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ORIGINAL ARTICLE

Local e-government and user satisfaction with city portals – the citizens' service preference perspective

Bernd W. Wirtz[1] · **Oliver Tuna Kurtz**[1]

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Abstract In the past decade, governments all over the world have incrementally employed E-Government websites to improve public administration efficiency by augmenting the effectiveness, quality, transparency and availability of information and services for their citizens. Despite the increased interest in providing E-Government services, knowledge about the success of E-Government remains limited. In terms of an efficient provision of E-Government services for citizens, a user-oriented approach needs to be considered. In this context, user satisfaction is a crucial factor for the success or failure of E-Government. Hence, a primary challenge for local E-Government city portals is the identification of key factors that determine user satisfaction. Therefore, this study develops a model for user satisfaction of E-Government city portals by applying a mixed method approach. The results of this paper, which are based on binary logistic regression, indicate that integration of downloadable forms, integration of a powerful search function, full online availability of E-Government Services, and Perceived Ease of Use positively influence user satisfaction with E-Government city portals.

Keywords Local e-government · E-government city portals · User satisfaction · Binary logistic regression · Mixed method approach

✉ Bernd W. Wirtz
ls-wirtz@uni-speyer.de

Oliver Tuna Kurtz
kurtz@uni-speyer.de

[1] German University of Administrative Sciences Speyer, Freiherr-vom-Stein-Str. 2, 67346 Speyer, Germany

1 Introduction

Advances in Information and Communication Technology (ICT) have fundamentally changed the way citizens and governments interact with each other. In the past decade, an increasing number of Federal Governments, States, and Local Administrative Bodies worldwide have established E-Government portals in order to empower and improve public services to citizens. When it comes to the delivery of public E-Services, they all require an efficient user-oriented interaction between government and citizen (Wirtz et al. 2015). Hence, the implementation and success of E-Government portals primarily has to focus on the needs of the citizens, which has become a challenging and complicated task as citizens' demands and requirements vary and change over time (Venkatesh et al. 2012). Although, there are significant advances of many countries in providing public E-Services, even the most developed E-Government Websites are shortened by a deficit of citizen-centric services (Tan et al. 2013). For this reason, a successful E-Government project in today's public administration landscape constantly requires new E-Government strategies of policy makers in order to fulfill citizens' needs, as well as valuable scientific contributions to provide implications for public administrations (Tan et al. 2013).

Despite the increased practical and scientific importance of this topic, knowledge about the success of E-Government remains limited (Arduini et al. 2011). Concerning this matter, Morgeson et al. (2011) stated that a recent review of the E-Government literature found a general lack of statistical, empirical rigor, especially with regard to quantitative confirmatory approaches.

Existing studies have often solely adapted and retested theoretical approaches and established technology-oriented models from information system (IS) research or service quality models from marketing research to the public administration context (Rana et al. 2011). These models are not conceptually expanded (Alawneh et al. 2013) and are frequently structurally adapted to specific E-Government Services such as tax filing (e.g., Chang et al. 2005; Chen 2010; Hu et al. 2009; Singha and Singh 2013).

Verdegem and Verleye (2009) have supported this aspect and stated that E-Government studies mostly have been conducted with regard to the supply side and technological requirements or possibilities rather than user needs of E-Government. However, as every citizen is a potential consumer of E-Government services, understanding citizens' needs can have a major impact on E-Government success (Venkatesh et al. 2012). Therefore, the request for more user-oriented E-Government analyses becomes increasingly eminent. Hence, this study focus on the demand of citizens by conducting a user-oriented approach.

Regarding the measurement of success in the context of IS, traditionally, user satisfaction has been widely quoted as a construct for determining success and effectiveness (Delone and McLean 1992; McHaneya et al. 1999; Muylle et al. 2004; Zviran and Erlich 2003). Scholars in the field of E-Government also have represented this view. Alawneh et al. (2013) state that regarding a demand-oriented approach, user satisfaction is a crucial indicator for the success or failure of E-Government. Alias et al. (2011) support this perception and quote that citizen's satisfaction is an important indicator in providing a general concept as to how well the government has performed its services in accordance with its citizen's needs. However, research studies investigating the determinants of user satisfaction are relatively rare. Furthermore, existing

studies are largely generic, often limited to non-transactional E-services, and do not adequately consider the needs of citizens, which have fundamentally changed in the past few years.[1]

Regarding the administrative level, this study considers local E-Government. The increasing number of available E-Services at the administrative level having the highest authority concerning governmental procedures and decision-making reflects the predominating relevance of E-Government portals for the local sector (Liu et al. 2010). However, examinations concerning E-Government city portals remain under-investigated (Hung et al. 2006; Jiang 2011; Morgeson et al. 2011; Wirtz et al. 2014a). In the light of these shortcomings in current E-Government research, this study seeks to develop a conceptual user-oriented model for the measurement of user satisfaction of local E-Government city portals. For this purpose, this study aims at answering the following core research question: What are the public management factors determining user satisfaction with local E-Government city portals from the citizen perspective?

To answer this question the study structure is as follows: The upcoming section offers an elaborate literature review of E-Government research in the context of user satisfaction. Based on this literature review, the subsequent section deduces the research model by developing the proposed hypotheses. In this context, beside the deduction of determinants by screening the literature, this study identifies them by combining quantitative and qualitative analyses by using a mixed approach method. In the body of the paper, an empirical test of the developed hypotheses is conducted using binary logistic regression. In the final section, results are presented along with a discussion of their implications for research and management practice of E-Government.

