtz, and Daiser (2016)	ECT	Web portal	477	Germany
57	Rodrigues, Sarabdeen, and Balasubramanian (2016)	UTAUT	Online services	380	United Arab Emirates
58	Seo and Bernsen (2016)	SCT, UTAUT, Trust	Municipality e-services	111	Netherlands
			Municipality e-services	73	
			Municipality e-services	70	
			Municipality e-services	83	
59	Oni, Oni, Mbarika, and Ayo (2017)	CMV, TRA	E-democracy	327	Nigeria
60	Schmidthuber, Hilgers, and Gegenhuber (2017)	TAM	Open government	466	Austria

Notes: CVM – civic voluntarism model, DOI – diffusion of innovation, GIM – general incentives model, SCT – social cognitive theory, SERVQUAL – service quality, TAM - technology acceptance model, TPB – theory of planned behaviour, TRA – theory of reasoned action, UTAUT – unified theory of acceptance and use of technology, ECT – Expectation confirmation theory.

Table 3
Distribution of respondents by type (ordered by percentage).

Population type	Respondents	Percentage (%)
General public - urban area	15,972	69.78
University students	3904	17.05
Employed people	1666	7.28
E-business consumers	647	2.83
General public - rural area	590	2.58
Public in scientific conferences	111	0.48
TOTAL	22,890	100

such a scale. Fig. 2 represents the world distribution of the respondents.

3.2. Weight analysis

Weight is an indicator of the predictive power of independent variables (Jeyaraj et al., 2006). The weight for a variable is calculated by dividing the number of times an independent variable was reported to be significant by the total number of times the independent variable was examined. In our case, we analyse the influence of an independent variable over a dependent variable; that is, a constructs' relationship strength. Following the approach implemented in Baptista and Oliveira (2016) and Rana et al. (2015), we included in our analysis all relationships that were examined three or more times, counting 24 relationships that comply with this condition (see Table 5).

According to Jeyaraj et al. (2006), in the context of individual IT adoption, independent variables can be considered "well-utilized" if tested at least five times; if tested fewer than five times, with a weight equal to 1, independent constructs can be considered as 'promising' predictors. For an independent variable to be labelled as 'best' predictor, it must have a weight greater or equal than 0.80 and have been examined at least five times (Jeyaraj et al., 2006). When weight = 1 it indicates that the relationship was significant in all articles. Weight = 0 indicates that the relationship is non-significant in all studies (Jeyaraj et al., 2006). In our case, the relationships that fall into the 'best' predictors for e-participation are: *trust* and *effort expectancy* on *intention to use* with a perfect weight of 1; *perceived usefulness* on *intention to use* and *perceived ease of use* on *perceived usefulness* with weights 0.94 and 0.93 respectively; *perceived usefulness* on *attitude* (0.89), *attitude* and *social influence* on *intention to use* (0.91 and 0.86 respectively); *intention to use* on *use* (0.83); and finally *trust in government* on *intention to use* (0.80). Fig. 3 shows variables of the two most used research models found in our list of articles, TAM and UTAUT, and includes two variables that are not part of those models, but obtained high weight values.

The relationships that fall into the category of 'promising' predictors (Jeyaraj et al., 2006) of e-participation (examined fewer than five times and weight 1 are: *compatibility, perceived behavioural control* and *perceived risk* on *intention to use*, *facilitating conditions* on *use*, *perceived quality on satisfaction*, *trust* on *perceived usefulness*, and *trust in government* on *trust* (in the technological tool).

3.3. Meta-analysis

One of the main reasons to use meta-analysis is the capacity of this quantitative technique to compare size of effect across studies, in this case, across relationships between constructs. It therefore requires a metric to measure those effects (Bowman, 2012). As metrics of effect sizes that can be used we have: correlation coefficient, regression coefficient, and standardized regression coefficient (Cooper, 2010). Furthermore, Bowman (2012), claimed that standarized regression coefficients (β) and correlation coefficients are highly correlated and able to be substituted one for the other in a quantitative meta-analysis. The input required to perform our meta-analysis is the effect size and the sample size of each relationship that has been identified three or more times in the articles.

We use the random effect models of error to calculate the

Table 4
Respondents by country and year (ordered by country name).

Country	Year														Total
	2003	2004	2005	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
Afghanistan									360						360
Australia											290				290
Austria														466	466
Canada										437					437
China										181	409				590
Gambia								167							167
Germany							232		200				477		909
India								360				419			779
Indonesia								751							751
Jordan								197	400	206	948	1970			3721
Macao						385									385
Malaysia						150									150
Netherlands					1225								337		1562
Nigeria														327	327
Pakistan									138				200		338
Romania					481										481
Saudi Arabia								624	400			970			1994
Singapore			121	183	214										518
South Korea									1076		491				1567
Spain									416		307				723
Sweden								422							422
Taiwan					119	525		307		531					1482
Thailand					614										614
United Arab Emirates												845	380		1225
United States	158	136	313	453	861				600						2521
Total by Year	158	136	434	636	3514	1060	232	2828	3590	1355	2445	4204	1394	793	22779

Note: Notes: As an exception, Zuiderwijk et al. (2015) were not accounted for in this table, the respondents (111) of that study were selected in an international conference, and therefore no particular country was reported.

