A Critical Analysis of E-Government Evaluation Models at National and Local Municipal Levels

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Abstract: The importance of e-Government models lies in their offering a basis to measure and guide e-Government. There is still no agreement on how to assess a government online. Most of the e-Government models are not based on research, nor are they validated. In most countries, e-Government has not reached higher stages of growth. Several scholars have shown a confusing picture of e-Government. What is lacking is an in-depth analysis of e-Government models. Responding to the need for such an analysis, this study identifies the strengths and weaknesses of major national and local e-Government evaluation models. The common limitations of most models are focusing on the government and not the citizen, missing qualitative measures, constructing the e-equivalent of a bureaucratic administration, and defining general criteria without sufficient validations. In addition, this study has found that the metrics defined for national e-Government are not suitable for municipalities, and most of the existing studies have focused on national e-Governments even though local ones are closer to citizens. There is a need for developing a good theoretical model for both national and local municipal e-Government.

1. Introduction

Following the success of e-Commerce in the late 1990s, a new face of government known as e-Government was introduced (Coursey & Norris, 2008). The European Union (EU) defined e-Government as the use of information and communication technologies (ICT) in public administrations to improve public services and democratic processes (Moraru, 2010). In development, e-Government has lagged behind e-commerce; a survey conducted in the UK said that, while 85% of Internet users have searched for or bought goods and services online, and 50% of users do e-shopping at least once a month, only 39% had interacted with e-Government in the last year (Petricek, Escher, Cox & Margetts, 2006). According to the United Nations (2012) e-Government report, the level of e-Government usage is low worldwide; in EU27 countries, the average usage rate is 32%, and in the Organization for Economic Co-operation and Development (OECD) countries it is about 40%. The United Nations report attributes limited adoption of e-Government mainly to privacy and security concerns plus a lack of usability (whether the site is designed for easy use by citizens). The more citizen-centric e-Government services are and the stronger the user focus, the more likely their adoption is, indicating a shift from what services governments can provide to what citizens really need.

To frame local entities in the e-Government context, the term "local government" defines governments that are not central or national but are state, provincial, regional, municipal, or city governments (Lanvin & Lewin, 2006). Arslan (2008) refers to local governments as municipalities or e-cities, whereas Zevedeos (2006) distinguishes the term *municipal e-Government*, used in Europe, from *local e-Government*, more likely used in the United States. From the e-cities' perspective, Kaylor, Deshazo, and Van Eck (2001) derived a wider definition of e-Government: the ability for anyone visiting the city website to communicate and interact with the city via the Internet in any way more sophisticated than a simple email letter to the city email address. Recent surveys in Europe show that 50% to 80% of the interaction between citizens and government occurs at the local levels (Moraru, 2010). Thus municipalities are key influences in citizens' lives. Focusing on citizen-centric websites, says Moraru , should be at the core of e-Government, and municipalities need to acknowledge and work to improve the online citizen-government relationship.

Precisely how well are e-Governments progressing around the world, and how can one measure website quality? Often e-Government is evaluated by a benchmark, which is a technique for comparing e-Government based on indicators that yield some sort of score (Flak, Olsen, & Wolcott, 2005). A framework or a model is a set of concepts, values, metrics, and practices that represent a method of viewing reality. The importance of developing models lies in their supplying a basis to measure and guide e-Government (Berntzen & Olsen, 2009). It is argued, however, that e-Government research is hampered by a want of comparison or comprehensive analysis of e-Government models. What is lacking is more in-depth analysis and a deeper recognition of e-Government models at national and local levels. Sandoval-Almazan and Gil-Garcia (2008b) stated that research assessing the limitations of e-Government models is scarce. In order to fill a gap in the literature on e-Government evaluation models, this paper has the following objectives: (1) to identify major e-Government evaluation frameworks at national and local levels, (2) to determine the strengths and weaknesses of their methodologies, and (3) to compare the evaluation models and note whether they differ between national and local e-Governments.

This paper is organized into seven sections including this introduction. The second section briefly introduces the concept of metrics, models, and web quality in terms of usability. The third section identifies the methodology followed. The first part of the fourth section considers e-Government models at national level while the second part is about e-Government models at local level, with the limitations of each. The fifth section compares national e-Government models to local ones. Following that is the discussion section, and the seventh section concludes the paper.

2. Web Quality, Metrics and Models

Web quality is still a debatable issue, and there are many parameters for measuring the Web, as different perceptions of quality lead to diverse criteria. Consequently, Web metrics are considered a valuable area of ongoing research (Calero, Ruiz, & Piattini, 2005)**.** Gibson (2006) says that the lion's share of research in Web development is focused on website usability and metrics. Other researchers such as Signore (2005) and Calero et al. (2005) have also noted that website quality is defined in terms of usability. Aikio (2006) has described usability as a measure of the success of a product, whether it is software, computer systems, or any other product. To define an appropriate set of metrics, one needs to determine a list of quality factors that are important for an object (Freire, Fortes, Turine & Paiva, 2008). So Web metrics cannot be regarded as one-size-fits-all and existing research indicates that they differ, to some extent, by website categories, such as government and commerce (Hong, 2007). For a website to be successful there must be a match among the organization's objectives, the user's goals, and the website's design (Bélanger et al., 2006).