2 Literature review

The scientific E-Government discourse has changed towards a more service-oriented perspective of E-Government in which a citizen is considered as a "customer" of public administration (Jansen et al. 2010) since in the late 1990s, more and more E-Government portals offering modern online service, particularly at the local level, have been deployed (Roy 2006). Regarding this fundamental transformation of public administration, user satisfaction has become a crucial factor for determining E-Government success and can be defined as the ability of citizens/customers to get the information they require and to have a service experience that solves their concerns (Reddick and Roy 2013). "*A modern public administration, which sees citizens as customers who pay rates and taxes and thus should receive value, should be able to satisfy their requirement about high quality portals and e-services*" (Magoutas and Mentzas 2010, p. 4292). Alias et al. (2011) state that measuring user satisfaction with E-Government would yield an immediate, meaningful, and objective feedback about user's preference and expectation. These aspects are essential for success as user satisfaction with E-Government is known to drive its use and is regarded a way for achieving customer loyalty (Magoutas and Mentzas 2010; Cohen 2006).

In this regard, the numbers of studies focusing on user satisfaction with E-Government have increased but are still relatively rare. Despite the growing number

[1] see Literature Review in Section 2

of empirical studies in the field of E-Government, the comprehension of factors determining user satisfaction has been conflicting and research outcomes are dominated by disagreements. The literature of user satisfaction with E-Government can mainly be classified into three categories using different theory and model approaches. The first category represents articles that adopted the DeLone & McLean IS Success Model (D&M model), the second category refers to Technology Acceptance (TAM) based models, whereas the third investigates user satisfaction based on the EGOVSAT model.

Regarding the first category, some researchers have transferred the D&M model introduced by Delone and McLean (1992) to the E-Government context. Floropoulos et al. (2010) for example adopted the model to a specific E-Service, namely TAXIS, to measure the success of the Greek Taxation IS. They applied the constructs information quality, system quality, service quality, and perceived usefulness. The authors found that higher levels of perceived usefulness are positively related to higher levels of user satisfaction. Chen (2010) who discussed user satisfaction with an online system for filling individual income tax returns supported the results and confirmed that the quality antecedents are strongly influencing taxpayer satisfaction with the online tax-filing system. Teo et al. (2008) using the D&M model examined the role of trust in E-Government success by involving user satisfaction. Their results showed that all quality constructs of the D&M model are positively associated with satisfaction toward the E-Government website.

Regarding the second category, TAM that has been introduced by Davis (1989) initially measures technology acceptance applying Perceived Ease of Use (PEoU) and Perceived Usefulness (PU) as independent variables. Within the E-Government research examining user satisfaction, TAM has been adopted, modified, and partly integrated into other theory approaches. Lai and Pires (2010) for example have evaluated the effects of quality constructs by building an integrated model of user satisfaction and technology acceptance to identify and examine factors influencing E-Government portal satisfaction and adoption. This cross-sectional study confirmed that information quality, system quality, and social influence are success factors influencing user satisfaction and adoption. Udo et al. (2012) have compared the influence of national culture (Nigerians and Americans) on satisfaction and acceptance, using constructs based on acceptance theories and thereby measured an integrated model of the TAM, the Theory of Planned Behavior (TPB), and the D&M model. Their results indicate that user satisfaction is affected by perceived usefulness, information and system quality, whereby user satisfaction, in turn, affects users' behavioral intention to continue using E-Government Services.

Using the Unified Theory of Acceptance and Use of Technology (UTAUT), which has been introduced by Venkatesh et al. (2003), Chan et al. (2010) have identified various external factors as antecedents of key technology adoption variables. They proved that performance expectancy, effort expectancy, and facilitating conditions have direct effects while social influence has no significant effect on citizens' satisfaction with smart cards.

With respect to the third category, some researchers have applied the EGOVSAT model. This model has been formulated with the aim to provide a scale to evaluate government-to-citizen web-based initiatives in terms of satisfaction derived by citizens (Lili 2009). Results of the study of Horan and Abhichandani (2006) imply that utility, efficiency, and customization are important factors that influence emotional

satisfaction. Alias et al. (2011) have confirmed these results and found out that additionally reliability and flexibility exhibit a positive relationship with EGOVSAT.

Further E-Government studies dealing with user satisfaction refer on results of prior research and combine multiple theory aspects. These studies have inter alia focused on the constructs privacy and security (Alawneh et al. 2013; Venkatesh et al. 2012; Verdegem and Verleye 2009), and cost-related constructs (Osman et al. 2011; Verdegem and Verleye 2009). Alawneh et al. (2013) for example, have studied amongst others security and privacy aspects concerning Jordanians' E-satisfaction and proved that the security and privacy factor does not significantly contribute to achievement of high E-satisfaction level. Venkatesh et al. (2012) in contrast supported that high security provision will positively influence citizens' intentions to use E-Government Services, which positively influence their satisfaction with the services.

Regarding cost-related constructs, Osman et al. (2011) for instance have measured factors that affect the satisfaction of users with an E-Government Service. Their results indicate that the lower the E-Service cost the higher the user satisfaction.

In summary, E-Government research of user satisfaction being in an early stage offers important insights for the public sector. However, regarding the fundamental transformation of public administration in the light of today's rapid ICT development, there is a deficit of a thorough understanding of the factors that determine user satisfaction. Many existing empirical studies solely use criteria from models of IS research or are affected by a rather generic and aggregated approach. In particular, scholars largely observe theoretical and abstract constructs, which refer to user perceptions such as Frustration, Social Influence (e.g., Lai and Pires 2010; Chan et al. 2010), Confidence (e.g., Morgeson et al. 2011), Awareness (e.g., Alawneh et al. 2013; Verdegem and Verleye 2009) Effort Expectancy (e.g., Chan et al. 2010), Responsiveness (e.g., Sung et al. 2009), etc. However, these perception oriented constructs focusing on personal emotional status of the user are inappropriate drivers to improve public management of E-Government Services as they do not refer to concrete E-Government Service applications and hence, hinder the identification of appropriate management parameters for an effective E-Government portal management. However, the increased importance of transactions between citizens and administration have shifted the focus towards innovative and up to date E-Services (Kaisara and Pather 2011).