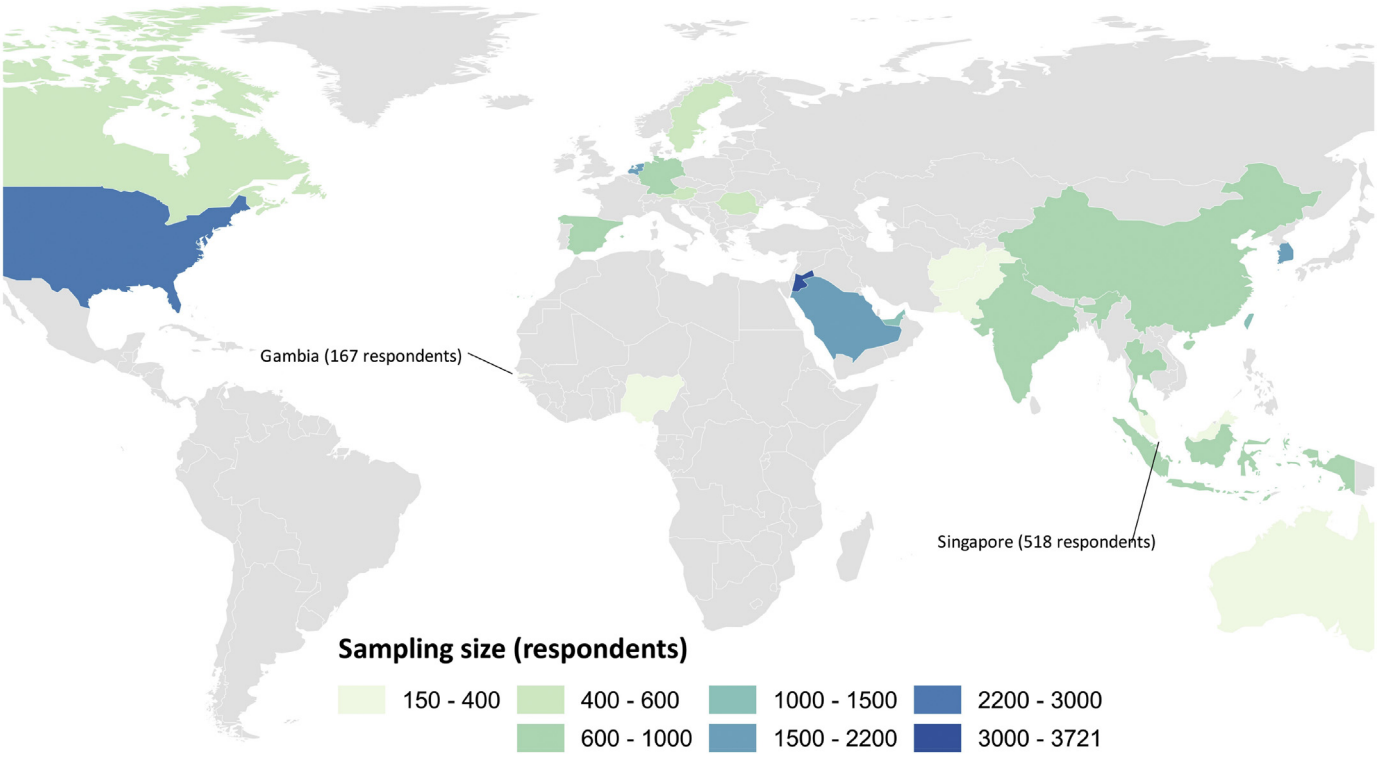

Fig. 2. World distribution of the respondents analysed in the articles considered for this study.

Table 5
Weight analysis results (ordered by Frequency of use).

Independent variable	Dependent variable	Non-significant	Significant	Frequency of use	Weight = Significant/Frequency	TAM/UTAUT
Perceived usefulness	**Intention to use**	**1**	**16**	**17**	**0.94**	**TAM**
Perceived ease of use	**Perceived usefulness**	**1**	**13**	**14**	**0.93**	**TAM**
Perceived ease of use	Intention to use	5	8	13	0.62	TAM derived
Attitude	**Intention to use**	**1**	**10**	**11**	**0.91**	**TAM**
Perceived ease of use	Attitude	2	7	9	0.78	TAM
Perceived usefulness	**Attitude**	**1**	**8**	**9**	**0.89**	**TAM**
Social influence	**Intention to use**	**1**	**6**	**7**	**0.86**	**UTAUT**
Trust	**Intention to use**	**0**	**7**	**7**	**1.00**	
Trust in Internet	Intention to use	2	5	7	0.71	
Subjective norm	Intention to use	2	4	6	0.67	
Image	Intention to use	5	1	6	0.17	
Relative advantage	Intention to use	2	4	6	0.67	
Intention to use	**Use**	**1**	**5**	**6**	**0.83**	**TAM, UTAUT**
Effort expectancy	**Intention to use**	**0**	**5**	**5**	**1.00**	**UTAUT**
Performance expectancy	Intention to use	2	3	5	0.60	UTAUT
Trust in government	**Intention to use**	**1**	**4**	**5**	**0.80**	
Compatibility	Intention to use	0	4	4	1.00	
Facilitating conditions	Use	0	4	4	1.00	UTAUT
Perceived quality	Satisfaction	0	4	4	1.00	
Trust	Perceived usefulness	0	4	4	1.00	
Perceived behavioural control	Intention to use	0	3	3	1.00	
Perceived risk	Intention to use	0	3	3	1.00	
Computer Self-Efficacy	Perceived ease of use	1	2	3	0.67	
Trust in government	Trust (in the technological tool)	0	3	3	1.00	

Note: Variables in bold represent best predictors (weight $\geq$ 0.80 and examined at least five times).

variability in the effect size estimated across studies (Cooper, 2010). As discussed in Cooper (2010), the fixed effect models consider only variation within studies due to sampling of participations. Random effect models take into consideration both the variance within a study and the variance between studies methods. Several meta-analysis articles have adopted the random effect model for their analysis, including for instance: Talò, Mannarini, and Rochira (2014), random effect model was chosen because the studies were heterogeneous from each other; Šumak, Heričko, and Pušnik (2011), conducted on random effect basis, assuming that every population is likely to have a different effect size; King and He (2006), adopted random effect model under the assumption that samples in individual studies are taken from populations that had varying effect sizes; and finally, Dwivedi, Rana, Chen, and Williams (2011), used the random effect model assuming that is more realistic in accordance with the articles they examined. The 24 most

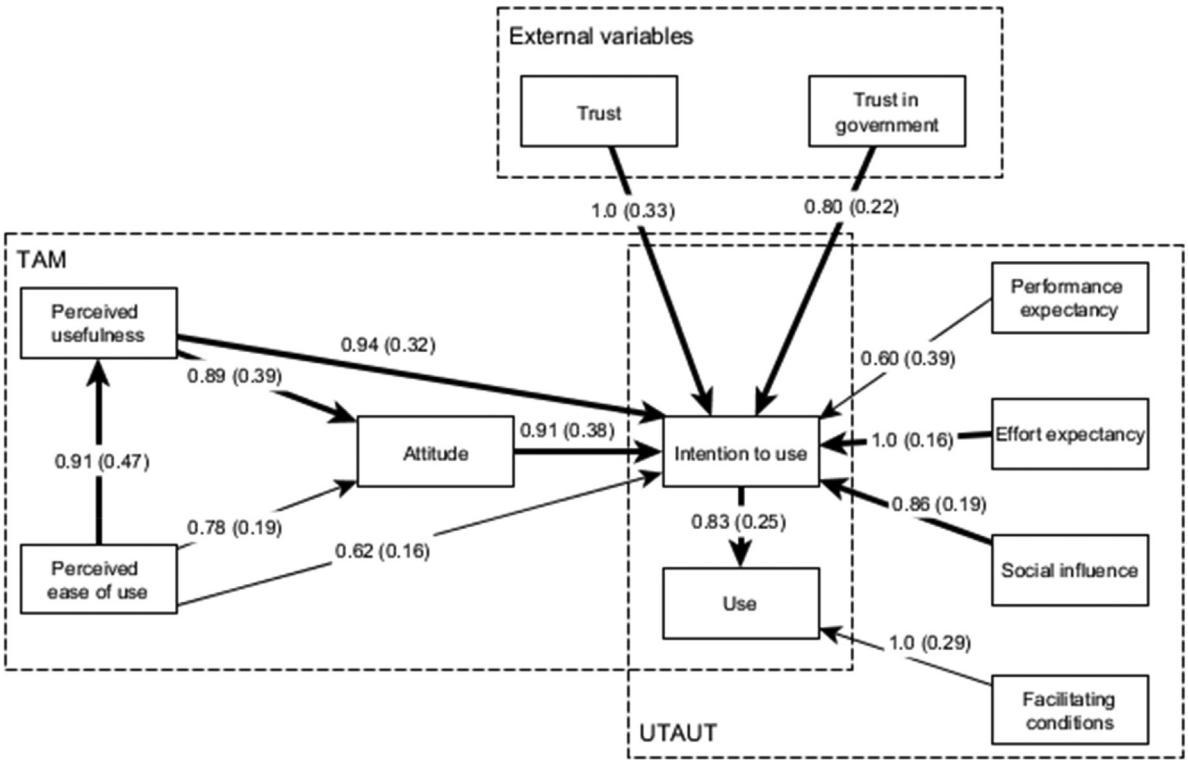

Fig. 3. Resulting model based on TAM and UTAUT. Values represent weights, and the average β-values are in parentheses. Bold arrows represent the 'best' predictors.

often evaluated relationships are shown in Table 6. We used the free tool software Meta-Essentials (Van Rhee, Suurmond, & Hak, 2015) for calculations and graphics. The average of β-values (correlation coefficient between independent and dependent variable) and the total sample size is previously calculated in a spreadsheet and then provided as input for the meta-analytic software.

