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Michael Fanta, Radek Soběhart

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Applications for citizen e-participation and communication in the Czech Republic – current supply and content analysis of mobile apps

Michael Fanta* and Radek Soběhart

Jan Evangelista Purkyně University in Ústí nad Labem,
Pasteurova 1, 400 96 Ústí nad Labem, Czech Republic
Email: michael.fanta@ujep.cz
Email: radek.sobehart@ujep.cz
*Corresponding author

Abstract: The level of e-participation in the Czech Republic is below EU average in a long term. In order to expand the research on this topic, we created an overview of the municipal mobile apps that are being used in the Czech Republic, analysed their functions, and performed a pilot evaluation. Overall, 84 mobile apps from Google Play Store and Apple Appstore were sorted into 15 types and divided into the two main groups according to their design: 1) universally designed products that municipalities can use for an appropriate monthly flat fee which depends/varies based on its selected functions; 2) custom designed products according to the requirements of the municipalities' management. We conducted a content analysis of the applications and identified their offered functions. Via a pilot evaluation we discovered that the universally designed apps scored significantly higher in four out of the five evaluated criteria than the custom designed apps.

Keywords: e-participation; communication; citizen; municipality; mobile application; content analysis; evaluation; Czech Republic.

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Biographical notes: Michael Fanta graduated from the Faculty of Economics and Faculty of Business Administration of the University of Economics in Prague. He continues with academic activities within his Doctoral degree program in Economic Policy and Administration at the University of Jan Evangelista Purkyně. He focuses mainly on economic analysis, research of unintended impacts of regulation and regulation of alcohol consumption.

Radek Soběhart focuses on political and economic analyses and on project management. He studied political studies and history and in his Doctoral studies, his specialised on general history at the Faculty of Arts at the Charles University. As part of his studies, he spent one and then several semesters at German universities (Berlin, Heidelberg, Bayreuth). As a scientific assistant, he worked at the Faculty of Economics at the University of Economics, Prague and at the Metropolitan University Prague. Currently, he teaches at the Faculty of Social and Economic Studies UJEP in Ústí nad Labem.

1 Introduction

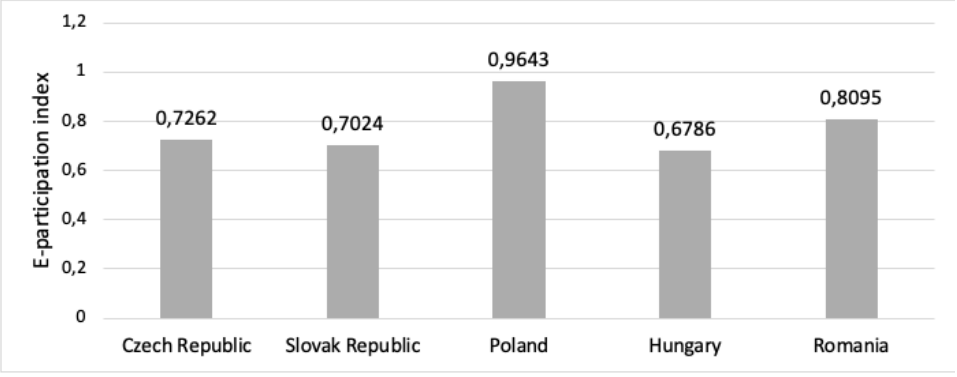
Information and communication technologies (ICTs) are essential for access of information and opportunity to participate in social and political life (Snellen, 2001; Shirazi et al., 2010; Albino et al., 2015; Meijer and Rodriguez Bolívar, 2016). Thus, very fast and dynamic development of ICTs is essential for modern society. Involving the population into the public decision-making processes through internet access (e-participation) has a great potential with numerous social benefits (Wirtz et al., 2018; Zheng, 2017; Drapalova and Wegrich, 2020).

Through the internet access a wide range of citizens can express their own opinion without necessity to join any civic association or other institution of a similar nature. Individual opinions and preferences of the population are a valuable input for decision-making at the national and local administrative level (Loukis et al., 2010, Anduiza et al., 2010; Meijer et al., 2012; Roudríguez Bolívar, 2019). Furthermore, sharing and providing information is an essential aspect of e-participation since information is seen as a prerequisite for participation (Sæbø et al., 2008; Meijer, 2015). The real challenge of the e-participation concept is not just to collect information and opinions from citizens, but also to set up and design the online platform correctly, implement the system, effectively evaluate the data collected, and last but not least, give a feedback to participants (OECD, 2003).

However, despite the wide availability of internet access, the level of e-participation in the Czech Republic is relatively low. Composite indicators designed by international organisations such as United Nations or World Bank shows the level of e-participation below European average for most of the post-communist countries (Figure 1). In the 2020 United Nations e-participation index assessment which evaluates 193 countries from all over the world on yearly basis, the Czech Republic ranked 65th place with the index value of 0.7262. Poland became a regional leader with the index value of 0.9643 which puts Poland on 9th place (United Nations, 2020).

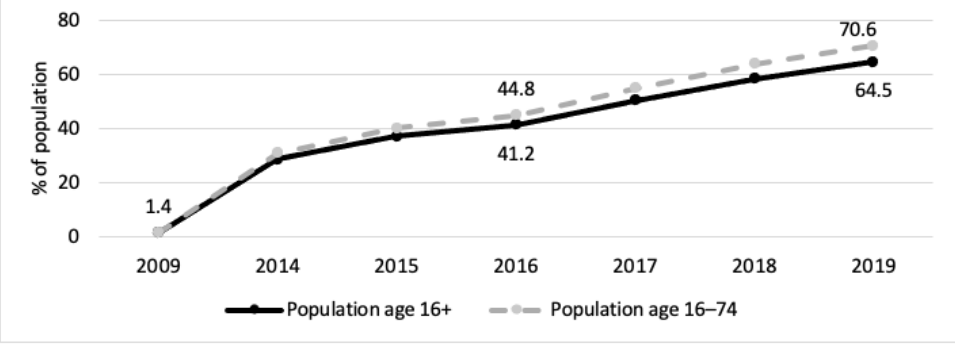
The Czech Republic is administratively very fragmented with more than 6,200 administrative autonomous towns and cities and 10.7 million inhabitants (Czech Statistical Office, 2019). According to current research, practical implementation of e-participation is still very challenging and inclinable to failure due to relatively high risk of low adoption rates among citizens (Omar et al., 2017; Kersting, 2016). As one of our research results shows, the same obstacle applies to Czech municipalities with implementation of participatory and communication mobile applications, even despite the fact, that share of Czech population using internet access on mobile phones has grown significantly during the last decade. As Figure 2 shows, share of 70.6 % of Czech population (age group 16–74) were somehow using internet access on their mobile phones in 2019 on a regular basis and number of mobile internet users is still growing (Czech Statistical Office, 2019). This development creates a fairly broad user base for supply of mobile applications and thus also opportunity to involve citizens of towns and cities into public life through internet access in their smartphones.