According to the Association for Computing Machinery (ACM): "Usability engineering, also known as human-computer interaction engineering, is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and the study of major phenomena surrounding them" (Folmer & Bosch, 2004). User-centered design is a broad philosophy, and there is a variety of methods for designing usable systems that place the users at the center of the design (Hasan, 2009). Thus, Web usability has moved from being a "nice-to-have" to being a "must-have" (Yan & Guo, 2010). Usability cannot be measured directly, however, it needs to be decomposed into specific attributes and then into metrics. The form of measurement structure is a model or criteria system used to describe usability quality (Li, Yu, & Liu, 2010).

3. Methodology

A critical analysis of e-Government evaluation models at national and local levels was undertaken. The methodology of this research follows systematic online searches in order to find major e-Government models developed since the year 2000, which represented the onset of e-Government models (Hu, Xiao, Pang & Xie, 2005; Montserrat, 2010). A cross-search among several computer and technology databases was employed to retrieve related articles. The literature review spanned the broad spectrum of journals specifically focused on e-Government benchmarking and evaluation. Hence, a large number of models assessing national e-Government were found in the literature, while less research has addressed the area of local e-Government models. To the best of our knowledge, we did not find research that covered e-Government models at national and local levels under one umbrella.

Hence, the data collected includes about 60 scientific articles examining different aspects of national and local e-Governments in addition to a large number of well-established e-Government reports that have been

published periodically by international organizations\companies such as the United Nations (UN), Accenture, and Capegemini. Table 1 presents a sample of e-Government studies and the models they addressed.

Table 1: Sample of E-Government Evaluation Models

References	E-Government Models
Rorissa, Demissie & Pardo (2011)	UN, West, Layne & Lee
Sandoval-Almazan & Gil-García (2008a)	UN, Layne & Lee, Moon
Andersen & Henriksen (2006)	UN, Layne & Lee, World Bank, Moon
Arslan (2008)	UN, West, Layne & Lee, Moon, KEeLAN, UN Digital Governance in Municipalities
Berntzen & Olsen (2009)	UN, West, Accenture, Layne & Lee
Bevan (2005); Scowen (2007); Ivory & Megraw (2005)	HHS guidelines
Coursey & Norris (2008)	UN, Layne & Lee, Gartner
Denfeld et al. (2002)	Community Benchmarks Program (CBP)
Flak et al., 2005	UN, West, Accenture, Capgemini, MeGAP
Heeks (2006)	UN, West, Accenture, Capgemini
Hu et al. (2005)	UN, West, Accenture
Jansen (2005)	UN, West, Accenture
Kaylor et al. (2001)	MeGAP
Kunstelj & Vintar (2004)	UN, West, Accenture, Capgemini, KEeLAN
Montserrat (2010)	UN, Capgemini, MeGAP, Gartner, Layne & Lee, UN Digital Governance in Municipalities
Moraru (2010)	West, MeGAP, Layne & Lee, World Bank, UN Digital Governance in Municipalities
Salem (2008)	UN, West, Accenture, Capgemini

Further, an analysis of e-Government up to the year 2004, conducted by Kunstelj and Vintar (2004) categorized existing e-Government approaches by the aspects (indicators) they cover: 1) e-readiness includes readiness of government, citizens and businesses to e-participate; 2) the back-office includes the reengineering and digitalizing processes within the administration; 3) the front-office consists of a number of online services and information (a. supply-side; b. demand-side); and 4) their effects and impacts. Also the authors have showed that the majority of e-Government studies focused on the front-office supply side, "the government", and less on the demand side, "the citizens and businesses", while largely neglecting the back-office and the impact of e-Government. Rorissa et al. (2011) attributed that trend to the expensive data collection and complex processing of the back-office approach. Therefore, this research will not address other e-evaluation tracks such as the driving success factors behind e-Government, including social utilization and e-readiness, e.g. the availability of ICT infrastructure and online penetration. Also, it is beyond the scope of this research to consider the effects and impacts of e-Government. Other critical variables, such as usability, are discussed in this paper for the sake of understanding some e-Government models that included usability as a measurement attribute.

The main purpose of this research is to identify major e-Government models, whether national or local ones, and to pinpoint their weaknesses and problems as well as their strengths. For our analysis, we selected the well-known and frequently cited e-Government models in the academic community and the practice field. At the national level, we adopted and extended the classification of e-Government models proposed by Schedler and Schmidt (2004). Since fewer basic models were proposed on local e-Government, we intend to describe all that we found. Therefore, for this study, the sample of national e-Government models includes the UN, West (or Brown University), Accenture, Capgemini, Gartner, Layne and Lee and HHS guidelines. For municipal evaluation models the sample includes the UN Digital Governance in Municipalities Worldwide, MeGAP (Municipal E-Government Assessment Project), CBP (Community Benchmarks Program), and KEeLAN (Key Elements of Electronic Local Authorities' Network).

4. e-Government

By 2012, most countries had embraced e-Government with varying levels of success; of the 193 United Nations Member States, only three countries were not online, so about 98% of the world's countries have

government websites available on the Internet (United Nations, 2012). In spite of a variety of descriptions, there is still no standard accepted definition of e-Government. The World Bank conceives e-Government as the use of ICT, such as the Internet and mobile devices, to transform relations with citizens and businesses, and between branches of government (Lanvin & Lewin, 2006). According to the United Nations (2008), e-Government is the use of ICT to improve the activities of public-sector organizations and deliver services to citizens. A common intersection between different e-Government definitions is the digitization of governmental operations and processes.