Accordingly, scientific endeavors should disengage oneself from the generic view and have to focus on concrete E-Services matched to the current digital opportunities and citizens' need to ensure an effective E-Government portal management. Therefore, this study aims at identifying and examining factors that determine user satisfaction on the local level related to concrete E-services by using items that are consistent with user's needs of today's developed public administration practice.

3 Hypotheses development and research model

For conducting and investigating appropriate determinants of user satisfaction with E-Government, this study applies a mixed method research approach that uses qualitative as well as quantitative analyses. The combination of both methods of analysis is considered to be more effective because it leads to a more comprehensive view,

facilitates the identification of current trends, and frequently results in research that provide broader perspectives than those offered by monomethod designs (Davis et al. 2011; Molina Azorín and Cameron 2010). In this context, we have conducted a three-stage analysis starting with an elaborate review of the scientific literature on E-Government. In the next stage, we have benchmarked five international E-Government city portals by undertaking an explorative Website analysis of Hong Kong, London, and New York, which are all considered best-practice examples (Waseda University 2013), as well as two further city portals - Berlin and Mainz.[2] Finally, we have evaluated expert interviews with seven public administration's experts in the field of E-Government.

Regarding the first stage, we have screened all relevant empirical publications on user satisfaction with E-Government of peer-reviewed journals to get a preliminary overview of factors determining user satisfaction. As described in the section "Literature Review", we have found that prior research has primary conceptualized E-Government user satisfaction through traditional technology-oriented or quality-related constructs. Especially system quality, PU and PEoU are widely used to measure E-Government user satisfaction. These factors were therefore tentatively added to the set of determinants for further adjustments and verifications in terms of the second and third stages of our analysis. Apart from the analysis of empirical publications, we additionally analyzed conceptual and practice-oriented contributions to expand the findings of empirical research on E-Government user satisfaction. In this context, the most frequent used determinants are Mobile Service Integration (e.g., Carrasco and Goss 2014; Carrasco and Fetherston 2011; Georgiadis and Stiakakis 2010), Social Media Integration (e.g., Bertot et al. 2012; Sandoval-Almazan and Gil-Garcia 2012; PwC 2012) Personalization (e.g., Abdellatif et al. 2013; Tang et al. 2013; Youngblood and Mackiewicz 2012), and Ease of Use (e.g., Carrasco and Goss 2014; Accenture 2009).

Considering the second stage, the results of the benchmark analysis ought to provide a set of public E-Services that reflect specific and user-oriented E-Services of public administrations. The outcome of the explorative qualitative Website analysis aims at picturing the current E-Government practice on the local level and identifying specific E-Government trends. On this basis, to generate determinants for the conceptualization of the proposed model, a preselection of important E-Government services that are on the specific level of E-Services has been made. Thus, we were able to complement the findings of the review of research on user satisfaction with E-Government. By comparing the international city portal cases of three different continents in terms of a benchmark analysis, we expect that this approach enriches the conceptualization since the cases are real-world practice oriented (Creswell and Zhang 2009) and facilitates the identification of emerging trends. As is known, "[…] case studies emphasize the rich, real-world context in which the phenomena occur" (Eisenhardt and Graebner 2007, p. 25). Moreover, the decision to apply a case study approach was further driven by the fact that E-Government, being in an early stage and developing fast, is a complex

[2] Apart from the analysis of best practice examples, our explorative Website analysis has considered the city portals of medium-sized municipalities (Berlin and Mainz) as this approach prevents biases for questionnaires development and as the additional medium-sized city portal cases reflect the structure of the basic population for the present study.

phenomenon with heterogeneous adoption behavior of citizens of different municipalities (Venkatesh et al. 2012). In this context, a case study is an appropriate approach to reflect this complex phenomenon and enables theory building (Eisenhardt 1989). In particular, we have therefore analyzed the city portals' service width and service depth in each case based on a qualitative Website content analysis referred to content-related measuring instruments from (Fassnacht and Koese 2006) who originally observe the quality of electronic services. Regarding the methodical approach for a content analysis of city portals in particular, the dimensions offered by a municipality's official Website that has to be analyzed in detail are Accessibility of Information, Relevant Information, Handling Complaints, and Citizen Service (Saez Vegas and Periáñez Cañadillas 2013). In the framework of our qualitative Website content analysis, we have compared the international city portal cases regarding their E-Government services including above dimensions and covering all available informational and transactional public E-Services in terms of a gap analysis. Furthermore, city portals becoming increasingly a holistic access platform based on the concept of virtual communities (Pynnonen and Kytola 2008), we additionally involve the qualitative content analysis called Nentography suggested by (Kozinets 1998). This technique analyses the free behavior of individuals on the Internet to provide useful insights. We have additionally chosen this technique as it facilitates conducting relevant factors that reproduce the reality regarding the service offer of a city portal and reflect the need satisfaction of the individuals more than the appliance of focus groups or interviews. A further advantage over other qualitative research methods is that it reduces self-fulfilling prophecies, as it is conducted using observations in a context that is not produced by the researcher (Kozinets 1998). The results of our qualitative Website analysis indicate that the maturity stages of the considered city portals considerably differ from each other. The E-Government portal of the city of New York offer the widest range of public E-Services including several downloadable forms as well as transactional public E-Services that are available fully online in almost all categories. Compared to the other cases, our benchmark analysis has further shown that the city portal of New York and London can considered top-tier regarding the provision of social media applications followed by Hong Kong. In his context, the city portals of Berlin and Mainz incrementally employing public social media services, however, lag far behind. Furthermore, outcomes of the benchmarking have shown that all considered city portals integrate a search function to facilitate the navigation through public E-Services. However, while analyzing the public E-Service offers of the city portal cases, we have discovered different qualities of Website search functions. Therefore, we have realized that a powerful search function is fundamental for the citizens to locate their public E-Services quickly without getting frustrated. Based on the results of the benchmark analysis, we have identified following determinants: "Social media integration", "Full Online Services", "Downloadable forms", and "Search function".