Figure 1 Value of e-participation index in selected post-communist countries in 2020



Source: UN E-Government Knowledgebase (2020)

Figure 2 Individuals using internet on mobile phones in the Czech Republic



Source: Czech Statistical Office (2019)

Through mobile applications, citizens can directly provide opinions, feedback or issue concerns within community (Thiel and Lehner, 2015). It is essential to utilise growing number of smartphone users to provide better interaction between administrative bodies and broad range of inhabitants. To support current relatively low level of e-participation in the Czech Republic, our research aims on the internet communication and participation on the local administrative level among Czech towns and cities, specifically through mobile applications which are considered as one of the key tools in the area of e-participation (Stieglitz and Brockmann, 2013; Ochara and Mawela, 2015; Wimmer et al., 2013).

In this paper we are focusing on supply side of the e-participatory and communication mobile applications offered on Google Play Store and Apple Appstore for Czech municipalities and their inhabitants and also on functionalities description provided by those mobile applications.

2 Theoretical background

2.1 E-government

Rapid development of modern ICTs and growing availability of online communication devices have significantly contributed to simplifying communication and reducing transaction costs (Cordelia, 2006; Bhatnagar, 2000; Meijer, 2015). Through various of possibilities, internet access and related communication channels can also be widely used as a valuable and effective communication tool in the field of public administration on the national and also local administrative level (Steinbach et al., 2020; Susha and Grönlund, 2012; Norris, 2010). The delivery of government and other administrative information services through the internet and other digital means is very well known as a concept of e-government (Krishnan and Teo, 2012).

The perception of e-government can be also defined as a 'way of making government institutions more transparent, helping citizens to obtain access to public information and broaden their participation in the democratic processes' (Netchaeva, 2002). At the same time, it can be understood as a form of government whose citizens have the opportunity to participate in the management of public affairs and public life through ICTs, while the interaction and expression of individuals can be a valuable information input for the government itself, which furthermore strengthens democratic principles (Freeman and Quirke, 2013; Karlsson, 2012).

2.2 E-participation

People's attitude to participate on decision-making processes and communicate with government bodies started to become a great topic especially at late 1960s (Arnstein, 1969 or Burke, 1968). Practices such as public assemblies, meetings, public hearings, workshops, seminars, conferences, etc. have been known for decades around the world, and the resulting effect of these tools may vary depending on the specific situation and location (OECD, 2001). Those practices are usually held during standard working hours at the fixed locations and thus, these inconveniences might often discourage citizens from participating (Kingston, 2007).

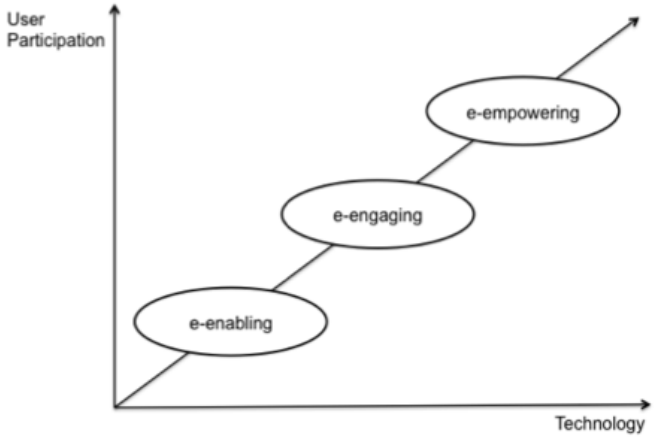
However, in connection with the digitalisation of various standard business and government processes, the way of participation became much easier and closer to all citizens (Wirtz et al., 2018). The combination of the concept of citizens' participation and ICTs creates the phenomenon of e-participation as one of the key elements of above-mentioned e-government (Conroy and Evans-Cowley, 2006). Macintosh (2006) defined e-participation as 'the use of information and communication technologies to broaden and deepen political participation by enabling citizens to connect with one another and with their elected representatives'. Moreover, Sæbø et al. (2008) also stated, that aim of e-participation is to 'support active citizenship with the latest technology developments, increasing access to and availability of participation in order to promote fair and efficient society and government'. According to Macintosh (2004) the e-participation can be divided into three dimensions, summarised in Figure 3.

1 E-enabling: this dimension consists of addressing (providing information) to as many potential participants as possible, as well as to those who would not normally use information technology. The aim is therefore to use the appropriate tools to provide the necessary information in a clear and simple way, and thus reaching the widest possible audience.

2 E-engaging: involvement of the inhabitants of towns and municipalities consists of deepening the discussion and consultation of political topics and planned important decisions. In this context, the top-down consultations are provided (from municipal leadership to residents).

3 E-empowering: this third dimension consists of the active involvement of the population in political decision-making process, as well as of enabling the promotion of citizens' own proposals and ideas (bottom-up consultations). In this context, residents are seen not only as clients, but also as full partners in the political field.

Figure 3 Dimensions of e-participation



Source: Macintosh (2004)

The process within these dimensions is also dependent on time, the readiness and confidence of residents in the management of their home municipality. In order to effectively involve citizens in the decision-making process (reach the dimension of e-empowering), it is necessary for residents to first get used to getting up-to-date information from available online platforms and their regular monitoring (dimension of e-enabling), and at the same time be willing to discuss relevant issues with the municipality with certainty (dimension of e-enabling). Thus, e-participation in the decision-making process itself is the last third step (Macintosh, 2004).

Many studies have proven various of social benefits and advantages of e-participation and online communication on the local level. Active citizen engagement has a great potential to support and improve the quality of public policies (Loukis et al., 2010) or the effectiveness of neighbourhood regeneration projects (Tomor et al., 2019). Moreover, internet participation and communication make easier for citizens to get information on public issues, reduce social pressure in political participation (Anduiza et al., 2010). E-participation is also connected with the fact, that individuals might have more courage

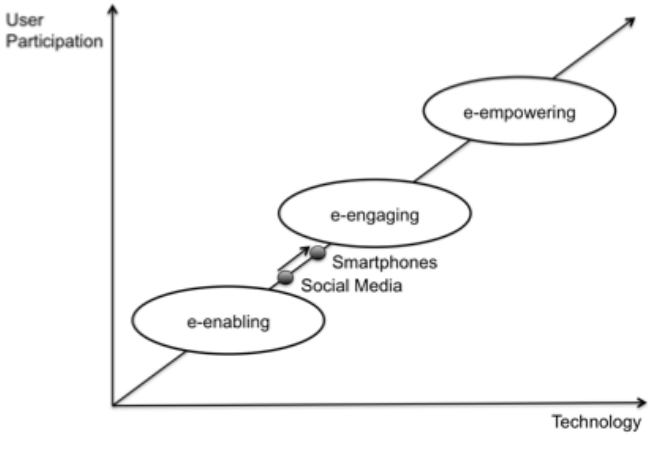
when participating and communicating through online instruments (McAdam et al., 2003) and thus the involvement of the public in political and administrative decisions is stimulated (Medaglia, 2012).