E-Governments reduce travel and waiting time (moving processes from in-line to on-line), eliminate corruption, reform government, increase transparency, enhance the relationship between government and citizens, and ultimately develop democracy (Al-adawi, Yousafzai, & Pallister, 2005). E-services are cheaper, faster, and readily available 24/7. Practical examples of e-Government's financial benefits include the Information Network of Kansas generating a revenue of 7 million USD per year and Singapore e-Tax saving SGD 20 million per year (Mohammad, Almarabeh, & Ali, 2009).

4.1 e-Government Evaluation Models at National Level

A model is used to derive suitable indicators for evaluating various e-Government initiatives (Berntzen & Olsen, 2009). The importance of creating such models lies in its offering a basis to measure and guide e-Government development by drawing attention to best practices. Actually, the construction of e-Government models began in 2000 (Montserrat, 2010). Inspired by Schedler and Schmidt (2004), we propose to classify the e-Government models into three kinds: organizations and consultancy firms, scholars, and official government models.

5. Organizations and Consultants e-Government Evaluation Models

Several organizations tried to understand the e-Government phenomenon by constituting models which are divided further into different numbers of stages of growth with specified features that must be fulfilled in each stage. Heeks (2006) has confirmed that stage models have their origins in private-sector e-commerce models, and Yildiz (2007) has said that e-Government is studied by developing models of its stages. Unfortunately, there is no agreement among organizations on the number of stages and requirements. The most established e-Government evaluation reports, published periodically and cited frequently, are identified in Table 2.

Table 2: E-Government Evaluation Models developed by Organizations

Model	Focus	Stages			
UN 2002	Worldwide	Emerging	Enhanced	Transactional	Connected
Brown University 2001	Worldwide	Billboard "Information"	Services Delivery	Portal	Interactive Democracy
Accenture 2000	22 Developed Countries	Publish Passive/Passive Relationship		Interact Active/Passive Interaction	Transact Active/Active Interaction
Capgemini Europe 2002	European Countries	Information	One-way Interaction	Two-way Interaction	Transaction

5.1 The UN Model:

The United Nations has been assessing e-Government since 2002 (Berntzen & Olsen, 2009). Initially, the UN e-Government model was described by Rutgers University as a three-stage model (Montserrat, 2010). Currently, it is well established and widely used in many studies, and it has two indices: the e-Government index (Table 3) and the e-participation index. The e-Government index ranks e-Governments worldwide at the national and ministry websites. Each of its three measures (online service, telecommunication infrastructure, and human capital) is a composite index that can be analyzed independently, with a value between one and zero. The

recent online-service index was based on a four-stage e-Government model: emerging, enhanced, transactional, and connected presence, with specified features for each stage (see United Nations, 2012).

Table 3: The UN E-Government Model (United Nations, 2012)

First Class Index	Second Class Index	Third Class Index
Overall Development	Online-service Measure	Emerging presence
		Enhanced presence
		Transactional presence
		Connected presence
	Telecommunication Infrastructure Measure	PCs / 100
		Internet users / 100
		Broadbanding / 100
		Telelines / 100
		Mobile phones / 100
		TVs / 1000
	Human-capital Measure	Adult literacy rate (%)
		Combined gross enrolment ratio for primary, secondary, and tertiary schools (%)

5.2 The Brown University (West) Model

Professor West and his research team at Brown University have conducted an annual evaluation report of government websites since 2001 (Berntzen & Olsen, 2009). The report analyzes government websites worldwide for the presence of 18 features, such as phone and address contact, publications, audio and video clips, number and type of e-services, privacy, and security policies. The ranking runs along a scale from zero to 100 points (West, 2008): 4 points for the presence of 18 features totaling 72 points, and one point for one service up to 28 points for 28 or more e-services. Moraru (2010) recognized West's stages as: (1) Billboard: online government information; (2) Service delivery; (3) Portal: "one-stop shop" concept, security, and privacy; (4) Interactive democracy.

5.3 The Accenture Model

Accenture is a consulting, technology services, and outsourcing company that has been issuing annual e-Government reports on developed countries since 2000 (Hu et al., 2005). The original Accenture model included two dimensions -customer relationship management (30%) and service maturity (70%) - with two indices: the number of online services (service breadth) and the level of service completeness (service depth). Service maturity is decomposed into the following stages (Peters, janssen & Engers, 2004): (1) Publish—passive/passive relation: no communication between users and government; (2) Interact—active/passive interaction: only users can e-communicate with government; and (3) Transact—active/active interaction: two-way communication is possible.

Berntzen and Olsen (2009) record some modifications on the Accenture rankings. The 2005 Accenture index had two components, each with a weight of 50%, service maturity and customer service maturity, which were measured by four dimensions: citizen-centered, multi-channel, cross-government service, and proactive communication about the services to users. Four hundred citizens in each evaluated country were questioned about their country's e-services, and interviews of 46 high-ranking government executives were conducted. The 2007 report introduced a new indicator, citizen voice (40%), reducing the weight of service maturity to 10%.