In the third stage, we have conducted seven qualitative expert interviews that should validate the first and second stages' deductions. In this context, the E-Government experts have evaluated the set of determinates identified in terms of the literature review and the set of determinants identified in terms of the benchmark analysis. Regarding the technology and quality-related determinants identified in terms of the empirical literature review, the experts have majoritarian verified PEoU but not the other factors system quality, and PU. Regarding the presentation of the determinants identified in

terms of the conceptual literature analysis, the expert did not verified the determinants Personalization and Mobile Service Intrgration. The majority of the experts verified all remaining factors identified within the Website content analysis and the benchmarking. Moreover, no other determinants has been added to the determinants of user satisfaction with city portals.

Based on the three-stage analysis, the study has finally identified five determinants of user satisfaction with E-Government city portals: "Social media integration", "Full Online Services", "Downloadable forms", "Search function" and "Perceived Ease of Use". The identified factors are therefore E-Government Service practice oriented, focusing on the concrete level of E-Service applications, matched to the requirements of citizens, and hence are particularly important for an appropriate portal management of today's E-Government. Based on the results of the three-stage analysis, user satisfaction is applied as a dependent variable. We will observe user satisfaction with E-Government city portals and its determinants in more detailed in the following.

3.1 User satisfaction as an endogenous construct for measuring e-government success

Bailey and Pearson (1983) initially have identified user satisfaction as a measure for success concerning computer usage. Since that time, studies of E-Research exploring success have applied user satisfaction as an endogenous construct in different research streams.

In the past decade, scholars and practitioners have realized that satisfaction is as well an important issue in E-Government, which public administrators should focus because, citizens require an effective and user friendly handling of public services since they expect a significant increase of service quality through E-Government portals compared to the traditional way (Schellong and Mans 2004). Furthermore, governments by themselves are interested in moving public administrations from traditional to internet channels, satisfying and committing citizens and enhancing the adoption of E-Government Services due to of cost reduction aspects (Magoutas and Mentzas 2010).

Therefore, user satisfaction is as well highly important for E-Government. The challenge of guaranteeing the adoption and continual usage of E-Government requires that citizens have higher levels of satisfaction with the online service (Liu et al. 2010) that in turn determines success of E-Government (Lai and Pires 2010). Alawneh et al. (2013) who stated, "*User satisfaction is a crucial factor for continual usage of E-Government services and for the success or failure of E-Government projects*" (Alawneh et al. 2013, p. 277), also support this. For the managerial practice of E-Government it is therefore of high relevance to identify the drivers and determinants of user satisfaction of E-Government in order to fulfill citizens need and foster E-Government usage and adoption.

3.2 Determinants of user satisfaction with e-government city portals

Social media integration For the following factor description, see also Wirtz and Kurtz (2016). Within the Web 2.0 technologies social media is at present the fastest growing segment and the current driving force on the internet (Wirtz et al. 2010, 2014b). In this context, today's public administrations are not left unaffected by this trend. An increasing

number of E-Government Websites are integrating social media that "*[...] provides a powerful platform to help government communicate directly with constituents and be more visible on the Web*" (Waseda University 2013, p. 12). According to the United Nations' E-Government Survey 2014, the number of countries applying social media has more than tripled from 2010 to 2012 and increased by another 50 % in 2014. Behind this background, especially citizens being more and more interested in interacting with their administrations via different social media applications (United Nations 2014) benefit from collaborative processes. The results of our benchmark analysis of international city portals shows that the official Website of the city of New York for instance, integrates manifold social media links to 312 social media channels distributed to 12 different applications and platforms, such as Facebook, Twitter, Tumblr, Flickr, YouTube, etc.

However, as social media are becoming ubiquitous and increasingly requested by the citizens, both academics and practitioners need some initial and reliable knowledge about the deployment of social media regarding E-Government to enhance and promote the engagement of citizens, higher levels of transparency, and the relationship between citizens and administrations (Bonsón et al. 2012). Recent scientific research about social media in the context of E-Government indicates that the advantages of social media are able to influence the government-citizen relationship significantly (Linders 2012). The premise for a positive relationship between citizens and administrations is that users are satisfied with the offered services. Despite the game-changing potential of social media to transform public authority operations (Bryer 2011; Lee and Kwak 2012; Meijer 2011), the lack of research that investigates E-Government user satisfaction regarding the integration of social media is surprising. Considering the rapid, extensive integration of ICT into public administrations and the increased citizen's interest in E-Government Service provision via social media channels (Morgeson et al. 2011), the integration of social media on local E-Government city portals may be a crucial factor in determining user satisfaction. Hence, the first proposed hypothesis is as follows:

> H1: An integration of social media into E-Government city portals will positively influence user satisfaction.