3 Mobile applications as e-participatory and communication tool

The traditional approach and structure of mass communication in the political context has changed significantly over the past decade (Shah et al., 2017). Among the most common tools used for e-participating and online communicating on the national and local level are online tools such as social media, websites or web platforms and mobile applications (Gao and Lee, 2017; Bonsón et al., 2012; Elvira et al., 2014). ICTs also enabling cities to use mobile applications or other smart solutions such as online problem-solving, intelligent shopping, services ordered electronically, telemedicine monitoring, smart grid applications (Novotný et al., 2014) or even tools based on virtual reality (Tozsa, 2013; Briciu et al., 2020).

However, mobile participation (or m-participation) which can be defined as 'an extensive use of mobile technologies and mobile applications in e-participation context' has so far not reached full potential (Wimmer et al., 2013). In the context of online communication, mobile applications may provide users with various of functions such as sharing information from the area of city services, mobility, safety, statistics, news and events or environment (Beutelspacher et al., 2018). Moreover, mobile surveys or mobile consultations represent valuable e-participatory tools which the use of smartphones enables (Wimmer et al., 2013). Following Macintosh (2004) dimensions of e-participation, social media and smartphones seem to have a big potential to support the stages of e-enabling and e-engaging (Stieglitz and Brockmann, 2013).

Figure 4 E-participation supported by social media and mobile applications



Source: Stieglitz and Brockmann (2013)

A relatively little scientific evidence related to the design and functionalities of mobile participatory applications have been published so far. Studies addressing these questions mostly on analysing single case studies and projects (Cristobal et al., 2018; Briciu et al.,

2020; Veeckman and Van Der Graaf, 2015). Beside the technical development of mobile applications, evaluation of the existing applications and their tools represents one of the important directions for current research (Wimmer et al., 2013).

4 Research methodology

This article endeavours to accomplish two main goals:

1 map mobile participatory and communication applications for cities and their inhabitants in the Czech Republic offered on Google Play Store and Apple Appstore

2 explore and evaluate the functions and features of said applications and find out whether they allow and support development of e-participation in the Czech Republic.

This research uses an exploratory case study as main research technique, which can be defined as 'an empirical inquiry that investigates a contemporary phenomenon (the 'case') in depth and within its real-world context' (Yin, 2014). The main advantage of this method is that it connects information and data from numerous sources, which allows the researcher to make use of both qualitative and quantitative evidence, which is particularly useful for research in the area of e-participation (Royo et al., 2020). On the other hand, a disadvantage of this method may be the fact that the collected data cannot be effectively statistically evaluated and generalised. Regardless of this shortcoming, the case study method nonetheless yields valuable information that can be further used to formulate theory and applied by experts (Toots, 2019). This article combines the methods of desk research, content analysis and semi-structured interviews.

In order to fulfill the first goal, a desk research was conducted to find relevant academic findings pertaining to the concept of e-participation in the Czech Republic listed in the database of Web of Science and SCOPUS (published between 2017 and 2020), using the keywords 'e-participation', 'citizen participation' and 'Czech Republic'. We found a total of eight relevant academic articles, the abstracts of which we extracted in full and united into a single document. From this document, a list of most commonly used words was further generated, from which we eliminated words not directly related to e-participation, such as 'Czech Republic', 'paper' or 'planning'. From the remaining most commonly used words, we finalised a total of seven keywords for the following analysis: 'participace' (participation), 'občan' (citizen), 'správa' (administration), 'veřejnost' (public), 'nástroj' (tool), 'mesto' (city) a 'obec' (municipality). These seven keywords were consequently used to search for relevant mobile applications in the Google Play Store and Apple Appstore databases, conducted between the 1st of October and the 5th of October 2020. After we filtered out games and other irrelevant applications for the purposes of our research, we identified a total of 84 mobile applications purposed to accommodate communication and participation between the municipal administration and their citizens (see Table 1). From these 84 results, 15 different types of mobile applications that varied in their features and ways in which their functioned were identified.

To fulfil the second goal, we used the tools of content analysis to explore the functions contained by the identified mobile applications. A similar method of analysis is also used by researchers for content analysis of mobile applications in the area of

healthcare (see for example Payne et al., 2015 or Mendiola et al., 2015). All 15 identified types of applications were downloaded and manually assessed by researchers, and consequently their functionality was examined, with focus on the presence of the following features: voting polls, reporting complaints, parking, newsfeed, emergency communication, cultural events, tips for trips and contacts.

To carry out a pilot test and evaluation of the mobile apps, we reached out to a total of 20 participants aged 18–25 and asked them to evaluate three different mobile apps via a standardised questionnaire. In research, there are several evaluation methods for mobile apps, such as the PACMAD usability model (Fabil et al., 2015) or the GQM evaluation metric (Hussain and Kutar, 2012). However, for the purpose of our research, we used the standardised mobile app rating scale (MARS) due to its clear and detailed guidelines (Stoyanov et al., 2015; Salazar et al., 2018). The MARS consists of 23 items which are grouped into the following sections: engagement, functionality, esthetics, information quality, subjective quality, and application specifics. Each item is scored from one (inadequate) to five (excellent), and a final mean score is given for each section. The mean values of the first four sections (engagement, functionality, esthetics, and information) serve as input values for the final measurement of the application's quality (average value of four mean values). This evaluation method is in line with the PACMAD or GQM methods but mainly used for healthcare applications. Therefore we have excluded one section and one item from our evaluation due to the irrelevance to our topic –

a the information section, because we believe that quality of shared content is not directly related to the functionality of the application, but is dependent on the current responsible person from the municipality's management

b the item 'Would you pay for this app' from the subjective quality section, because we believe that these applications will be perceived by consumers as public goods and therefore they will not be willing to pay for them out of their own financial resources (for the complete structure of our modified scale see Table 1).

Table 1 Structure of the modified MARS scale

Section (number of items)		*Definition*
A	Engagement (5)	Entertainment, interest, customisation, interactivity, target group
B	Functionality (4)	Performance, ease of use, navigation, gestural design
C	Esthetics (3)	Layout, graphics, visual appeal
App quality		Mean value of A, B and C section
D	App subjective quality (3)	Would you recommend this app? How many times do you think you would use this app? What is your overall star rating of the app?
E	App specifics (2)	This app is likely to change attitudes toward improving communication between municipality and citizens. Use of this app is likely improve the relationship between municipality and citizens.

As a final step, we run a t-test (for equal or unequal variances) in the SPSS software for all sections comparing the evaluation results of two main application groups identified (as well as for example Hussain et al., 2013).

The desk research, content analysis and evaluation method outlined above was also supplemented by information obtained from semi-structured interviews with sales representatives of a company developing and operating one of the most commonly used communication and participation mobile application by Czech cities and municipalities. Information provided through interview are stated in the discussion section of this research paper.