5.4 The Capgemini Europe Model

Capgemini (2006), a company specializing in consulting, technology, outsourcing, and local professional services, focuses on evaluating the e-presence and sophistication of government websites in 32 European countries. According to Capgemini (2010), the survey benchmarks 20 basic online services, 12 services to citizens, and 8 services to businesses with the following indicators: online sophistication, full online availability, user experience (usability, transparency, privacy, multi-channel policy, and users' feedback), and portal sophistication (most mature, user-centric, and personalized portals). Basic citizen services include income tax, job search, social-security benefits, personal documents (passports, driver's license), car registration, building permission application, declaration to the police, public libraries, birth and marriage certificates, enrollment in education, announcement of moving house and health-related services. The online sophistication and availability rankings assess the 20 public services against four stages in the 2006 report then against a 5-stage maturity model in the 2010 report: information, one-way interaction, two-way interaction, transaction, and automation threshold (proactive, automated service delivery).

5.5 Scholars E-Government Models

Sparse contributions to this vital subject are still evolving, as several scholars offer their own insights. The first e-Government model was proposed by Baum and Di Maio (Gartner model) in 2000 and has four stages: Web presence, interaction stage, transaction stage, and transformation stage (a citizen-centric and responsive government) (Montserrat, 2010). Another highly cited e-Government model was proposed by Layne and Lee (2001) with reference to the USA in four stages: catalogue, transaction, vertical integration (connecting government agencies), and horizontal integration (one-stop portal) (Andersen & Henriksen, 2006).

5.6 Official Government Frameworks

Several governments developed their own official frameworks to help designers build high-quality e-Government websites. A good example is the USA Research-Based Web Design and Usability Guidelines created by the Department of Health and Human Services (HHS) according to the best available up-to-date research. The HHS guidelines were praised by some researchers such as Scowen (2007), Bevan (2005), and Ivory and Megraw (2005). These guidelines are widely used by government agencies and private sectors, and also translated into several foreign languages. The project began in 2000 with 500 guidelines, but shortly was reduced to 398 and now 209 guidelines. Each guideline has a rating for its "Relative Importance" to the success of a website and a rating of the "Strength of Evidence" supporting the guideline. To determine the "Relative Importance," eight website designers and eight usability specialists assigned each guideline a rating from 1, for the least important guidelines, to 5, for the most important. The "Strength of Evidence" represents a consensus among a group of 8 usability researchers so that the users can verify the quality of the supporting evidence (HHS, 2013).

5.7 Limitations of National E-Government Evaluation Models

The majority of models, such as the UN, Capgemini, and Brown, are based on objective measures and follow a quantitative approach; only Accenture uses hybrid measures (Salem, 2008). The quantitative method may lead to a dilemma if not designed properly. Curtin (2006) has said that higher ranking may not predict better performance, since most surveys do not evaluate qualitative issues such as the quality of service or the citizen usage of e-Government. Furthermore, Jansen (2005) has showed that a number of experts have interpreted the framework differently.

Another problem with most of these models is their focusing on the supply side (government) not the demand side (citizen and business) of e-Government (Berntzen & Olsen, 2009). Two examples of the supply-side models are West and Capgemini, while the demand-side models are like Gartner and HHS guidelines (Rorissa et al., 2011; Flak et al., 2005; Scowen, 2007). The imbalance of the abundance of government-side surveys compared with the scarcity of citizen-side studies has led to a misinterpretation of the final objective of e-Government. The existing practices are pushing countries to prioritize getting good ratings for creating many services without caring whether citizens use them or not (Montserrat, 2010). Accenture tries to overcome this shortcoming and uses interviews to determine the citizen's point of view.

Unfortunately, most countries launch e-Government through the "quick fix, quick wins" principle and hastily construct the e-equivalent of a bureaucratic administration (Kunstelj, & Vintar, 2004). Usually, countries reach the second stage easily and quickly, as it takes no great effort to supply information, forms, and emails. In contrast, a website that advances from stage 3 to stage 4 has to go through tremendous changes that require massive efforts and resources to provide transaction and a one-stop portal (Rorissa, Demissie, & Pardo, 2008).

In fact, the conceptualization into stages is doubtful. There has been some criticism aimed at stage models, focused on the evolutionary aspect and the quality assumptions of these models: 1) The assumption that evolutionary stages are independent seems not to be true empirically. An e-Government website may have characteristics of multiple stages; 2) The assumption that evolutionary stages are consecutive, linear progressing and higher stages include lower stages, seems not to be true empirically also. The models predict that the e-Government evolutions occur in pre-described order; first stage 1 occurs and then stage 2 and so on, but in practice the stages occur simultaneously. It could be that some e-portals had characteristics of advanced stages but did not have features from the early stages (Sandoval-Almazan & Gil-Garcia, 2008a, 2008b; Goldkuhl & Persson, 2006).Other researchers have criticized Web metrics proposed for Web systems because they tend to be simplistic and define very general criteria (Signore, 2005) or are not well defined at all (Calero et al., 2005). There is a rush to develop more Web metrics without any kind of validations, which may make the use of them dangerous and difficult. Calero et al. (2005) have found 3% of metrics in the literature validated theoretically and 37 % validated empirically; there are also hundreds of Web metrics available, but no guidelines for their use. The lack of evaluations of existing metrics leads researchers to develop more new metrics without knowing how similar these metrics are or what each metric is measuring (Vigo & Brajnik, 2011).