A forest plot (Hak, van Rhee, & Suurmond, 2016) is the graphical representation of the meta-analysis. Fig. 4 presents the forest plot of the meta-analysis of the set of studies in Table 6. The X-axis represent the effect size (average β), the blue bullets represent the effect size for each individual relationship and the line across the blue dot is the confidence interval for that relationship at 95%. To generate the forest plot, the relationships are arranged from the biggest to the smallest in terms of cumulative sample size. When the confidence interval lines are entirely on the positive side (>0) the relationships are considered statistically significant; when the confidence interval includes zero, the relationship is not statistically significant. The plot shows that all the relationships, but *trust in government* on *trust*, are statistically significant. We also test for heterogeneity in the dataset, which is assessed by the statistic I^2 (Higgins & Thompson, 2002). I^2 indicate the percentage of variance between studies produced by heterogeneity rather than by chance. The results show a high level of heterogeneity for the list of variables in Table 6 ($I^2 = 0.97$).

Following the approach of King and He (2006) and Rana et al. (2015), p-value, standard normal deviations (Z-value), and the upper and lower confidence interval (95%) are calculated. Based on p-value, the effect of the relationship strength was found to be non-significant ($p > .05$) for *perceived risk* (p-value = .27) on *intention to use*. The remaining relationships in the list were found significant. The average β indicates the strength of the influence of the independent variable over the dependent variable; thus, *perceived ease of use* on *perceived usefulness* (0.47), *perceived usefulness* on *attitude* (0.39), *attitude* on *intention use* (0.38), and *perceived usefulness* on *intention to use* (0.32) were found to be the strongest ones. By using all the relationships that have been examined five or more times, we build the resulting model (see Fig. 5). Jeyaraj et al. (2006) suggest that variables that have been tested five or more times can be considered "well-utilized". Variables that have been used less than five times, even though having high values for weight and β, under the same approach, are still considered 'promising' predictors (Jeyaraj et al., 2006).

3.4. Evaluation of publication bias and normality

Publication bias (Borenstein, Hedges, Higgins, & Rothstein, 2009), refers to the higher probability for studies with significant and positive results to get published over the studies that report not statistical significant or negative results. If the articles included in the meta-analysis are a biased sample of the e-participation literature, then it is likely that the results computed by the meta-analysis may reflect this bias. Harrison, Banks, Pollack, O'Boyle, and Short (2017) notes that publication bias can occur for different reasons: (i) researchers may adjust their research models until supportive results are obtained; (ii) researchers may prefer to publish the results that have bigger effect size and statistically significant; and, (iii) reviewers and editors may give priority to studies with statistically significant results over the not statistically significant ones. Following the approach of Harrison et al. (2017), that focusing on a single criterion offers a more sensitive and appropriate test for publication bias, we focus our analysis of the publications bias on one of the most widely examined variables of e-participation, *intention to use*. We derive a dataset from our list of selected articles to perform a publication bias test. The dataset contains the studies that have reported the β values, which are the effect size for the relationship *perceived usefulness* on *intention to use* [independent - dependent variable] (Table 7). This relationship is the most examined in our list of studies (17 times).

Table 6
Meta-analysis results (ordered by frequency).

Independent variable	Dependent variable	Frequency	Average β	∑ sample size	p-value	z-value	Confidence interval (95%) Low - High	
Perceived usefulness	Intention to use	17	0.32	4895	.00	23.33	0.30	0.35
Perceived ease of use	Perceived usefulness	14	0.47	5091	.00	36.37	0.45	0.49
Perceived ease of use	Intention to use	13	0.16	4475	.00	10.81	0.13	0.19
Attitude	Intention to use	10	0.38	3277	.00	22.82	0.35	0.41
Perceived ease of use	Attitude	9	0.19	3057	.00	10.76	0.16	0.23
Perceived usefulness	Attitude	9	0.39	3048	.00	22.90	0.36	0.42
Social influence	Intention to use	7	0.19	2798	.00	10.28	0.16	0.23
Trust	Intention to use	7	0.33	2963	.00	18.44	0.29	0.36
Trust in Internet	Intention to use	7	0.14	2106	.00	6.60	0.10	0.18
Intention to use	Use	6	0.25	2959	.00	14.07	0.22	0.29
Relative advantage	Intention to use	6	0.30	1722	.00	12.94	0.26	0.34
Subjective norm	Intention to use	6	0.28	2003	.00	12.83	0.24	0.32
Image	Intention to use	5	0.07	1350	.00	2.65	0.02	0.13
Effort expectancy	Intention to use	5	0.16	2436	.00	7.98	0.12	0.20
Trust in government	Intention to use	5	0.22	1110	.00	7.39	0.16	0.27
Performance expectancy	Intention to use	4	0.39	1211	.00	14.31	0.34	0.44
Compatibility	Intention to use	4	0.35	1200	.00	12.55	0.30	0.40
Facilitating conditions	Use	4	0.29	1500	.00	11.68	0.25	0.34
Perceived quality	Satisfaction	4	0.39	1014	.00	13.21	0.34	0.44
Trust	Perceived usefulness	4	0.36	1834	.00	15.88	0.31	0.39
Computer Self-Efficacy	Perceived ease of use	3	0.23	2312	.00	11.10	0.19	0.27
Perceived behavioural control	Intention to use	3	0.22	631	.00	5.54	0.14	0.29
Perceived risk	Intention to use	3	0.03	463	.27	0.60	−0.06	0.12
Trust in government	Trust (technological tool)	3	0.30	1743	.00	12.83	0.25	0.34

No	Independent-dependent variable		Average (β)	∑ sample size
1	Perceived ease of use	Perceived usefulness	0.47	5091
2	Perceived usefulness	Intention to use	0.32	4895
3	Perceived ease of use	Intention to use	0.16	4475
4	Attitude	Intention to use	0.38	3277
5	Perceived ease of use	Attitude	0.19	3057
6	Perceived usefulness	Attitude	0.39	3048
7	Trust	Intention to use	0.33	2963
8	Intention to use	Use	0.25	2959
9	Social influence	Intention to use	0.19	2798
10	Effort expectancy	Intention to use	0.16	2436
11	Computer Self-Efficacy	Perceived ease of use	0.23	2312
12	Trust in Internet	Intention to use	0.14	2106
13	Subjective norm	Intention to use	0.28	2003
14	Trust	Perceived usefulness	0.36	1834
15	Trust in government	Trust (technological tool)	0.30	1743
16	Relative advantage	Intention to use	0.30	1722
17	Facilitating conditions	Use	0.29	1500
18	Image	Intention to use	0.07	1350
19	Performance expectancy	Intention to use	0.39	1211
20	Compatibility	Intention to use	0.35	1200
21	Trust in government	Intention to use	0.22	1110
22	Perceived quality	Satisfaction	0.39	1014
23	Perceived behavioural control	Intention to use	0.22	631
24	Perceived risk	Intention to use	0.03	463