Full online services For the following factor description, see also Wirtz and Kurtz (2016). Over the last decade, governments have realized the significance of providing services and information electronically to efficiently improve cost, time, and quality related aspects of E-Government Services (Wirtz and Daiser 2015). In this context, the process of deploying E-Government runs through various stages until it reaches its highest potential stage (Al-Sebie 2014). The two core indicators to measure this process of E-Government service delivery are "online sophistication" and "full online availability" of public services, which are assessed against the five-stage maturity model firstly introduced by the benchmark study of the European commission in 2001. Full Online Services allow for handling cases fully electronic without any appearance at the competent public authority and enables users to obtain government services from a single point of access within a completely and exclusively online interaction, e.g., electronic tax declaration (Al-Sebie and Irani 2005). Capgemini et al. (2012) have pointed out the importance of innovative E-Services such as Full Online Services regarding citizen's needs. The implementation of Full Online Services would foster that

governments and citizens profit by the benefits of digitization of government services as these kind of E-Services offer several advantages for the citizens - primarily including effort, cost, and time savings (Al-Sebie 2014; Capgemini et al. 2012).

From general E-Commerce research, it is known that variables such as effort, cost and time savings positively influence user satisfaction (e.g., Christodoulides and Michaelidou 2011; D'Avanzo and Kuflik 2013; Kohli et al. 2004). In the field of E-Government, existing benchmark studies as well as studies at the academic level have solely proposed conceptual frameworks regarding Full Online Services to understand the maturity of E-Government and to model different stages of E-Services development (Assar et al. 2011). However, they do not empirically test the influence of Full Online Service application on the satisfaction of citizens of local E-Governments. Therefore, this study proposes that the integration of Full Online Services at local E-Governments may influence user satisfaction and hence draws the following hypothesis:

> H2: An integration of Full Online Services into E-Government city portals will positively influence user satisfaction.

Downloadable forms In today's public administration practice, there are different possibilities of interacting. Beside transactional E-Services such as Full Online Services, the possibility of downloading forms has similarly become a ubiquitous and important E-Service. In the context of the five-stage maturity model, downloadable forms refer to the second stage, namely one-way interaction. Here, One-way interaction means, that citizens can download official documents or forms to fill in and post back, without doing an online submission, e.g., to obtain birth/death certificates, permits or subsidies, or applications for license renewals (Al-Hossienie and Barua 2013). According to our Benchmark analysis, New York's city portal is leading regarding the provision of downloadable forms. In terms of the gap analysis, we found that all considered city portals are fostering these kinds of E-services. Particularly, the access to information and services by downloading forms quickly and easily has become extremely important for the user of governmental E-Services. Tolbert and Mossberger (2006) quoted that downloadable forms are examples of more efficient and effective processes through E-Government. The efficiency and effectiveness of public service processes consequently affect the citizens using E-Government Services. Therefore, downloadable forms might be an essential factor for determining user satisfaction. Hence, the next hypothesis reads as follows:

> H3: An integration of downloadable forms into E-Government city portals will positively influence user satisfaction.

Search function Scientific studies of Website design and Website navigation confirm that the search function of a Website is a crucial success factor. Webster and Ahuja (2006) have described that the most popular feature on IBM's Website was the search function, because of the complex site navigation, whereas the second most popular feature was the "help" button, because of the ineffectiveness of the search technology. In the first week after redesigning Website navigation and search function, sales

increased by 400 %. This highlights the significant effects of a powerful search engine of Websites. In this context, Freed (2009) has quoted that the most successful Website is capable to provide the user immediately and effortlessly with searchable information.

Meanwhile, the importance of a powerful and effective search function has also become indispensable for E-Government Websites. The city portal cases of our benchmark analysis all employ search engines on their portals. However, the quality of the search functions considerably differ between the observed E-Government Websites. The city portal of New York for instance provide sophisticated search results as they may be filtered regarding different categories, e.g., events, resources, downloadable forms. Furthermore, related searches are presented and the citizens can sort the results by different aspects. In contrast, the search function of Hong Kong's city portal for example is not clearly arranged and provide poor search results. Given the broad range of governmental Services of today's E-Government web portals, including informational and transactional E-Services, the navigation and especially the search function of E-Government Websites have become very important for the implementation of those E-Government Services (Hermana and Silfianti 2011). Al-Nuaim (2011) has found that an ineffective search function reduces the credibility of the E-Government site's services, and lead to user frustration and dissatisfaction. Against this background, the search function of an E-Government Website is considered as a highly important web element. Therefore, the proposed hypothesis is as follows:

> H4: An integration of a powerful search function into E-Government city portals will positively influence user satisfaction.

Perceived ease of use Additionally to the described E-Government Service applications, this study applies a usage and perception oriented factor, namely perceived Ease of Use (PEoU), which is regarded highly important for the use of and the convenient navigation through the mentioned concrete E-Services that in turn may influence the user satisfaction of E-Government Service applications. The concept of PEoU is deduced from TAM-based research and refers to the user's degree of belief regarding the effortless usage of a technical system (Davis et al. 1989).

With regard to scientific E-Government literature, the concept has been used successfully in a number of studies (Chang et al. 2005; Barnes and Vidgen 2006; Hung et al. 2006; Ozkan and Kanat 2011; Wang 2003). Some scholars adapted the concept of PEoU to the context of user satisfaction regarding E-Government Services. Udo et al. (2012) and Mohamed et al. (2009) have empirically confirmed that PEoU positively influences user satisfaction of E-Government. In this study, the concept can be understood as the perceived ease of use to utilize E-Government Service applications offered by a city portal. Deduced from the TAM and E-Government research about user satisfaction, it is assumed that PEoU has a positive influence on user satisfaction. Thus, the proposed hypothesis reads as follows:

> H4: Perceived Ease of Use of E-Government Service applications of city portals will positively influence user satisfaction.