The UN model is widely used by many studies, and it is unique in including three measures (Berntzen, & Olsen, 2009). Yildiz (2007), however, has concluded that the UN and Layne and Lee models are oversimplifications. Abanumy, Mayhew, and Al-Badi (2003) have criticized the UN model for being too general and having too many features. The problem in ranking occurs when a website covers some but not all features in a certain stage; then, it cannot be ranked correctly as belonging to any stage, and it is difficult to distinguish between a ministry that fulfills 100% of the stage features and one that fulfills just 20%. The authors have tried to solve this problem by splitting each UN stage into three layers.

The Brown University reports lack a detailed description of their e-Government methodology (Schellong, 2009). They give more weight to the number of features and too little to services, underestimating their importance. A government website offering 28 services is presented as equal in score to another website offering hundreds of services, because the maximum score for services is 28. In addition, the reports check only the presence of services without measuring their quality. Rorissa et al. (2008) have examined the profiles of two government websites according to the Brown University model and concluded that the model may suggest inaccurate conclusions. A country with a single e-Government website may have the same e-Government index value as a country with five websites. Another criticism for the Brown University model is that it has decreased its measurement criteria over the years; in 2001, 2002, 2003, 2004, 2005, and 2006, the number of measures were 24, 25, 20, 19, 19, and 18, respectively (Holzer & Kim, 2005). Consequently, there were inconsistencies in annual rankings from year to year; for instance, Portugal has fluctuated in ranking from position 182 to 133, 31, 86, 43, 48, 7, and then 18 in an eight-year period (Schellong, 2009).

Essentially, the strength of the Accenture model lies in the evaluation of the maturity of e-services following a hybrid methodology, quantitatively assessing the breadth and depth of e-services and qualitatively appraising the customer service delivery. Another strength is the new indicator introduced in 2007, "citizen voice," which integrates user views of e-Government. On the other hand, this model's main weakness is its continual changes in methodology and measurements, which make it impossible to compare e-Government rankings over the years (Berntzen & Olsen, 2009). Furthermore, Accenture provides no details of measured services and their maturity scores. Thus, the calculation of the indices is not reproducible. Kunstelj and Vintar (2004) have implied that Accenture lacks an evaluation of integrated services, and since it focuses on only 22 countries, this model is limited in its application.

The most common critique of the Capgemini model is its focus on the government side only. Also, Kunstelj and Vintar (2004) criticize the Capgemini for its measuring the availability of 20 public services despite some of

these services bringing no value to customers. They add that highlighting the technological side of e-Government without considering the quality of information and usefulness of services will miss important qualitative aspects of e-Government. A further problem is that higher stages of the model do not necessarily imply the existence of lower stages: for example, a service can reach stage 3 or stage 4 without offering downloadable forms. In addition, this model is narrow in its scope, being concerned only with European countries. However, the Capgemini (2009) report has claimed a paradigm shift toward customer-centric services. New patterns of relations go from the "you-centric" model to the "me-centric" model, changing the role of the user from that of a passive viewer and user to that of an active creator of the public-service delivery chain.

Scowen (2007) has praised the official American HHS guidelines for being supported in the Human Computer Interaction (HCI) field, and Ivory and Megraw (2005) have said that they are clear and have been validated empirically. Bevan (2005) has compared them with the ISO 9241-151 standard and the JISC (Joint Information Systems Committee) guidelines for the UK academic websites. The JISC carried out an extensive search to adapt the best guidelines to its services, and thus confirmed the superiority of the HHS guidelines even though they were not exhaustive and omit some material specific to e-commerce. The study also shows how subsets of the HHS guidelines can be tailored for particular audiences. Nevertheless, very few studies assess these guidelines. One can say it may be difficult to evaluate a website against too many guidelines (currently 209 guidelines). When Nielsen (1993) succeeded in condensing usability principles to only 10 heuristics, many researchers adopted his evaluation and built upon it. Likewise, it may be better for the HHS to work on providing the Web community with a shorter list of guidelines.

Formerly mentioned frameworks revealed that many e-Government reports were based on different measurement instruments, which explains the difference in e-Government rankings and the disparity of conclusions. Furthermore, several scholars of e-Government are skeptical about the e-Government rankings and have justifiably argued that existing e-Government frameworks have some methodological limitations (Schellong, 2009; Yildiz, 2007; Rorissa et al., 2011; Sandoval-Almazan & Gil-Garcia, 2008b). Their analysis shows a messy picture of the measurement of e-Government. Yildiz (2007) has indicated that the "stagi-est" approach to e-Government is unsatisfactory and that the development of stages does not necessarily follow neatly in a linear order. He adds that such models are not applicable to e-Government, especially in developing countries. Ataloglou and Economides (2009) and Peters et al. (2004) have concluded that a good theoretical framework for measuring the impact of e-Government is still lacking. Schellong (2009) has said that a relevant and universally accepted e-Government model still needs to be developed.

From the preceding discussion, it is evident that there is no generally accepted comprehensive e-Government evaluation framework and no universal standard for assessment at the national e-Government level (Ataloglou & Economides, 2009; Jansen, 2005).