5 Research results

In the internet interface of Google Play Store and Apple Appstore, we identified a total of 84 results that meet the definition of a municipal mobile application designed for communication and participation with citizens (see Table 2). The greatest number of results was found using the keyword '*obec*' (municipality), namely 41 mobile applications. Further 24 mobile applications were found using the keyword '*město*' (*city*) and the last 19 mobile applications were found using the keyword '*občan*' (*citizen*).

Table 2 Search key words and results found in Google Play Store and Apple Appstore

Search key word	*Number of results*
Participace (Participation)	0
Občan (Citizen)	19
Správa (Administration)	0
Veřejnost (Public)	0
Nástroj (Tool)	0
Město (City)	24
Obec (Municipality)	41
	Sum = 84

All the above-mentioned applications were subjected to content analysis, where we first investigated how the registration process works. Consequently, we explored the features and their similarities and differences for all the applications. Based on this detailed analysis we were then able to divide the 84 identified results into 15 types of mobile applications (from a total of 15 different developers of mobile applications), which differ mostly in their functionality, features, names and also in their ways of operation. These 15 types of applications were further divided into two main groups:

a Universal-designed apps, which can be further divided by application names into two sub-groups (with single app name and with municipal app name)

b Custom-designed apps.

5.1 Universal-designed apps

The unifying factor of the first main identified group of applications is that their design and functionality are universally designed, i.e., they are identical (design and function-wise) for all municipalities that decide to use them. Should a municipal administration decide to use this type of mobile applications, they only need to purchase

it from the company that offers it and the company also takes care of its implementation and related training. The fees and final cost differ depending on the number of tools that the municipality wishes to implement as part of the application (see further). The municipal administration can thus decide to either use the full range of functions offered by the developer of the application, or to select only some preferred functions.

5.1.1 Universal-designed apps - with single app name

The main distinguishing feature of this sub-group is the unchanging name of the application, whose interface is being used by up to thousands of different Czech cities and municipalities. As an example, let us look at the most commonly used mobile application from this group, called '*Mobilní rozhlas*' (*Mobile broadcast*). If a municipality opts for using this application, its citizens can simply download it onto their mobile devices; the application can be found by searching its name using the search engine of Google Play Store or Apple Appstore.

After installing the application on the mobile device, the user needs to register (for instance by entering their e-mail address or phone number), and then search for the name of their preferred city and subscribe to its newsletters. The advantage of this particular solution is the possibility to subscribe to news from several different cities simultaneously within a single mobile application (which is useful for example for individuals commuting to work to a different city). Regardless of which city (or cities) to the newsletter of which the user subscribes, the layout and set up of the application is always the same. The Facebook application can serve as a good analogy to this, as its users also add friends and acquaintances to their portfolios. Similarly, in the case of these municipal universal-designed apps, the users add their preferred cities instead of friends in order to follow the latest events and to communicate with them.

Three of the applications from three different developers that we found were included into this group. First of these is the above-mentioned '*Mobilní rozhlas*' (*Mobile Broadcast*), then an app called '*Hlášení rozhlasu*' (*Broadcast announcement*) and '*V obraze – vím co se děje'* (*I know what is going on*). It is this group of mobile apps that is the most commonly used variant by Czech cities and municipalities, while the range of functions and tools it offers varies significantly from application to application.

- Example (City of Most): administration of the city of Most with 64 907 citizens opted for the '*Mobilní rozhlas*' (*Mobile broadcast*) application for daily communication with its citizens. The citizens or visitors of the city can now find the app using the Google Play Store or Apple Appstore search engine by entering the application's name (i.e., '*Mobilní rozhlas*'). Then they register, and in the search bar of the application they enter the city's name (which is most) and subscribe to its news. Within the application, they can also access a wide range of other tools that the city of Most wished to make available for its citizens (see below for functionality of individual applications).

5.1.2 Universal-designed apps – with municipal app name

The distinguishing feature of this sub-group is mainly the altering name of the application so that it corresponds to the name of the city that uses it and which can therefore also be used to look up this application. It is thus also a universally-designed product, which can however be found by its potential users in the Google Play Store or Apple Appstore

search engine upon entering the particular city's name. In other aspects, this group of apps is not significantly different from the previous group described above. The application's appearance can be sometimes tailored to include the city's colours, as well as name (the app's logo is also adjustable, meaning that it can be changed for instance to the city's official logo).

Three more mobile apps were placed into this subgroup. The first of them always bears the name of the city in question (X) first, which is then followed by 'in mobile', making the full name of the application 'X in mobile' ('*X v mobilu*' in Czech). The second app also boasts the city's (X) name together with the pronoun 'our'. The full name of the second application is 'Our X' ('*Naše X*' in Czech). The full name of the third mobile app from this group is 'City of X' ('*Město X*' in Czech).

- Example (City of Říčany): the administration of the city of Říčany with 15 571 citizens decided to use a universally designed application bearing the city's name for communication with its inhabitants. The full name of this mobile app is 'Říčany in mobile' ('*Říčany v mobilu*' in Czech). The inhabitants or visitors of the city of Říčany who are interested in using the application can now look it up in Google Play Store or Apple Appstore by entering the city's name. After installing the application, the users are asked to register to then be able to fully use all the tools that the application offers.

5.2 Custom-designed apps

The second main identified group of mobile apps is specific in that the cities commission their development (making them not universally designed products). The cities can thus select any name, design, logo or range of tools and functions they wish to offer their citizens through the application.

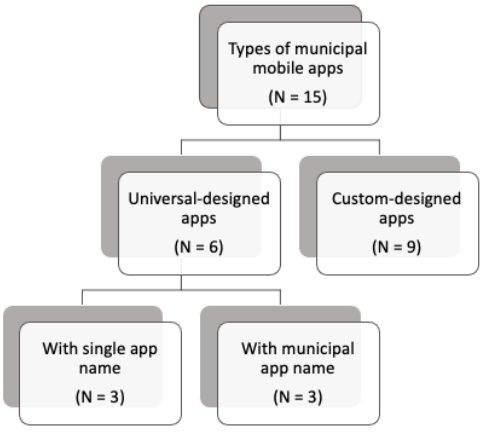
We placed a total of nine of the examined mobile apps into this group, two of which belong to the capital city of Prague – 'My Prague' ('*Moje Praha*' in Czech) and 'Change.it' ('*Změňte.to*' in Czech). The remaining apps belong to seven other medium-sized and smaller cities in the Czech Republic.

- Example (City of Prague): Prague, the Czech capital, a home to 1.3 million citizens, uses a mobile app called 'My Prague' ('*Moje Praha*' in Czech) for day-to-day communication with its inhabitants. It provides access to basic information concerning various bureaus and city offices, facilitates parking payments and informs on culture events and happenings. Alongside this application, the city uses another application called 'change.it' ('*Změnte.to*' in Czech), which serves as a means of informing on all types of maintenance and disruptions in service of public transportation, roads, public lighting, litter, etc., and allows evaluation of services at the city's bureaus. The city of Prague is however further divided into 57 administrative districts, each of which has its own city hall and municipal representation. Some of these districts opted for also providing their citizens with a municipal mobile app, often making use of the universally designed products, the properties of which were defined above (for instance Prague 3, Prague 7 or Prague 21). Citizens can therefore encounter a mix of several different applications in Prague.