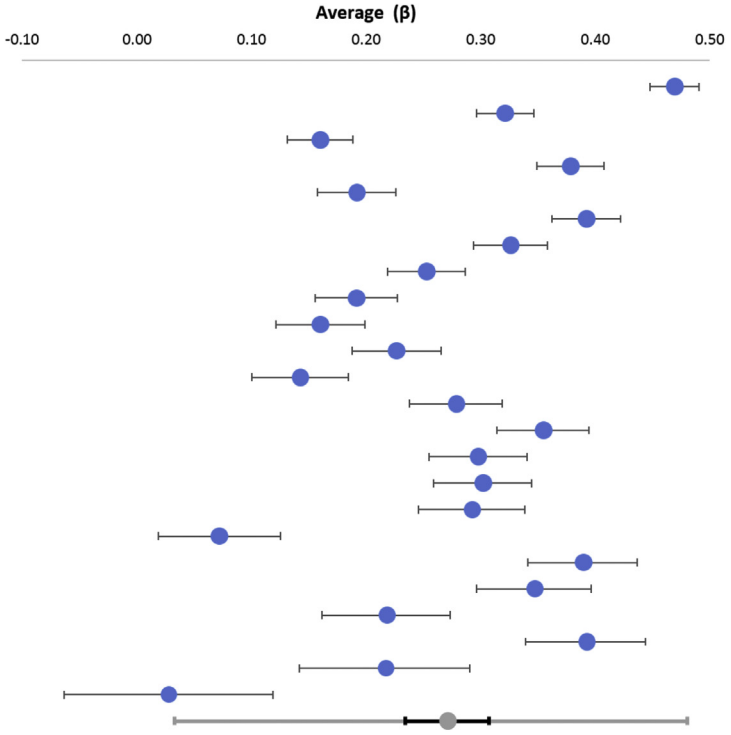

Fig. 4. Forrest plot of Table 6 (Meta-analysis). Ordered by ∑ sample size descending.

The funnel plot (Torgerson, 2006), is a graphical method commonly used to detect publication bias. As explained in Sterne et al. (2011), the plot will be similar to a symmetrical and inverted funnel if there is no bias and between-study heterogeneity. The asymmetry in the funnel plot, which can be caused by the missing studies, may indicate publication bias. We follow the suggestion of Borenstein et al. (2009), that the use of the standard error in the Y axis instead of the traditional sample size makes the identification of asymmetry easier. Torgerson (2006) cautions that the asymmetry in the funnel plot should be considered just 'suggestive' of publication bias. Sterne, Gavaghan, and Egger (2000) describe three other possible reasons for asymmetry in the funnel plot: (i) true heterogeneity, (ii) data irregularities, and (iii) chance. Publication bias is evaluated assuming a random effect model with a 95% confidence level. Random effect model (Cooper, 2010) considers the variance within study and the variance between studies methods.

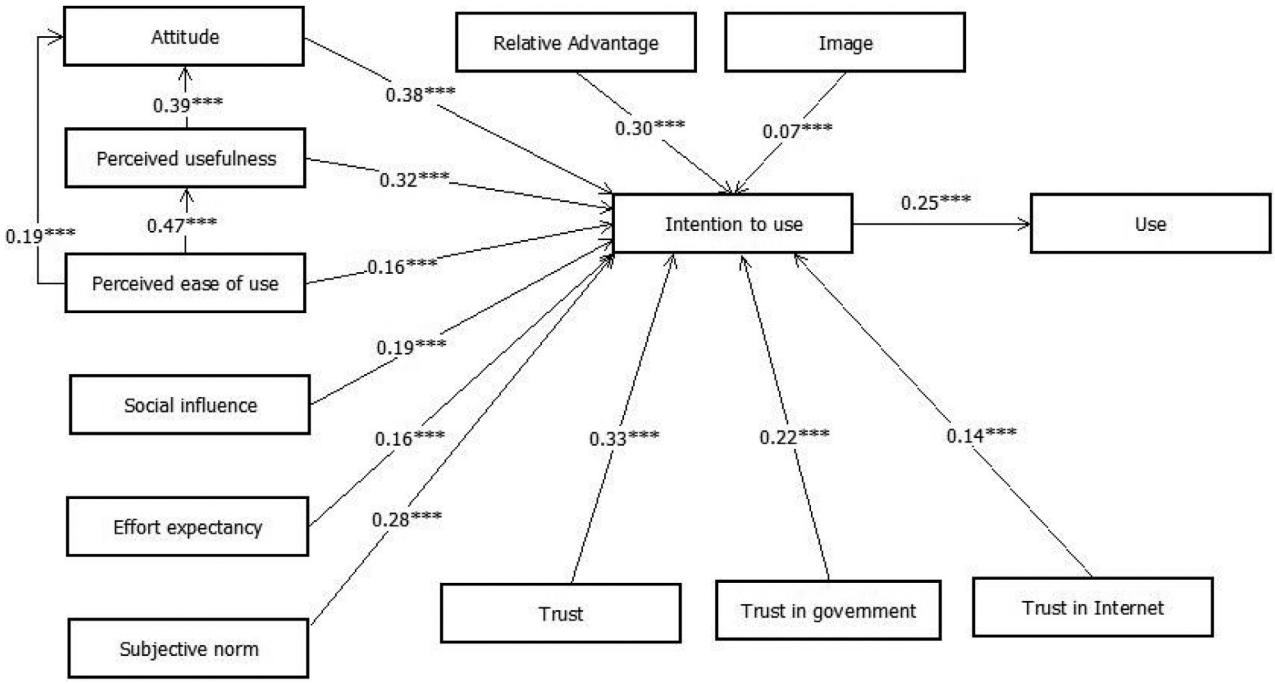

Fig. 5. Model resulting from meta-analysis. Notes: Numerical values represent the average β; ***p < .05.

Table 7
List of 17 articles that examined the relationship [perceived usefulness - intention to use] (ordered by year).