5.8 Municipal E-Government Evaluation Models

Most of the frameworks evaluating municipal websites are based on Moon's work. Moon (2002) has proposed a framework of five stages: information dissemination/catalogue, two-way communication, service and financial transactions, vertical and horizontal integration, and political participation. Having surveyed 1,471 US e-municipalities with populations over 10,000, he has found that larger municipalities are more advanced in e-Government; nevertheless, they are still at an early stage of development and have not reached many of their expected outcomes. The four most popular local e-Government models within the literature are the following.

6. Digital Governance in Municipalities Worldwide

Co-sponsored by the UN, this benchmark compares the largest e-cities globally every two years since 2003. It is still the only framework that evaluates municipal websites worldwide in terms of digital governance, which includes digital government (delivery of public service) and digital democracy (Holzer, You, & Manoharan, 2009). Moon (2002) selected the largest city in a country to represent that country regardless of its advances in e-Government; the UN study sampled cities by the same principle. Montserrat (2010) considers the sampling in this survey to have been biased, but its methodology remains constant over the years. The instrument for assessing city websites consisted of five components: security and privacy, usability, content, services, and citizen participation. The research applied 18–20 measures coded on either a scale of 1:

information exists on the website; 2: downloadable items are available; and 3: services, transactions, or interactions are completely online, or a dichotomy of two points, (0, 3) in the "service" and "citizen participation" and (0, 1) in the "privacy" and "usability" categories. Hence, the survey instruments used 98 measures (see Holzer et al., 2009). To ensure reliability, each municipal website was assessed by two evaluators who were given clear instructions.

7. MeGAP

The MeGAP (The Municipal E-Government Assessment Project) is an assessment tool for US municipal websites emphasizing online service provision. Kaylor et al. (2001) surveyed 38 American cities with a population between one and two hundred thousand people and developed a rubric for evaluating them. Functional performance dimensions were grouped into 12 categories containing 51 e-services. To rank municipalities, each service was scored on a 1–4 scale (information, contact, downloadable forms and transaction or interaction) that yielded an e-score corresponding roughly to the stage model concepts (Flak et al., 2005). In 2005, a third version of Kaylor's survey maintained the original framework, but the catalogue expanded to 68 local services in 4 categories (Montserrat, 2010; Flak et al., 2005): (1) Information dissemination (city codes, minutes, traffic information, municipal government directory); (2) Interactive functions (bidder applications, downloadable forms, building permit process, business license); (3) E-Commerce functions (utility payment, tax look-up and payment, code enforcement); (4) E-Democracy (e-meetings, e-forums, user customization).

8. Municipal Website Assessment of Community Benchmarks Program

The Maxwell School at Syracuse University established the Community Benchmarks Program (CBP) in 1999 and developed a website assessment instrument to evaluate e-municipalities in Onondaga County. Denfeld et al. (2002) re-evaluated the previous study and devised the following assessment criteria:
- Information available: municipal meeting, minutes, budget, downloadable forms, date of website update;
- Contact information: phone and fax numbers, e-mail, physical address;
- Architecture: search, site map, link function properly, link to home page provided;
- Continuity of Web design: consistent design of all pages;
- Search engines: placement of the municipality's website on Yahoo, Google, and MSN for official name, popular name;
- General: responsiveness of town clerk, unique features of each site (both well and poorly executed), broken links.

The 2002 report assigned each attribute a score of 1, if the website met the criterion, or 0, if it did not. An example of a blank evaluation form for the "Information Available" criteria is in Table 4.

Table 4: An Example of a blank evaluation form (Denfeld et al., 2002)

	Information Available			
	Attribute	Yes	No	Comment
1	Date of **next** town/village board or city council meeting (acceptable in place of the date is, i.e. third Monday of the month)	1	0	
2	Location of town/village board or city council meeting	1	0	
3	Time of town/village board or city council meeting	1	0	
4	Agenda of next town/village board or city council meeting (posted within 48 hours of meeting—use last meeting agenda if necessary)	1	0	
5	Minutes of the last town/village board or city council meeting held within the last two months	1	0	
6	Archive of past board or council meeting minutes	1	0	
7	Minutes can be downloaded	1	0	
8	Budget for the current fiscal year	1	0	
9	Downloadable forms	1	0	
10	A date is provided for the most recent Web update	1	0	

9. Key Elements for Electronic Local Authorities' Network (KEeLAN)

The Key Elements of Electronic Local Authorities' Network (KEeLAN) is a local e-Europe government framework and is also known as "Framework Programs." Started by e-Europe research, the KEeLAN framework is divided into two phases measuring e-Government and back-office development. The e-Government stages are divided into six phases: stage 0: no Web presence; stage 1: information (about services); stage 2: interaction (downloading forms); stage 3: two-way interaction (processing of forms including authentication); stage 4: transaction (full case handling); stage 5: service integration (online service enabled by a secured network linked to various back-offices/service modules). The stages are exactly the same as in the Capgemini model, except the last one. In this context, a Web assessment tool contains questions to evaluate e-cities on 9 basic services: policy making, economic development, personal documents, credit and loans/financial support, education, building permits, environment, culture and leisure, and information dissemination. Depending on the interactivity, a score is computed to indicate the stage of the service (Arslan, 2008).