Figure 5 serves as a summary of the structure of the identified types of mobile applications that we outlined above. We can identify a total of 15 distinct types of mobile

applications designed to facilitate participation and communication between the city administration and the citizens on the Czech market. These 15 types can be further divided into two main groups, where six of the types belong to the category of universal-designed apps (out of which three belong to the category of applications with single app name and another three into the category of applications with municipal app name). The remaining nine types of applications belong to the category of custom-designed apps.

Figure 5 Summary of identified types of municipal mobile apps in the Czech Republic



5.3 Features of identified mobile apps

Municipal mobile apps were further analysed from the viewpoint of their functionality, with focus on eight different criteria, namely whether they contain the following tools: voting polls, reporting complaints, parking (possibility to find information about free parking slots or possibility to buy a parking ticket), newsfeed, emergency communication, cultural events information, tips for trips and contacts for various of municipal departments.

Features assessment of municipal mobile apps in the Czech Republic are summarised in Table 3. Only one of the total 15 identified mobile apps contains the voting polls function, which allows for active collection of the citizens' opinions in the areas of urban planning, participative budgeting, and various other matters. It is especially the voting poll tool which can be considered as one of the most important participative tools that mobile apps can effectively utilise. Another 6 types of applications offer an alternative participation tool – reporting complaints, which allows the cities' inhabitants to voice complaints and point out issues of various kinds, – e.g., pavement or road defects, untowed automobile wreckages, illegal dumping et cetera. The capital city of Prague has a separate application to address the need for such tools called 'change.it' ('*Změnte.to*' in Czech). A total of four applications allow the users to find information on free parking capacities in the city. Almost all of the identified mobile apps offer various informative tools, such as cultural events sharing, newsfeed of current events, emergency communication, also travelling tips for the city and its vicinity, or various contacts for the city's bureaus and offices.

Table 3 Features assessment of municipal mobile apps

Name of the app	*Voting polls*	*Reporting complaints*	*Parking*	*Newsfeed*	*Emergency communication*	*Cultural events*	*Tips for trips*	*Contacts*
Universal-designed apps (with single app name)								
Mobilní rozhlas (Mobile broadcast)	YES	YES	YES	YES	YES	YES	YES	YES
Hlášení rozhlasu (Broadcast announcement)	NO	YES	NO	YES	YES	YES	NO	YES
V obraze – vím co se děje (I know what is going on)	NO	NO	NO	YES	NO	YES	YES	YES
Universal-designed apps (with municipal app name)								
"X" v mobilu ("X" in mobile)	NO	YES	YES	YES	YES	YES	YES	YES
Naše "X" (Our "X")	NO	NO	NO	YES	YES	YES	YES	YES
Město "X" (The city of "X")	NO	NO	NO	YES	NO	YES	YES	YES
Custom-designed apps								
Moje Praha (My Prague)	NO	NO	YES	YES	YES	YES	YES	YES
Změňte.to (Change.it)	NO	YES	NO	NO	NO	NO	NO	NO
Portál občana – město Písek (Citizen's portal – city of Písek)	NO	NO	NO	YES	YES	YES	YES	YES
Moje Olomouc (My Olomouc) Kladno v mobilu (Kladno in mobile)	NO	NO	YES	YES	YES	YES	YES	YES
	NO	NO	NO	YES	YES	YES	YES	YES
Město Prachatice (The city of prachatice)	NO	NO	NO	YES	YES	YES	YES	YES
Obec Dětmarovice (Municipality dětmarovice)	NO	YES	NO	YES	YES	YES	YES	YES
Moje Líbčany (My líbčany)	NO	YES	NO	YES	YES	YES	YES	YES
Nová Ves	NO	NO	NO	YES	YES	YES	YES	YES
Count	1	6	4	14	12	14	13	14

5.4 Evaluation of selected mobile apps

Table 4 shows the results of the specific scores for each application divided into section defined in the methodology part of this paper. The application quality range from the highest score of 4.58 to the lowest score of 2.8. A similar situation was observed in each Section: 4.20 to 1.30 (engagement), 4.81 to 3.18 (functionality), 4.75 to 3.75 (esthetics), 3.75 to 2.83 (app subjective quality) and 4.63 to 2.50 (app specifics).

Table 4 Evaluation score of municipal mobile apps

Name of the app	*App quality mean (A-C)*	*Section**				
		A	*B*	*C*	*D*	*E*
		Mean score	*Mean score*	*Mean score*	*Mean score*	*Mean score*
Universally designed apps						
Mobilní rozhlas (Mobile broadcast)	4.58	4.20	4.81	4.75	3.67	4.63
Hlášení rozhlasu (Broadcast announcement) V obraze – vím co se děje	3.90	2.65	4.56	4.50	3.50	4.13
(I know what is going on)	3.66	2.25	4.31	4.42	3.67	3.50
'X' v mobilu (X' in mobile)	3.59	2.20	4.31	4.25	3.67	4.38
Naše 'X' (Our 'X')	3.49	1.85	4.38	4.25	3.50	4.50
Město 'X' (The city of 'X')	3.64	2.10	4.31	4.50	3.50	4.25
Custom designed apps						
Moje Praha (My prague)	3.88	2.30	4.50	4.83	3.75	4.00
Změňte.to (Change.it)	3.62	2.00	4.19	4.67	3.67	4.25
Portál občana – město Písek (Citizen's portal – city of Písek)	3.44	1.75	4.25	4.33	3.50	3.75
(Moje Olomouc My Olomouc)	3.24	1.80	3.75	4.17	3.41	3.63
Kladno v mobilu (Kladno in mobile)	3.25	1.55	4.13	4.08	2.92	3.00
Město Prachatice (The city of Prachatice)	3.25	1.70	3.81	4.25	3.25	3.13
Obec Dětmarovice (Municipality Dětmarovice)	2.93	1.40	3.56	3.83	2.92	3.00
Moje Libčany (My libčany)	2.80	1.35	3.31	3.75	3.00	2.75
Nová Ves	2.80	1.30	3.18	3.92	2.83	2.50

Notes: *A) Engagement, B) functionality, C) esthetics, D) app subjective quality, E) app specifics.

The overall mean scores for the two main groups of mobile apps, i.e., universally designed apps and custom designed apps in each section were quantified (Table 5). Subsequently, we run a t-test for all sections to compare the score differences between those two groups. An example of such t-test for section A is as follows:

$$H_0 : \mu_{Universally\ designed} = \mu_{Custom\ designed}$$

where

H_0 the null hypothesis

$\mu_{\text{Universally designed}}$ mean score in section A for universally designed apps

$\mu_{\text{Custom designed}}$ mean score in section A for custom designed apps

($t_A = 0.028$, $p < 0.05$).