Study	Beta(β)	Sample size	Correlation (z)	Standard error (z)	Confidence interval (95%) Low - High		Subgroup
Lee et al. (2003)	0.360	158	0.38	0.08	0.21	0.49	Year 2003–2011
Carter and Bélanger (2004)	0.192	136	0.19	0.09	0.02	0.35	
Schaupp and Carter (2005)	0.357	208	0.37	0.07	0.23	0.47	
Tang et al. (2009)	0.069	385	0.07	0.05	−0.03	0.17	
Lean et al. (2009)	0.580	150	0.66	0.08	0.46	0.68	
Lin et al. (2011)	0.210	167	0.21	0.08	0.06	0.35	
Shyu and Huang (2011)	0.405	307	0.43	0.06	0.31	0.49	
Al-Hujran et al. (2011)	0.236	197	0.24	0.07	0.10	0.36	
Belanche et al. (2012)	0.356	416	0.37	0.05	0.27	0.44	Year 2012–2017
Winkler et al. (2012)	0.290	200	0.30	0.07	0.16	0.41	
Rehman et al. (2012)	0.105	138	0.11	0.09	−0.06	0.27	
Choi and Kim (2012)	0.360	228	0.38	0.07	0.24	0.47	
Wang and Lo (2012)	0.360	200	0.38	0.07	0.23	0.48	
Aloudat et al. (2014)	0.444	290	0.48	0.06	0.35	0.53	
Abu-Shanab (2014)	0.428	759	0.46	0.04	0.37	0.48	
Dahi and Ezziane (2015)	0.549	845	0.62	0.03	0.50	0.59	
Seo and Bernsen (2016)	0.169	111	0.17	0.10	−0.02	0.35	

The funnel plot (Fig. 6), heterogeneity (I^2), and the Egger regression (Egger, Smith, Schneider, & Minder, 1997) (Table 8) to assess for asymmetry are calculated using a free tool software, *Meta-Essentials* (Van Rhee et al., 2015).

Heterogeneity is assessed by the statistic I^2 (Higgins & Thompson, 2002). The results show a high level of heterogeneity (87.91%) in the data set of studies. Even though having a high level of heterogeneity may not produce a funnel shape in the plot (Terrin, Schmid, & Lau, 2005), Sterne et al. (2011) suggest that the "funnel plot will be symmetrical but with additional horizontal scatter". To provide a more accurate assessment of the asymmetry, rather than the visual evaluation of the funnel plot, Egger regression is also presented in the results, which resulted not significant for asymmetry (p-value = .10). In summary, there is no evidence to suggest that there is a publication bias in the selected data set of e-participation adoption studies. Nevertheless, there is a high level of heterogeneity. High level of heterogeneity in our study coincides with studies like Harrison et al. (2017), that evaluated a set of meta-analysis articles in the field of strategic management research, and I^2 was found above 60% for most of the meta-analysis studies.

Given the high level of heterogeneity of the dataset (Table 7), we perform a subgroup analysis to examine if the level of heterogeneity decreases, the first group are the studies from 2003 to 2011 (8 articles) and the second group are the studies from 2012 to 2017 (9 articles). Results of the subgroup analysis are shown in Table 9, heterogeneity I^2 remains very high (0.86) for each of the subgroups.

The forest plot of the 17 articles that examined the relationship *perceived usefulness* on *intention to use* is presented in Fig. 7. The plot shows three not significant studies in the meta-analysis of this dataset (studies No. 1, 15, and 17). We can notice a small drift to the

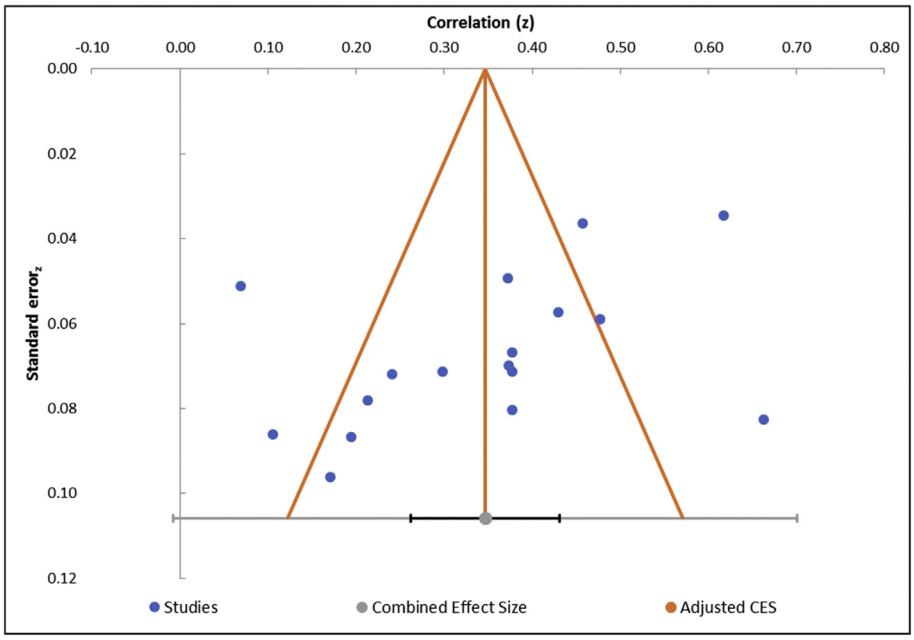

Fig. 6. Funnel plot of studies that examined [perceived usefulness - intention to use]. Note: Between sample heterogeneity $I^2 = 87.91\%$. CES = Combined effect size.

Table 8
Egger Regression for asymmetry.

	Estimate	SE	CI LL	CI UL
Intercept	−10.64	6.01	−23.39	2.10
Slope	2.22	1.06	−0.03	4.47

Note: *t*-test = −1.77; p-value = .10. SE=Standard error. CI LL = Confidence interval lower level. CI UL=Confidence interval upper level.

left when the studies of smaller sample size are added. The drift can be an indicator of publication bias (Harrison et al., 2017) produced by the inclusion of studies with small sample size.

This study uses the random effect model for the meta-analysis. Nevertheless, Chen, Zhang, and Li (2015) caution that the selected model may result in misleading results if the model does not fit the data. They suggest that "normality tests can be used to check the goodness-of-fit for random model". The normal quantile plot (M. C. Wang & Bushman, 1998), also known as the Q-Q plot, has been proven to be useful in checking normality in meta-analytic datasets. The normal quantile plot is used to evaluate normality on the dataset of studies that examined the relationship between perceived usefulness and intention to use e-participation. All data points fall approximately on a straight line (Slope = 1), which suggests that the data follow a standard normal distribution (see Fig. 8).

4. Discussion

A substantial variety of theories, theoretical models, and constructs were evaluated in the 60 articles considered in our paper. This led to a respectable number of 483 relationships [independent-dependent variable] and provides a comprehensive picture of all variables analysed in e-participation adoption research in the last 17 years, which may lay the foundations for future research (Webster & Watson, 2002). The analysis of the correlations in those 483 relationships through weight analysis revealed the 'best' and 'promising' predictors (Jeyaraj et al., 2006) in the analysis of e-participation. Meta-analysis complemented these findings by providing the significance level, the level of heterogeneity I^2 of the dataset, and an analysis of publication bias using the forest plot and funnel plot.

Table 9
Subgroup analysis of studies that examined [perceived usefulness - intention to use].