3.3 Research model

After developing the hypotheses, a research model for user satisfaction of E-Government is proposed and illustrated in Fig. 1. In developing the model, the study has identified a set of determinants that are important for an efficient portal management based on the changed needs of citizens as well as new possibilities for public administration practice, concerning E-Government trends and innovative E-Services. Hence, the proposed research model comprises the above-described determinants, which are all assumed to positively influence user satisfaction of E-Government. Outcomes of the impact of the determinants on user satisfaction are especially relevant considering the local level of E-Government, since city portals are the essential point of contact for citizens compared to Federal E-Governments and States E-Government (Piehler et al. 2014). To the best of our knowledge, no research study up-to-now has empirically examined user satisfaction with E-Government city portals applying determinants that consider these modern and advanced public E-Services in an integrated model.

4 Method and data

This study applies binary logistic regression model to investigate user satisfaction with E-Government city portals based on citizens' perceptions. Social science scholars have recognized logistic regression as an alternative method to linear discriminant function as it is less restrictive (Tabachnick and Fidell 2001). It does not assume linear relationships between the dependent and independent variables. Further, the independent variables are not required to be interval, or normally distributed, nor linearly related (Tabachnick and Fidell 1996). Binary logistic regression suits the purpose of this study since the outcome variable is dichotomous and predictor variables are categorical (Field 2005). The present analyses examines the influence of the determinants described in the proposed research model on the dichotomous outcome of user

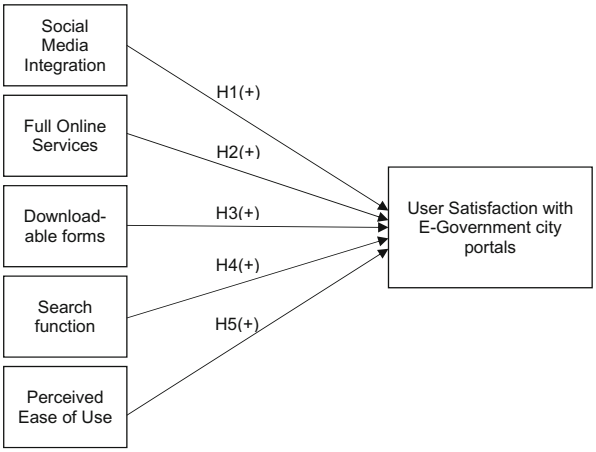

Fig. 1 Research model for user satisfaction with e-government city portals

satisfaction with E-Government city portals by estimating probabilistic relationship of the variables and the outcome using odds ratio (see Appendix A) (Wright 1995).

Therefore, the response variable used in this study have two categories, coded as 'satisfied, 1' or 'not satisfied, 0'. The odds ratio indicates the relative effect on the odds of an event by a one unit change in the independent variable (Homser and Lemeshow 2000). "*The odds ratio illustrates how straightforward interpretation is one of logistic regression's advantages*" (Khoshgoftaar and Allen 1999, p. 306). Furthermore, the advantage over linear regression is that the result is not a prediction of a numerical value, but a probability of belonging to one of two conditions (Kleinbaum 1994). Since it may be inappropriate to drop any variable that theoretically may influence citizens' satisfaction, we have chosen enter method, which is a procedure for variable selection in which all variables in a block are entered in a single step.

A web-based survey has been administered for data collection. To guarantee that the participants are actual users of E-Government Services, we directly collected data from local E-Government city portals in Germany, asking 233 small to medium-sized municipalities to place our survey link on the front page of their city portals (see also Wirtz and Kurtz 2016). This is an ideal survey instrument for the purpose of this study, since the participation of non-portal users should be prevented as far as possible. As a result, 117 municipalities have agreed to participate in the study.

Hence, citizens of the 117 municipalities, who access their city portal to handle their public service concerns, had the opportunity to participate in the survey. To prevent a stimulation of the intention to participate in the voluntary survey no incentives have been offered. Finally, the sample comprises 717 responses with no missing data. The recommended sample size for logistic regression analysis is not less than 100 as otherwise the result will be erroneous (Pampel 2000; Long 1997). Wright (1995) recommends a minimum of 50 cases per independent variable. Thus, the sample size used in this study fulfills the methodological requirements. About two thirds (69.5 %) of the respondents were male and one-third (30.5 %) female with an average age of 46 years. 6.2 % of the participants have finished secondary modern school, 22.4 % have secondary school certificates, 21.7 % have Technical Baccalaureate diploma, 47.8 % have post-secondary school diploma, and 1.8 % have other education. The majority (74.1 %) of the respondents used the internet more than 10 h per week. To reduce systematic bias in the data (Groves 2004), we have calculated the squared Mahalanobis distances to identify questionnaires that are completed but made no sense (Hair 2010). The test results indicate that all questionnaires deliver meaningful responses. Furthermore, we have compared the responses of early participants with the questionnaires that have been submitted later on to check the data for non-response bias (Ruxton 2006). Since late responses in our study did not vary significantly from early ones, non-response bias has not been confirmed in the sample (Armstrong and Overton 1977).

The study uses a single-item measure based on a 5-point Likert scale ranging from '1' "strongly disagree" to '5' "strongly agree". The reason for choosing single-item rather than multi-item measure is that it hence minimizes respondent refusal and reduces data collection and data processing costs (Bergkvist and Rossiter 2007). Furthermore, from a theoretical perspective, single-item use is recommendable as the object of the constructs is "concrete singular", i.e., that it consists of one object that may be imagined easily and uniformly, and the attribute of the construct is "concrete", again

meaning that it is easily and uniformly imagined (Rossiter 2002). Regarding the specific setting of the present study, the use of "concrete" practice-oriented e-Services instead of complex and abstract constructs is a clear argument for using single-item rather than multi-item measure (Sackett and Larson Jr 1990). An empirically based argument for single-item use is that additional items generating synonymous adjectives are hazardous of resulting into another predictive attribute (Bergkvist and Rossiter 2009; Drolet and Morrison 2001). Finally, the use of single-item measure arise from the desire to avoid common method bias, i.e., the rise of correlation of two or more constructs that are measured similarly (Podsakoff et al. 2003). The correlation between the constructs is likely to be increased if they are measured with several identical items rather than a single identical–format item (Bergkvist and Rossiter 2007).