As the result show, at a 95% confidence level, the mean score in engagement (A) for universally designed apps is higher than for custom designed apps. No major esthetics (C) differences were found ($t_C = 0.8$), however another relatively high difference was found in app specifics (E) with score range of 0.9 points ($t_E = 0.003$). Significant differences were also found in the functionality ($t_B = 0.002$) and app subjective quality sections ($t_D = 0.01$).

Table 5 Mean scores for two main groups of mobile apps

*Section**	*Universally designed*	*Custom designed apps*
	Mean (variance)	*Mean (variance)*
A	2.54 (0.73)	1.68 (0.11)
B	4.45 (0.04)	3.85 (0.20)
C	4.44 (0.04)	4.20 (0.13)
D	3.58 (0.01)	3.25 (0.12)
E	4.23 (0.16)	3.33 (0.36)

Notes: *A) Engagement, B) functionality, C) esthetics, D) app subjective quality, E) app specifics.

6 Discussion

Increasing rate of daily users of mobile internet access greatly increases the importance of mobile applications for involving residents into public affairs and decision-making process (Thiel and Lehner, 2015). Share of daily users of mobile internet access in the Czech Republic has more than doubled since 2014. However, Czech level of e-participation is below EU average in a long term. In order to improve this situation, there is a need to arouse interest of Czechs in participation at the lower – local administrative level, for which mobile apps are one of the well-suited online tools. Mobile apps have already proved their efficiency in many other areas, such as healthcare (Ventola, 2014; Kao and Liebovitz, 2017).

The first goal of this article was to map the market of mobile apps that are available to Czech cities for communication and active participation with their inhabitants. From the total of 84 mobile apps, we identified on Google Play Store and Apple Appstore, which meet the definition of a municipal communication application, we further identified 15 distinctive types of mobile applications. These differ not only in their names, but also in their functionality and ways in which they operate. Based on a number of characteristics, we divided these 15 types into two main groups: *Universal-designed apps*, which can further by divided into two subgroups based on differing names of the applications (with single app name and with municipal app name) and *Custom-designed apps*. The apps from the category of Universal-designed applications with single app

name offer a relatively practical utilisation, where the user can subscribe to news from a number of cities at once through the same application. This possibility is likely to be appreciated especially by individuals with place of work differing from their city where they reside. On the other hand, a key advantage of mobile apps from the category Universal-designed, with municipal app name is mainly the option to set up a custom logo and application design, for instance to reflect the official colours and logo of the city.

Another aim of this article was to explore whether these identified mobile apps offer participation tools. Overwhelming majority of Czech cities and municipalities actively use mobile apps from the category Universal-designed – with single app name. Out of all the identified mobile applications, only one offers the voting poll tool, and a total of six applications offer the Reporting complaints tool that meet the definition of participation tools. Other applications only offer tools of the informative nature and thus cannot be used to collect information or feedback from the inhabitants.

We also conducted a pilot evaluation of these applications through a standardised questionnaire survey and compared not only the rating score of the applications among themselves but also the average rating between the universally designed apps and custom designed apps. As our results show, the universally designed apps scored significantly higher in four out of the five evaluated criteria. These results may indicate that universally designed apps that remain under the management of a private developer that regularly and consistently updates and corrects errors, might be more user-friendly and more attractive than applications that remain under the management of the municipalities themselves. Generally, a number of apps obtained relatively high score in the app speficics, which assessed whether apps have a potential to improve the communication and the relationship between citizens and municipalities. On the other hand, the relatively lowest results were achieved by applications mainly in the section engagement, which assessed the level of customisation or interactivity of apps.

A specific example is the capital city of Prague. In order to access all the available online mobile functions, a citizen of Prague needs to download to their device three distinct mobile apps. This is because Prague has a different application for defects and complaints reporting, and another for sharing information from the city hall, information on free parking capacity, cultural events, etc. Furthermore, Prague is divided into 22 administrative districts, and a number of these also use mobile applications for communication and participation with their citizens, independently from the two applications mentioned above. This can be quite confusing for the inhabitants of Prague, which can impact their willingness to use this combination of mobile applications and fully utilise the functions that they offer.

The most commonly used application in the Czech Republic is the universally designed app called ‘Mobile broadcast’ (‘*Mobilní rozhlas*’ in Czech) which also achieved the highest score in the evaluation. According to the information provided by the operator and developer of this online mobile tool, a mobile application is used by more than 1 100 Czech cities and municipalities, which is approximately 17.6 % from the total number of registered municipalities in the country. Nonetheless, this number has been constantly growing since the beginning of 2020. Number of registered users by the end of 2020 exceeds 468,000, which is however only around 4.5 % of the country’s population. Based on an interview with representatives of the company operating this application, it can be said that there was a rapid increase in demand for the application among Czech cities following the first wave of the COVID-19 pandemic. Administrations of cities and

municipalities often realised the importance of a simple and widely available tool for emergency communication with their citizens in this critical situation, a need that, because of the relatively high popularity of mobile internet among Czechs, mobile applications well meet. This mobile application also created a new tool 'Questions about coronavirus' ('*Dotazy ke koronaviru*' in Czech) as a result of the pandemic, where citizens can ask questions related to the pandemic and the emergency measures in effect, the answers to which are then visible to all users of the application. The interview further shows that administrations of cities and municipalities have for a long time considered the low number of inhabitants registered in the app a key problem. For instance, the above-mentioned city of Most with 64,907 inhabitants has 7,289 registered users by the end of 2020, which is around 11.2 % of the city's inhabitants. As another example, we may look at for instance one of the administrative districts of Prague – Prague 3 with 71,409 inhabitants, which has only 2,384 registered users by the end of 2020 (3.3 % of the total number of inhabitants of the district).

One of the most important remaining questions for further research is what particular steps can be taken to increase interest in the usage of mobile applications for communication and e-participation between the administration of cities and municipalities and their inhabitants. Sufficiently wide userbase seems to be the key determinant for increasing the range of functions currently on offer by further tools of participative nature, such as participative budgeting or voting on essential municipal matters.

7 Conclusions

The aim of this article was to analyse, describe, and evaluate the available mobile applications designed for facilitating communication and participation between the city's or municipality's administration and their citizens in the Czech Republic. Content analysis of the applications identified the functionality offered by the applications and thus also whether they support the development of the concept of e-participation in the Czech Republic. On the other hand, the pilot evaluation of those apps discovered that universally designed apps might be more user-friendly because they obtained significantly higher scores than the custom designed apps.

Demand for those mobile applications is very fragmented due to specific administrative division of the Czech Republic, which consists of more than 6,200 self-governing municipalities. So far only a relatively small proportion of Czech municipalities use participatory and communication mobile applications with low level of citizens' involvement. The challenge for the future is to expand the range of applications and their user base (e.g., using gamification elements and other modern tools which current supply lacks) which might support the development of the whole concept of e-participation in the Czech Republic.