Subgroup name	Correlation	CI Lower limit	CI Upper limit	I^2
Studies year 2003–2011	0.31	0.16	0.44	0.86
Studies year 2012–2017	0.36	0.25	0.46	0.86

'Best' predictors include *perceived usefulness, attitude, social influence, trust, effort expectancy,* and *trust in government* on *intention to use, perceived ease of use* on *perceived usefulness*, *perceived usefulness* on *attitude*, and *intention to use* on *use*. All those relationships identified as best predictors in the weight analysis were also found to be statistically significant in the meta-analysis, coinciding with the claim of Baptista and Oliveira (2016) and Rana et al. (2015) about the predictors, that is, the higher its weight, the higher the probability that it achieves significance in the meta-analysis. All of these predictors, except *trust* and *trust in government*, are part of either TAM (Davis, 1989) and UTAUT (Venkatesh et al., 2003). *Trust* on *intention to use* (weight 1) was also identified as a strong predictor in other contexts: Mobile banking (Baptista & Oliveira, 2016), e-government (Rana et al., 2015), mobile commerce (Zhang, Zhu, & Liu, 2012), social network services (Shin, 2010), and health informatics services (Shin, Lee, & Hwang, 2017). The importance of *trust* for e-participation was also highlighted by Panopoulou, Tambouris, and Tarabanis (2014), as one of the success factors for e-participation. Building trust is a challenging matter, however. The increase of citizen's trust can lead to satisfaction and continuance intention to use over time (Shin et al., 2017).

Relationships in the weight analysis that were examined three or four times and obtained weight = 1 are considered 'promising' predictors (Jeyaraj et al., 2006): *compatibility, perceived behavioural control,* and *perceived risk* on *intention to use*, *facilitating conditions* on *use*, *perceived quality* on *satisfaction, trust* on *perceived usefulness*, and *trust in government* on *trust.* The promising predictors need further analysis before being considered as best predictors (Jeyaraj

No	Study name	Beta (β)	Sample size
1	Dahi & Ezziane (2015)	0.55	845
2	Abu-Shanab (2014)	0.43	759
3	Belanche et al. (2012)	0.36	416
4	Tang et al. (2009)	0.07	385
5	Shyu & Huang (2011)	0.41	307
6	Aloudat el al. (2014)	0.44	290
7	Choi & Kim (2012)	0.36	228
8	Schaupp & Carter (2005)	0.36	208
9	Winkler et al. (2012)	0.29	200
10	Wang & Lo (2012)	0.36	200
11	Al-Hujran et al. (2011)	0.24	197
12	Lin et al. (2011)	0.21	167
13	Lee et al. (2003)	0.36	158
14	Lean el al. (2009)	0.58	150
15	Rehman et al. (2012)	0.11	138
16	Carter & Bélanger (2004)	0.19	136
17	Seo & Bernsen (2016)	0.17	111

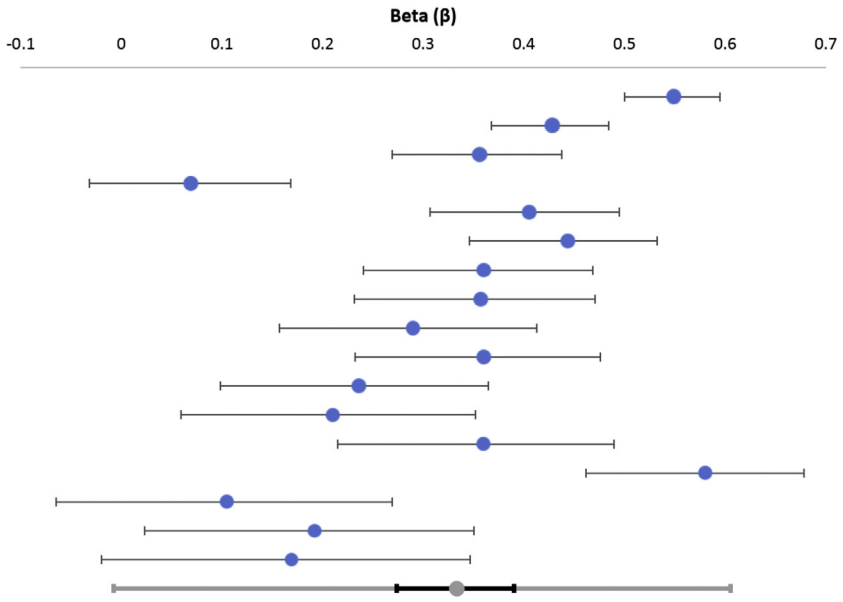

Fig. 7. Forest plot of the 17 articles that examined [perceived usefulness - intention to use]. Ordered by sample size descending.

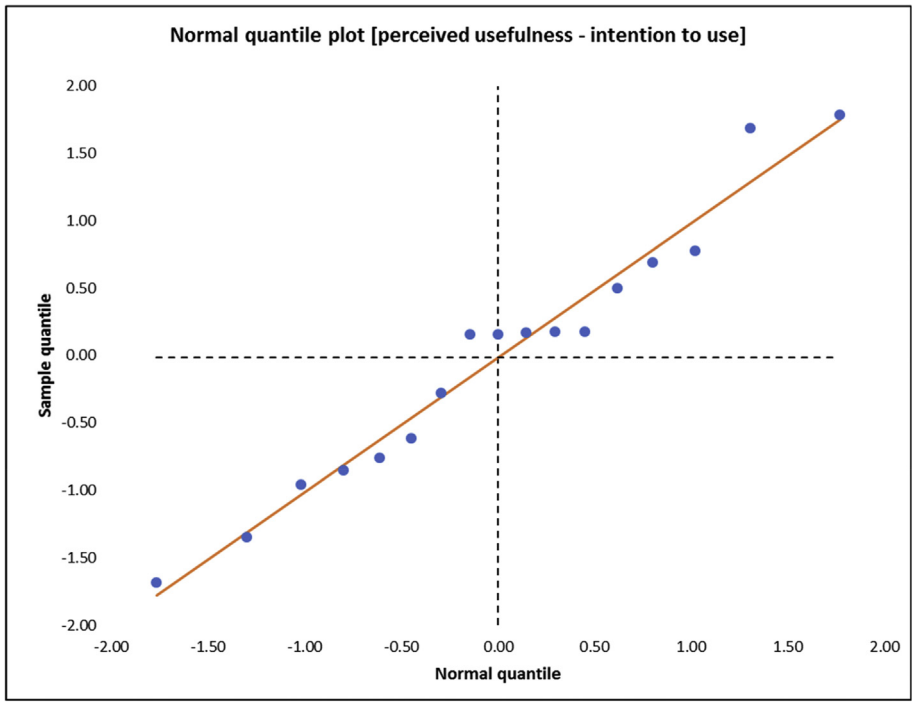

Fig. 8. Normal quantile plot for the studies that examine [perceived usefulness - intention to use].

et al., 2006). However, results in meta-analysis and low value of average β for *perceived risk* on *intention to use* suggest that *perceived risk* is a weak predictor of e-participation adoption. An interesting relationship from the set of promising predictors is *trust in government* as predictor *trust* on the e-participation system, that showed satisfactory results in terms of weight, significance and average β. This finding may suggest that when the citizens have a higher level of trust in their governments, are also more willing to trust, and indeed use, the e-participation systems available from that government.