5 Empirical results

Binary logistic regression has been conducted to correctly predict user satisfaction with E-Government city portals. By means of the omnibus goodness of fit test, we have tested the overall significance of the model using the model chi-square (Homser and Lemeshow 2000; McCullagh and Nelder 1989). The test significantly predict that the model fits accurately (χ^2 ($df = 5$) = 394.773; $p = .000$). The addition of the independent variables to the model reduces the deviance (-2log) by 394.773 on five degrees of freedom. This implies considerable variations in user satisfaction with E-Government city portals. The p-value is significant ($p < 0.05$) and shows that the independent variables explain these variations in user satisfaction.

This has been supported by the value for the Cox and Snell coefficient (0.423), which indicates that 42.3 % of the variation in the dependent variable is explained by the logistic model. The Nagelkerke coefficient being an even more reliable test is also consistent with the findings. It shows a strong relationship between predictor and prediction as variance explained is 60.0 %. The collinearity statistics indicate the absence of multicollinearity among predictor variables since for each of the predictor variables the Variance Inflation Factor (VIF) is less than 5 and the value for tolerance is above 0.25 (Belsley et al. 1980).

The following tables illustrate that the model correctly predicts 85.6 % of the cases (Table 1) in comparison to 70.0 % of the predicted cases excluded the independent variables (Table 2). Overall, 70.2 % of respondents who have indicated that they are satisfied with the E-Government city portal have been correctly predicted (Table 1).

Table 1 Classification table[a]

	Observed		Predicted percentage correct
Step 1	How satisfied are you with the e-government city portal overall?	0	92,2
		1	70,2
	Overall percentage		85,6

a. The cut value is,500

Table 2 Classification table[a,b]

	Observed		Predicted (percentage correct)
Step 0	How satisfied are you with the E-Government city portal overall?	0	100,0
		1	,0
	Overall percentage		70,0

a. Constant is included in the model; b. The cut value is,500

The results of the logistic regression analysis are presented in Table 3. The estimated model shows that all factors are positively related to user satisfaction with E-Government city portals because of positive sign and their odds ratios [Exp(B)] lying above 1 (see also Appendix A and B). This indicates that - ignoring other variables - one unit change of the considered independent variable is expected to positively influence user satisfaction with E-Government city portals.

The analysis suggests that only social media integration (H1) is not statistically significant. All other hypotheses (H2-H5) are supported. Perceived Ease of Use (H5) has the strongest influence on user satisfaction with E-Government city portals. Odds ratio indicates that Perceived Ease of Use is 3.532 times more likely to make users of E-Government city portals satisfied than dissatisfied. Regarding downloadable forms (H3), the odds of being satisfied with E-Government city portals are 2.108 greater than the odds for being dissatisfied. Results for search function integration (H4) show that the odds for being satisfied are 60 % higher than the odds for being not satisfied. Considering Full Online Services (H2), a citizen using E-Government city portals is 1.466 more likely to be satisfied than dissatisfied with the E-Government city portals.

6 Discussion of findings, implications, and conclusions

The initial motivation for this study has been the scarce number of research contributions that deal with E-Government on the local level investigating user satisfaction with city portals. In this regard, we firstly identified specific innovative E-Services of the current E-Government environment that are in accordance with citizens' needs applying a mixed method analysis. Hence, the key aim of this study was to propose a model that involves important concrete E-Government Services determining user satisfaction

Table 3 Variables in the equation

		B	S.E.	Wald	df	Sig.	Exp(B)	Hypothesis
Step 1[a]	Social media integration	,142	,165	,744	1	,388	1,153	H1: Rejected
	Full online services	,383	,151	6,433	1	,011	1,466	H2: Supported
	Download-able forms	,746	,176	17,908	1	,000	2,108	H3: Supported
	Search function integration	,470	,155	9,229	1	,002	1,600	H4: Supported
	Perceived ease of use	1,262	,188	45,091	1	,000	3,532	H5: Supported
	Constant	−10,082	,779	167,572	1	,000	,000	

in order to provide policy recommendations to city portal management and expand scientific research regarding concrete E-Service types.

Therefore, we collect a large sample gathering data from actual E-Government users of city portals. The tests for model fit showed that the empirical data accurately fit the model. Consequently, the proposed model of user satisfaction with E-Government city portals is considered utile. In particular, the combination of portal-related determinants such as Full-Online Services or downloadable forms and the traditional usage-related determinant of PEoU allows for a more ambitious modelling approach. Furthermore, the identification of innovative concrete E-Government Services based on citizens' needs reflects the reality more than the sole examination of IS characteristics (e.g., information quality, system quality) of prior research endeavours. By applying this approach, we hope that scientists increasingly disengage themselves from the generic view and the sole adaption of quality constructs of IS models by shifting their focus more on concrete E-Services matched to the current digital opportunities as well as citizens' needs.