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References

Albino, V., Bearrdi, U. and Dangelico, R.M. (2015) ‘Smart cities: definitions, dimenions, performance, and initiatives’, *Journal of Urban Technology*, Vol. 22, No. 4, pp.3–21.

Anduiza, E., Gallego, A. and Cantijoch, M. (2010) ‘Online political participation in Spain: the impact of traditional and Internet resources’, *Journal of Information Technology and Politics*, Vol. 7, No. 4, pp.356–368.

Arnstein, S.R. (1969) ‘A ladder of citizen participation’, *J Am Inst Planners*, Vol. 35, No. 4, pp.216–224.

Beutelspacher, L., Mainka, A. and Siebenlist, T. (2018) ‘Citizen participation via mobile applications: a case study on apps in Germany’, *International Journal of Electronic Government Research* (*IJEGR*), Vol. 14, No. 4, pp.18–26.

Bhatnagar, S. (2000) ‘Social implications of information and communication technology in developing countries: lessons from Asian success stories’, *The Electronic Journal of Information Systems in Developing Countries*, Vol. 1, No. 1, pp.1–9.

Bonsón, E., Torres, L., Royo, S. and Flores, F. (2012) ‘Local e-government 2.0: social media and corporate transparency in municipalities’, *Government Information Quarterly*, Vol. 29, No. 2, pp.123–132.

Briciu, A., Briciu, V.A. and Kavoura, A. (2020) ‘Evaluating how ‘smart’bra□ov, romania can be virtually via a mobile application for cultural tourism’, *Sustainability*, Vol. 12, No. 13, p.5324.

Burke, E.M. (1968) ‘Citizen participation strategies’, *Journal of the American Institute of Planners*, Vol. 34, No. 5, pp.287–294.

Conroy, M.M. and Evans-Cowley, J. (2006) ‘E-participation in planning: an analysis of cities adopting online citizen participation tools’, *Environment and Planning C: Government and Policy*, Vol. 24, No. 3, pp.371–384.

Cordelia, A. (2006) ‘Transaction costs and information systems: does IT add up?’, *Journal of Information Technology*, Vol. 21, No. 3, pp.195–202.

Cristobal, I., Cruz, C., Cruz, J., Manalansan, J., Fabito, B, Rodriguez, R. and Octaviano, M. (2018) ‘Pasigueño assistant: an e-participation mobile application framework for the City of Pasig, Philippines’, in *TENCON 2018–2018 IEEE Region 10 Conference*, pp.1807–1812.

Czech Statistical Office (2019) ‘Mylý lexikon obcí České republiky – (small lexicon of Czech municipalities – 2019), [online] https://www.czso.cz/csu/czso/maly-lexikon-obci-ceske-republiky-2018-42hnx5qxcd (accessed 10 October 2020).

Czech Statistical Office (2019) ‘Využívání informačních a komunikačních technologií v domácnostech a mezi jednotlivci – (Use of ICT among Czech households and individuals – 2019), [online] https://www.czso.cz/csu/czso/vyuzivani-informacnich-a-komunikacnich-technologii-v-domacnostech-a-mezi-jednotlivci-2019 (accessed 10 October 2020).

Drapalova, E. and Wegrich, K. (2020) ‘Who governs 4.0? Varieties of smart cities’, *Public Management Review*, Vol. 22, No. 5, pp.668–686.

Elvira, N.I.C.A., Popescu, G.H., Nicolăescu, E. and Constantin, V.D. (2014) ‘The effectiveness of social media implementation at local government levels’, *Transylvanian Review of Administrative Sciences*, Vol. 10, No. SI, pp.152–166.

Fabil, N.B., Saleh, A. and Isamil, R.B. (2015) ‘Extension of PACMAD model for usability evaluation metrics using goal question metrics (GQM) approach’, *Journal of Theoretical and Applied Information Technology*, Vol. 79, No. 1, pp.90–98.

Freeman, J. and Quirke, S. (2013) ‘Understanding e-democracy: government-led initiatives for democratic reform’, *Journal of E-democracy and Open Government*, Vol. 5, No. 2, pp.141–154.

Gao, X. and Lee, J. (2017) 'E-government services and social media adoption: experience of small local governments in Nebraska state', *Government Information Quarterly*, Vol. 34, No. 4, pp.627–634.

Hussain, A. and Kutar, M. (2012) 'Usability evaluation of SatNav application on mobile phone using mGQM', *International Journal of Computer Information Systems and Industrial Management Applications*, Vol. 4, No. 2012, pp.92–100.

Hussain, A., Hashim, N.L., Nordin, N. and Tahir, H.M. (2013) 'A metric-based evaluation model for applications on mobile phones', *Journal of Information and Communication Technology*, Vol. 12, No. 1, pp.55–71.

Kao, C.K. and Liebovitz, D.M. (2017) 'Consumer mobile health apps: current state, barriers, and future directions', *PM&R*, Vol. 9, No. 5, pp.106–115.

Karlsson, M. (2012) 'Democratic legitimacy and recruitment strategies in eParticipation projects', in *Empowering Open and Collaborative Governance*, Springer, Berlin, Heidelberg.

Kersting, N. (2016) 'Participatory turn? Comparing citizens' and politicians' perspectives on online and offline local political participation', *Lex Localis*, Vol. 14, No. 2, pp.251–263.

Kingston, R. (2007) 'Public participation in local policy decision-making: the role of web-based mapping', *The Cartographic Journal*, Vol. 44, No. 2, pp.138–144.

Krishnan, S. and Teo, T.S. (2012) 'Moderating effects of governance on information infrastructure and e□government development', *Journal of the American Society for Information Science and Technology*, Vol. 63, No. 10, pp.1929–1946.

Loukis, E., Xenakis, A. and Charalabidis, Y. (2010) 'An evaluation framework for e-participation in parliaments', *International Journal of Electronic Governance*, Vol. 3, No. 1, pp.25–47.

Macintosh, A. (2004) 'Characterizing e-participation in policy-making.', in *37th Annual Hawaii International Conference on System Sciences*, *Proceedings of the IEEE*, pp.1–10.

Macintosh, A. (2006) 'eParticipation in Policy-making: The research and the challenges', in Cunningham, P.M. and Cunningham, M. (Eds.): *Exploiting the Knowledge Economy: Issues, Applications and Case Studies*, pp.364–369, IOS Press, Amsterdam, Netherlands.

McAdam, D., Tarrow, S. and Tilly, C. (2003) 'Dynamics of contention', *Social Movement Studies*, Vol. 2, No. 1, pp.99–102.

Medaglia, R. (2012) 'eParticipation research: moving characterization forward (2006–2011)', *Government Information Quarterly*, Vol. 29, No. 3, pp.346–360.