Publication bias (Borenstein et al., 2009) was not conclusive by the analysis of the funnel plot (Fig. 6) because the high level of heterogeneity ($I^2 = 0.879$) in the dataset (Table 7). As suggested by Hak et al. (2016), when exist a high level of heterogeneity, results in the funnel plot are not very clear for interpretation. The high level of heterogeneity can be due to the use of different research models, different variables, different populations, and different study protocols to evaluate e-participation adoption. We also used a second approach to test for publication bias, the forest plot (Fig. 7) of the 17 studies that analysed the relationship [perceived usefulness – intention to use]. In the forest plot we can observe a slight drift toward the left when studies with smaller sample are added to the list, which may indicate a publication bias (Harrison et al., 2017). However, we consider that there is not enough evidence to

conclude that there is publication bias in the set of studies. As suggested by Harrison et al. (2017) in the context of management research, at least a sample of 20 studies should be analysed to obtain clear results about the publication bias. In other scientific fields, as the medicine, publication bias can be assessed with smaller datasets of studies, as few as 10 studies (Sterne et al., 2011). In the case of e-participation research would be more appropriate to evaluate a sample of at least 20 studies that analyse the same variable.

Research on e-participation adoption has used TAM, UTAUT, combinations of TAM and UTAUT with other theories, and self-developed research models (see Table 2). Therefore, it is not a surprise that the most frequently evaluated constructs across the studies also belong to TAM and UTAUT, or are adapted from them. Although, not all constructs from these well-known theories resulted always significant or demonstrated to be strong predictors of e-participation (see Fig. 3). This is the case of *perceived ease of use* on *attitude* (TAM), and *perceived ease of use* on *intention to use* (adaptation of TAM), which did not show a good performance in weight analysis and obtained low average β values (0.19 and 0.16 respectively). On the other side, *perceived ease of use* has the strongest average β (0.47) on *perceived usefulness*, which in turn is a strong predictor of *attitude* and *intention to use*. The explanation for these seemingly opposite results may be due to the fact that the solely perception that the e-participation system is easy to use is not enough motivation to trigger the intention to use the system in the citizen. Maybe there are other factors inherent to the participation itself -and not to the technological tool-that can produce stronger motivation in the citizen to use e-participation, for instance, trust in the public institutions, sense of community (Talò et al., 2014), or the perception of the citizen that is truly making a contribution to a given community by using e-participation (empowerment). *Perceived usefulness* may encompass, at least partially, those above-mentioned factors, thus demonstrating to be a strong motivator for *intention to use* and *attitude*.

Interestingly, *effort expectancy* on *intention to use*, a relationship of the UTAUT model (Venkatesh et al., 2003) that was originally derived from *perceived ease of use* from TAM (Davis, 1989), has been found significant and examined five times in the studies. Due to the low number of times that *perceived ease of use* has been examined in the articles, there is not enough evidence to claim that *effort expectancy* performs better than its predecessor *perceived ease of use* in the study of e-participation adoption.

Other relationships evaluated five or more times were found to be significant in the meta-analysis, but obtained a weight slightly below 0.80. This is the case for *perceived ease of use* on *attitude* (weight = 0.78), *relative advantage* on *intention to use* (weight = 0.67), and *trust in Internet* on *intention to use* (weight = 0.67). For those variables, further research is needed to assess the impact in the prediction of e-participation adoption. Variables such as *performance expectancy* (weight = 0.60), *perceived ease of use* (weight = 0.62) and *image* (weight = 0.17) on *intention to use* ranked considerably lower from the threshold of 0.80. Even though they show statistical significance in the meta-analysis, their low weight values may discourage their continued use in future studies.

5. Implications

5.1. Implications for theory

First, the synthesis of cumulative influence of an independent variable on a dependent variable in the form of weight analysis, and the evaluation of significance in the meta-analysis, allowed us to derive a model of best predictors of *intention to use* and actual *use* of e-participation. Results presented in this paper confirm the high performance of all TAM and UTAUT constructs for research on e-participation adoption, except for *perceived ease of use* on *intention to use*, which resulted in low performance. *Trust* and *trust in government,* without being part of UTAUT or TAM, are also part of the best predictors of *intention to use* e-participation. These findings suggest continuing the use of *trust* and *trust in government* on *intention to use* in future research of e-participation adoption.

Second, weight and meta-analysis provide the performance of a wide-ranging view of the relationships [independent-dependent variable] used in models to study e-participation adoption at individual level, consequently allowing researchers to identify trends, and highlighting issues in the use of some constructs. For instance, even though *perceived ease of use* and *image* were found to be significant and frequently used in literature, their weight is noticeably low. Researchers can use the findings of this study as a starting point for a more accurate and effective selection of constructs in the analysis of e-participation adoption, providing additional criteria whether to include or not a variable in the research model. For example, on one hand, variables that showed high frequency of use, low weight, and non-significance, may be excluded from further use; on the other hand, promising predictors require further analysis to become best predictors, and their continued use may therefore be appropriate.

5.2. Implications for practice

Findings in this study raise important implications for governments and institutions aiming to implement e-participation platforms. *Perceived usefulness, attitude, social influence*, *trust,* and *effort expectancy* on *intention to use* e-participation technologies resulted strong predictors in the weight analysis. The meta-analysis confirms the significance. This suggest that governments should put special attention on strategies that help to preserve positive attitude, the perception that the platform is useful, and trust of citizens in the long-term. The implementation of e-participation should not only lie on the use of cutting edge technology and innovative interface design, solid back office processes are also recommended for e-participation platforms. For instance, when users give opinions on forums or vote electronically, feedback should be provided in a reasonable timeframe; this may contribute to improve the perception of usefulness and preserve trust of citizens.

The high weight value of *perceived usefulness* on *intention to use,* but low weight value of *perceived ease of use* on *intention to use* may suggest that citizens do not really find difficulties in the use of e-participation, rather, citizens probably are more focused on the contributions that they can make to a given community through e-participation, for instance, submitting a project proposal to a government agency or giving an electronic vote for a project to be implemented. The action to vote electronically, for instance, by SMS message may not be a technical challenge for citizens (*perceived ease of use*), but is the final impact of the given vote (*perceived usefulness*) that really motivates the *intention to use* e-participation. This implies that governments that implement e-participation systems should make sure that the citizens have a clear understanding about the impact of using e-participation to contribute for the community.

Due to voluntary nature of e-participation, ease and simplicity for general public users is strongly advised to promote the diffusion of this technological platform amongst the citizens. Even though, implementation and promotion of e-participation can lead to a better governance in the long term, Andersen, Henriksen, Secher, and Medaglia (2007) highlight the importance for public agencies to be aware of the significant administrative costs to support e-participation. Furthermore, citizen participation involves a sense of

community (Chavis & Wandersman, 1990), thus *social influence* resulted an important predictor of the intention to use e-participation. This suggest that governments should actively promote and socialize its e-participation tools among the citizens.