Results of binary logistic regression show that almost all hypotheses, with the exception of social media integration, were supported to have significant positive effects on user satisfaction with E-Government city portals. On the one hand, by proving a strong empirical support for the influence of PEoU on user satisfaction with E-Government city portals, our study indicates that the estimated model is a valid measurement since there are comparable results in prior E-Government-related research (Floropoulos et al. 2010; Mohamed et al. 2009; Udo et al. 2012) as well as other E-Research areas on website usability (e.g., Green and Pearson 2011; Mohamed et al. 2014; Ong and Chang 2013). Hence, results are transferable to the public sector and thus, highly important for E-Government practitioners. On the other hand, this study provides new scientific insights since we identified innovative concrete E-Services based on current E-Government trends to determine citizens' user satisfaction with E-Government city portals in an integrated model. Today, it is known that web navigation and especially the quality of the search function of E-Government Websites has become highly important for the implementation of the offered E-Services (Hermana and Silfianti 2011). We found that search function integration into E-Government city portals positively influences user satisfaction. Our results are congruent with the findings of the case study of Al-Nuaim (2011) who detected that an ineffective search function lead to user dissatisfaction.

Further, to enhance the efficiency and effectiveness of public administration processes through E-Government, public management authorities are expected to provide downloadable forms for the citizens (Tolbert and Mossberger 2006). Our results showed that the integration of downloadable forms into E-Government city portals leads to user satisfaction. Besides the integration of downloadable forms, the full online availability of E-Government Services are important for a successful city portal. The main advantage of Full Online Services is citizens' opportunity of handling their concerns fully electronic without any appearance at the competent public authority. According to the rapid development of ICT, citizens increasingly require the provision of Full Online Services due to cost and time saving aspects (Capgemini et al. 2012). Therefore, we supposed that the integration of Full Online Services might influence user satisfaction. This has been supported by the results of our study since the

integration of Full Online Services positively influence user satisfaction of E-Government city portals.

In summary, our study is able to provide a couple of scientific implications for scholars and practical implications for public administration officials to effectively manage city portals. First, the study's content and outcomes showed that a user-centric strategy in designing and implementing E-Government Services at the local level is crucial for a successful portal management. Scientist should therefore increasingly neglect the supply perspective and should foster research considering user-centric studies. For E-Government city portals, an implementation of up-to-date and user-oriented E-Services that involve current E-Government trends is necessary. Thus, for upcoming research on E-Government, it is recommendable to respect current and future trends and involve concrete E-Service types rather than generic and abstract constructs. Based on our benchmark analysis of international city portals and the outcome of the binary logistic regression, this means for the competent public authorities that first they should keep in mind to optimize portal search function to facilitate website navigation. In this way, citizens are able to handle their cases more rapidly and easily without any dissatisfaction. The provision of downloadable forms (Al-Hossienie and Barua 2013) and the availability of Full Online Services (Capgemini et al. 2012) becoming increasingly important for users of E-Government city portals should be fostered by portal management towards innovative and user-centric E-Government Services. Second, our results suggest that city portals' Ease of Use is the fundamental basis for each E-Government project. When setting up E-Government Services, public administration officials should follow the advice of providing a user interface that is easy to navigate and user friendly structured to guarantee an effortless usage of E-Services, to improve its performance, and to ensure citizens' satisfaction. Third, against the fact that the model has not supported the influence of social media integration into E-Government city portals, it should not be completely neglected by portal's management. The reason for the hypothesis' rejection may be the innovation and novelty of integrating social media into E-Government. This fact is also in accordance with the expert opinions. Another reason may be the usage of a traditionalist-sample. However, in the light of social media applications, the integration of a social media site has also become important for E-Government projects since it may help to improve the relationship between citizens and public administrations enhancing communication, interaction, transparency, and participation (Bonsón et al. 2012). Therefore, we suggest that the path of social media integration into E-Government city portals should be maintained. Public authorities should at least be prepared to current requirements of the citizens and the rising importance of implementing E-Government social media sites in the future. This advice emphasizes the expectation of the recent United Nations Survey 2014 that social media surges fast within E-Government city portals (United Nations 2014).

Despite its scientific contribution and practical implications, this study also exhibits limitations. Since the data was gathered using E-Government city portals, a potential self-selection bias cannot be fully expulsed. Furthermore, this study is limited to public E-Services in German municipalities. Although we have carried out an explorative Website analysis of five international top tier first-mover E-Government city portals, the generalization of the results refers to German E-Government city portals. Therefore, cultural specific differences may be relevant in the context of certain user needs and specific concrete E-Services, so that a cross-cultural examination seems to be highly

relevant. Moreover, regarding the identification of concrete E-Services and measurement variables of the subsequent qualitative analyses, this study concerns only a limited period of time and thus does not emulate a long-term span. However, since the present study is one of the first studies that provides a scientific contribution regarding the implementation of concrete E-Government Services, public officials can use our implications for an efficient and effective portal management.

Appendix A

Term	Definition
Logit = Natural log of odds	Regression model that linearly links the logit transformation of predicted probabilities with a set of parameters $\text{Logit}(Y) = \ln(\text{odds}) = \ln\left(\frac{p}{1-p}\right) = \alpha + \beta X$ Whereby; p = probability that Y = 1 and 1-p = probability that Y = 0
Odds	$\left(\frac{p}{1-p}\right)$ = likelihood of p
Odds ratio	Relative effect on the odds of an event by a one unit change in the independent variable. $\frac{\left(\frac{p1}{1-p1}\right)}{\left(\frac{p0}{1-p0}\right)}$, where p_1 = probability of an event given the membership in group 1, p_0 = probability of an event given the membership in group 0. An odds ratio greater than 1 implies an increased likelihood. An odds ratio less than 1 implies a decreased likelihood.

Appendix B

Estimated logistic regression model for user satisfaction with E-Government city portals:

$$\text{Logit}(Y) = -10.082 + 0.142\ X_1 + 0.383\ X_2 + 0.746\ X_3 + 0.470\ X_4 + 1,262\ X_5$$

Whereby;

Y = User Satisfaction with E-Government city portals, X_1 = Social Media integration, X_2 = Full Online Services, X_3 = Downloadable forms, X_4 = Search function integration, X_5 = Perceived Ease of Use.

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