Meijer, A. (2015) 'E-governance innovation: barriers and strategies', *Government Information Quaterly*, Vol. 32, No. 2015, pp.198–206.

Meijer, A., Curtin, D. and Hillebrandt, M. (2012) 'Open government: connecting vision and voice', *International Review of Administrative Sciences*, Vol. 78, No. 1, pp.10–29.

Meijer, A., Roudríguez Bolívar, M.P.R. (2016) 'Governing the smart city: a review of the literature on smart urban governance', *International Review of Administrative Sciences*, Vol. 82, No. 2, pp.1–17.

Mendiola, M.F., Kalnicki, M. and Lindenauer, S. (2015) 'Valuable features in mobile health apps for patients and consumers: content analysis of apps and user ratings', *JMIR mHealth and uHealth*, Vol. 3, No. 2, p.e40.

Netchaeva, I. (2002) 'E-government and e-democracy: a comparison of opportunities in the north and south', *Gazette* (Leiden, Netherlands), Vol. 64, No. 5, pp.467–477.

Norris, D.F. (2010) 'E-government not e-governance not e-democracy not now! not ever?', in *Proceedings of the 4th International Conference on Theory and Practice of Electronic Governance*, pp.339–346.

Novotný, R., Kuchta, R. and Kadlec, J. (2014) 'Smart city concept, applications and services', *J. Telecommun. Syst. Manag.*, Vol. 3, No. 1, pp.1–5.

Ochara, N.M. and Mawela, T. (2015) 'Enabling social sustainability of e-participation through mobile technology', *Information Technology for Development*, Vol. 21, No. 2, pp.205–228.

OECD (2003) 'Promise and problems of e-democracy – challanges of online citizen engagement', [online] http://www.oecd.org/governance/digital-government/35176328.pdf (accessed 10 October 2020).

OECD (2001) *Citizens as Partners: Information, Consultation and Public Participation in Policy – Making*, [online] https://www.oecd-ilibrary.org/governance/citizens-as-partners_9789264195578-en (accessed 10 October 2020).

Omar, A., Weerakkody, V. and Sivarajah, U. (2017) 'Developing criteria for evaluating a multi-channel digitally enabled participatory budgeting platform', in *International Conference on Electronic Participation*, pp.3–11.

Payne, H.E., Lister, C., West, J.H. and Bernhardt, J.M. (2015) 'Behavioral functionality of mobile apps in health interventions: a systematic review of the literature', *JMIR mHealth and uHealth*, Vol. 3, No. 1, p.e20.

Roudríguez Bolívar, M.P.R. (2019) 'In the search for the 'smart' source of the citizen's perception of quality of life in european smart cities', *Proceedings of the 52nd Hawaii International Conference on System Sciences*, pp.3325–3334.

Royo, S., Pina, V. and Garcia-Rayado, J. (2020) 'Decide madrid: a critical analysis of an award-winning e-participation initiative', *Sustainability*, Vol. 12, No. 4, p.1674.

Sæbø, Ø., Rose, J. and Flak, L.S. (2008) 'The shape of eParticipation: characterizing an emerging research area', *Government Information Quarterly*, Vol. 25, No. 3, pp.400–428.

Salazar, A., de Sola, H., Failde, I. and Moral-Munoz, J.A. (2018) 'Measuring the quality of mobile apps for the management of pain: systematic search and evaluation using the mobile app rating scale', *JMIR mHealth and uHealth*, Vol. 6, No. 10, p.e10718.

Shah, D.V., McLeod, D.M., Rojas, H., Cho, J., Wagner, M.W. and Friedland, L.A. (2017) 'Revising the communication mediation model for a new political communication ecology', *Human Communication Research*, Vol. 43, No. 4, pp.491–504.

Shirazi, F., Ngwenyama, O. and Morawczynski, O. (2010) 'ICT expansion and the digital divide in democratic freedoms: An analysis of the impact of ICT expansion, education and ICT filtering on democracy', *Telematics and Informatics*, Vol. 27, No. 1, pp.21–31.

Snellen, I. (2001) 'ICTs, bureaucracies, and the future of democracy', *Communications of the ACM*, Vol. 44, No. 1, pp.45–48.

Steinbach, M., Wilker, N. and Schöttle, S. (2020) 'E-participation on the local level–A census survey approach for researching its implementation', *Journal of Information Technology and Politics*, Vol. 17, No. 1, pp.12–32.

Stieglitz, S. and Brockmann, T. (2013) 'The impact of smartphones on E-participation', in *2013 46th Hawaii International Conference on System Sciences*, pp.1734–1742.

Stoyanov, S.R., Hides, L., Kavanagh, D.J., Zelenko, O., Tjondronegoro, D. and Mani, M. (2015) 'Mobile app rating scale: a new tool for assessing the quality of health mobile apps', *JMIR mHealth and uHealth*, Vol. 3, No. 1, p.e3422.

Susha, I. and Grönlund, Å. (2012) 'eParticipation research: Systematizing the field', *Government Information Quarterly*, Vol. 29, No. 3, pp.373–382.

Thiel, S.K. and Lehner, U. (2015) 'Exploring the effects of game elements in m-participation', in *Proceedings of the 2015 British HCI Conference*, pp.65–73.

Tomor, Z., Meijer, A., Michels, A. and Geertman, S. (2019) 'Smart governance for sustainable cities: findings from a systematic literature review', *Journal of Urban Technology*, Vol. 26, No. 4, pp.3–27.

Toots, M. (2019) 'Why E-participation systems fail: the case of Estonia's Osale.ee.', *Government Information Quarterly*, Vol. 36, No. 3, pp.546–559.

Tozsa, I. (2013) 'Virtual reality and public administration', *Transylvanian Review of Administrative Sciences*, Vol. 9, No. 38, pp.202–212.

United Nations (2020) *UN E-Government Knowledgebase* [online] https://publicadministration.un.org/egovkb/Data-Center (accessed 10 October 2020).

Veeckman, C. and Van Der Graaf, S. (2015) 'The city as living laboratory: empowering citizens with the citadel toolkit', *Technology Innovation Management Review*, Vol. 5, No. 3, pp.6–17.

Ventola, C.L. (2014) 'Mobile devices and apps for health care professionals: uses and benefits', *Pharmacy and Therapeutics*, Vol. 39, No. 5, p.356.

Wimmer, M.A., Grimm, R., Jahn, N. and Hampe, J.F. (2013) 'Mobile participation: exploring mobile tools in e-participation', in *International Conference on Electronic Participation*, pp.1–13.

Wirtz, B.W., Daiser, P. and Binkowska, B. (2018) 'E-participation: A strategic framework', *International Journal of Public Administration*, Vol. 41, No. 1, pp.1–12.

Yin, R.K. (2014) *Case Study Research*, *Design and Methods*, Sage London, UK.

Zheng, Y. (2017) 'Explaining citizens' e-participation usage: functionality of e-participation applications', *Administration and Society*, Vol. 49, No. 3, pp.423–442.