6. Conclusions

We carried out a weight and meta-analysis of the constructs utilized in the evaluation of theoretical models of e-participation adoption amongst 60 articles published in the last 17 years. This study presents an extensive vision of the predictors and their cumulative synthesis through weight and meta-analysis, serving as the foundation for future research and providing additional criteria for researchers to accurately select the constructs to be included in research models to analyse e-participation adoption. The article identifies 'best' and 'promising' predictors (Jeyaraj et al., 2006) of e-participation adoption. The constructs: *perceived usefulness, attitude, social influence, trust, effort expectancy,* and *trust in government* on *intention to use*; *perceived ease of use* on *perceived usefulness*; *perceived usefulness* on *attitude*; and *intention to use* on *use* are considered the best predictors. This suggests that public agencies, authorities, and governments that plan to implement e-participation platforms should endeavour to preserve the positive attitude, perception of usefulness, and trust of citizens in the long-term participative processes. Moreover, best predictors achieved statistically significant results in most of the studies in which they were used, and therefore represent a safe side for future research in e-participation intention to use and use. The constructs identified as 'promising' predictors: *compatibility* and *perceived behavioural control* on *intention to use*, *facilitating conditions* on *use*, *perceived quality* on *satisfaction*, *trust* on *perceived usefulness*, and *trust in government* on *trust* (in the technological tool), reached a perfect weight of 1, however, due to low frequency of usage in research models, still more research is needed for the promising predictors may be considered 'best' predictors.

7. Limitations and future research

The 60 articles used for the weight and meta-analysis in this study are a small portion of the existing literature on e-participation adoption. There are two main factors in the literature search that limit the results: (i) The language of the articles is limited to English, which excludes all the significant research conducted in other languages; and (ii) as for the calculations, the beta coefficients and sample size are needed, the type of selected articles was of quantitative type, excluding all the qualitative articles that are the majority retrieved from the database search. Due to the relatively limited sample size, conclusions regarding the trends and patterns should be interpreted with caution.

Since most of the studies did not report the items used in their surveys, it is not possible to fully identify whether a construct is already used in other articles. Hence, the merging process has its limitations. Not all variables with similar names, apparently standing for analogous meanings, could be merged due to the lack of details in the articles that allow us to determine their equivalence (see Appendix). For instance, *trust*, in some articles is not entirely clear whether it refers to the technological tool, to the authorities, or to the whole process.

More than the half of the articles analysed do not describe the technologies evaluated in sufficient detail, nor their specific interaction with citizens. For example, of the 60 studies, 25 described them only as online services and seven described them as web portals. Lack of detailed description prevents us from deepening the research of more tailored adoption models for different levels of e-participation. The use of moderator variables (e.g., cultural dimensions or demographics, and second-order constructs) was scarce in the quantitative articles. As a result, moderator analysis and second-order constructs analysis were not incorporated in this study.

Hoftede, Hofstede, and Minkov (2010) have stated that culture is for humans what software is for computers. Culture varies from country to country. The inclusion of new or barely explored variables such as cultural dimensions in primary studies is suggested for future research on e-participation adoption. We note that e-participation has several levels of citizen involvement, from simply being informed to expressing opinion and voting. Therefore, a comparative meta-analysis between incremental levels of e-participation is recommended. This may provide interesting insights about whether the factors that influence e-participation have the same impact across the different levels.

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Appendix. Merging of variable names.

Study	Orignal Variable Name	Merged/Modified Variable Name
Van Dijk et al., 2008	Attitude towards use	Attitude
Chiang, 2009	Attitude towards using e-voting system	
Lin et al., 2011	Attitude Towards Using	
Oni et al. (2017)	Attitude towards e-democracy	
Wangpipatwong et al., 2008	Continuance Intention	Intention to continue using
Tan et al., 2008	Continuance usage intentions	
Piehler, Wirtz, & Daiser, 2016	Continuance Intention	
Yang et al., 2007	Intention towards Participation	Intention to participate
Yao & Murphy, 2007	Participation Intention	
Tang et al., 2009	Intention of usage	Intention to use
Persaud & Persaud, 2013	Usage intentions e-government	

(*continued*)

Study	Orignal Variable Name	Merged/Modified Variable Name
Alrashedi et al., 2015	e-Participation Intention	
Choi & Kim, 2012	User Intention	
JK Lee et al., 2003	Intention to use online function	
Y. Wang & Shih, 2009	Behavioural Intention	
Kollmann & Kayser, 2010		
Shyu & Huang, 2011		
Al-Sobhi et al., 2011		
Zuiderwijk et al., 2015		
Rana & Dwivedi, 2015		
Lin et al., 2011	Behaviour Intention	
Rehman et al. (2012)	Intention to adopt	
Rabaa'i (2015)		
Seo and Bernsen (2016)		
Oni et al. (2017)	Perceived e-democracy outcome	Perceived outcome
Yao & Murphy, 2007	Ease of use	Perceived ease of use
Chiang, 2009		
Rokhman, 2011		
Choi & Kim, 2012		
Al-Quraan & Abu-Shanab, 2015		
Lin et al., 2011	Information System Quality [a]	Perceived quality
Y. Wang & Liao, 2008	System Quality [a]	
Teo et al., 2009		
Cai Shuqin et al., 2016	Quality of E-services [a]	
Alshehri et al., 2012	Website Quality [a]	
Choi & Kim, 2012	Usefulness	Perceived usefulness
JK Lee et al., 2003	Perceived Usefulness of e-Government services	
Mou et al., 2013	Political Internal efficacy	Political efficacy
Y. Wang & Liao, 2008	User Satisfaction	Satisfaction
Jooho Lee & Kim, 2012	Satisfaction with e-participation applications	
Cai Shuqin et al., 2016	Citizen's Satisfaction	
Teo et al., 2009	User Satisfaction	
Colesca & Dobrica, 2008	Perceived Trust	Trust
Alharbi et al., 2015	Trust in E-Participation	
Tan et al., 2008	Consumer Trust	
Teo et al., 2009	Trust in E-Government Web Site	
Chiang, 2009	Trust in e-voting system	
Abu-Shanab, 2014	Trust in E-Government	
Bélanger & Carter, 2008	Trust of the Government	Trust in government
JK Lee et al., 2003	Trust in the Government	
L Carter & Bélanger, 2004	Trust of Government	
Rehman et al., 2012	Trust in the government	
Piehler, Wirtz, & Daiser, 2016	Trust in the Local Administration	
L Carter & Bélanger, 2004	Trust of Internet	Trust in Internet
Bélanger & Carter, 2008	Trust of the Internet	
Lemuria Carter & Bélanger, 2012	Internet Trust	
Styvén & Wallström, 2011	Trust in the internet	
Rehman et al., 2012		
Piehler, Wirtz, & Daiser, 2016		
Al-Sobhi et al., 2011	Trust of the Internet	
Mou et al., 2013	Internet Trust	
Oni et al. (2017)	Technological skill	Usage skill
Carter and Bélanger (2012)	E-service usage skills	
Van Dijk et al., 2008	Actual use	Use
Kollmann & Kayser, 2010	Use Behaviour	
Y. Wang & Shih, 2009		
Alshehri et al., 2012		
Al-Sobhi et al., 2011		
Mou et al., 2013	Online Forum Use	
Shyu & Huang, 2011	Actual usage	
Oni et al. (2017)		
Schmidthuber et al. (2017)	Platform activity	

[a] All these constructs are derivations from system quality construct from DeLone and McLean model (DeLone & McLean, 1992, 2003), except website quality, which according to its author, includes multiple dimensions of that model.

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