9.1 Limitations of Municipal E-Government Evaluation Models

Even though most of the time the interaction between citizens and government occurs at the local levels, one can find very little research that describes or analyzes existing local e-Government models. In fact, there is a disproportionate number of studies focusing on national e-Government models compared with that of studies targeting local e-Government models (Heeks, 2006).

Nevertheless, the UN's "Digital Governance in Municipalities Worldwide" is still the only international survey of e-cities. By supporting two different models, the UN implies that there is a difference between assessing central e-Governments and assessing local ones. The methodology of digital governance has remained constant over the years, so its rankings of cities are comparable and remarkably informative. On the other side, Montserrat (2010) regards the sampling in this survey as biased. Also, the survey gives no justification for the framework measurement evaluation criteria, which constitutes a major weakness in the methodology. Each municipal website was assessed by two evaluators given clear instructions (Holzer et al., 2009). But, no information was given about the evaluators' backgrounds and their degree of expertise.

For the MeGAP of the US e-municipalities, Flak et al. (2005) believed that this model gives a more detailed analysis of the depth and breadth of municipalities than any other assessment model; but, on the other hand, the MeGAP lacks a firm theoretical foundation, doesn't assess usability, and it is a country-specific model. The major drawback of the Community Benchmarks Program is that it focuses only on the supply side of e-Government. Since the two models are similar, the KEeLAN model suffers from the same problems as Capgemini (quantitative approach, focus on government only).

9.2 Comparison of National and Municipal E-Government Models

There is still no agreement on how to measure e-Government and devise metrics for the Web. At the national level, the existing e-Government models are very similar and are based on analogous attributes and measures; they view e-Government as stages of growth and adopt four or five stages: Web presence, interaction, transaction, integration (portal), and e-participation or e-democracy (included in few models).

On the other hand, Yildiz (2007) has criticized the "stagi-est" approach to assessing national e-Government and complained that there is no agreement on the number of stages and requirements. Toonders (2010) has deemed it unclear whether the same stages of national e-Government are useful for describing local e-Government. Norris (2009) has cast doubt on the adequacy of stage models in municipalities. He used survey data from US municipalities over three years (2000, 2002, and 2004) and empirically examined how e-Government has developed in practice and contrasted this with the predictions of the models. The US e-municipalities did not progress through stages as anticipated. They were informational with fewer transactions and interactions and had not evolved into e-democracy yet. Norris attributed that to the e-Government models having been developed in a vacuum and not being based on research or even reviews of literature, so that, even after 10 years of adoption, e-Government has not reached higher stages of development in most countries.

Again Norris and Reddick (2013) addressed the trajectory of US local e-Government using empirical data from two nationwide surveys of American local governments conducted in 2004 and 2011. They found American

local e-Governments are delivering information and services online with few transactions and limited interactivity and they are mainly one way, from government to citizens, with no evidence that it is transformative. The authors also presented more empirical studies of e-Government; for example: service has been the primary focus of e-Government in various locations such as the United Kingdom (McLoughlin and Cornford 2006), Canada (Roy 2006, 2007), Australia (Dunleavy et al. 2008), the Arab nations (Chatfi eld and Alhujran 2009), and Italy (Nasi and Frosini 2010). This is consistent with the conclusion of Sandoval-Almazan and Gil-Garcia (2012) who said that almost a decade after the publication of a similar study on U.S. municipalities by Moon (2002), the results of their assessing Mexican local e-Government remain very similar. They believed that e-Government in municipalities is still more rhetoric and less reality, at least in some countries. In fact, the e-Government experience differs dramatically from the national to the local level and from one country to another. Montserrat (2010) believes that the indicators and metrics defined for national e-Government are not applicable at the local level He asks, "Why are there no benchmarks at local government?" Collecting comparable data about e-municipalities is a difficult task because of differences in political and economic systems. The different role played by cities is one of the challenges that scholars must address. Montserrat also confirms a clear lack of local e-Government evaluation models. Heeks (2006) says that most studies focus on national e-Government, although in developing countries it is local governments that are the main point of contact for delivery of services. Most public services that are relevant to citizens are offered by the local e-Government, and this is a possible source of error in the assessments (Berntzen & Olsen, 2009; Schellong, 2009).

Through its development of two models, the UN demonstrated the difference between assessing national and local e-Governments. For assessing state portals, Sandoval-Almazan and Gil-Garcia (2008a) identified three approaches: 1. managerial, 2. evolutionary (e-Government stages) and 3. citizen-centered perspectives. Using a mixture of the last two approaches, they assessed 32 Mexican portals against a six-stage model and also against other important variables such as usability, openness, customization, transparency, e-services, privacy, security, etc. Another contribution by Goldkuhl and Persson (2006) is a proposal to replace the one-dimension stage models (called e-ladder) by a three-dimension e-diamond model consisting of three polarities (informative vs performative, standardized vs individualized; separate vs coordinated).

Upon analyzing existing normative models on municipalities (Table 5), it is noticeable that some of them, such as the UN Digital Governance in Municipalities and CBP, focus on general aspects of the site such as content and services. They avoid the concept of stage models and instead regard local e-Government as different components or categories. Other models such as, the KEeLAN and MeGAP, follow the stage model (Arslan, 2008; Flak et al., 2005). Also worth mentioning are the individual efforts by some authors, such as Sandoval-Almazan and Gil-Garcia (2008a), Moraru (2010) and Luna, Gil-Garcia, Luna-Reyes, Sandoval-Almazan & Duarte-Valle (2013), who use a mixture of e-Government stages and some other components they perceived important in the evaluation of municipal websites.

Table 5: Two Kinds of Municipalities Models

Models	Kind of Model	Descriptions				
Digital Governance in Municipalities Worldwide 2003	Components	Security/Privacy	Usability	Content	Services	Citizen Participation
Community Benchmarks Program 1999	Components	Content	Architecture		Layout	Website Design
MeGAP 2001	Stages	Information	Contact		Downloadable Forms	Transaction or Interaction
KEeLAN 2002	Stages	Information	1-way Interaction	2-way Interaction	Transaction	Service Integration

10. Discussion

There is still no agreement on how to measure governments online, and this has become a valuable area of ongoing research. The situation remains arbitrary since there is a rush to develop more e-Government models without any validations, and most of these models are not based on solid research. Several scholars,

such as Schellong (2009), Yildiz (2007), and Rorissa et al. (2011), are skeptical about the e-Government rankings, and their analyses show a confusing picture of e-Government.

We have classified three kinds of national e-Government models : organizations' models (UN, Brown University, Accenture, and Capgemini), scholars' models (such as the Gartner model and the Layne and Lee model), and official government models (e.g. USA Research-Based Web Design and Usability Guidelines). For local e-Government, the most popular models are the UN Digital Governance in Municipalities, the U.S. MeGAP, the Community Benchmarks Program, and the KEeLAN Europe model.

The common limitations of most e-Government models include focusing on the government rather than the citizen side, using quantitative measures, and not considering qualitative issues such as the quality of services, constructing the e-equivalent of a bureaucratic administration, or defining very general criteria without sufficient validations.

The UN national model has been widely used by many studies, but it has been criticized for being too general and having so many features. The Brown University model assigns more weight to the number of features and too little to services. The Brown and the Accenture models have changed their measurement criteria over the years, so they are inconsistent in their annual rankings; the Accenture model, moreover, lacks an evaluation of integrated services and has been applied to only 22 countries. The Capgemini model, limited to European countries, focuses on the government side only and checks the availability of e-services without measuring their quality. Some studies have praised the official American HHS guidelines for being clear and validated empirically, but it is difficult to evaluate a website against 209 guidelines.

It is hard to find research that discusses the limitations of e-Government model at the local level. Nevertheless, the UN model of Digital Governance in Municipalities is still the only international survey of e-cities, and its methodology has remained constant over the years. On the other hand, no justification has been given for its evaluation criteria, nor any information about the evaluators' backgrounds. Although it gives a detailed analysis of municipalities, the MeGAP is a country-specific model particular to US municipalities and also lacks an assessment of website quality. The major drawbacks of Community Benchmarks Program and the KEeLAN models are their focus on the government side and consideration of only quantitative measures.

Comparing national with local e-Government models has revealed interesting findings. The existing e-Government models are very similar in viewing e-Government in terms of stages of growth. Many, however, have criticized th "stagi-est" approach; the stages are not independent or consecutive, and there are no agreements on the number of stages and requirements. Furthermore, the adequacy of stage models for assessing municipalities is suspected. Some of the existing local government models avoid the stage approach and instead adopt the concept of viewing local e-Government as a different component.

The model requirements for e-Government vary from those for e-commerce, the e-experience differs from national to local governments, and there is a disparity between cities in politics, economics, and type of public services. Thus, the metrics defined for national e-Government are not applicable to municipalities, and the different roles played by cities make the development of a city model far more challenging for scholars.

Most studies have focused on national e-Governments despite local governments being the main point of contact with citizens, and this may lead to misreading the aims of e-Government. Thus, there is a clear lack of local e-Government evaluation models. Most e-Government reports, however, have focused on the government, thus enhancing the image of the government and not prioritizing citizens' needs or facilitating their lives. Yet, a complete view of e-Government in cities is not possible (Montserrat, 2010). Also e-Government has had too little user testing to convey the voices of citizens. A well-developed citizen-centric website could greatly benefit the outcomes expected from e-Government.

E-Government models use good practices to assess development, but they are still an inaccurate reflection of the real situation. It is evident that there is no comprehensive e-Government evaluation model and no standard for assessment; therefore, there is a genuine need for developing a good theoretical model for national and local e-Governments that are clearly distinct.

11. Conclusion and Future Research

This research examined major e-Government evaluation models at national and local levels. The stage model approach seems to be the prevailing trend in the evaluation of e-Government and has been taken for granted even though many studies have showed its limitations, as described earlier in this paper. We believe, like Goldkuhl and Persson (2006), that the use of e-Government stage models seems to be misleading and erroneous and should be abandoned. Another solution that exploits the strengths and reduces the weaknesses of this method could be to think about it as components rather than stages (Sandoval-Almazan & Gil-Garcia, 2008b).Then the right combination of components should be the focus of future research. A good proposal here is to include, in such a way, a combination of website quality and e-services quality.

Also we fully support a more comprehensive evaluation, such as the study of Luna et al. (2013), which considers the front-office factors (information, interaction, transaction, integration and participation) and other factors such as technology (number of internet, computers, mobile users), organization\institution (government efficiency index), and context (global competitiveness and infrastructure indexes).

The UN model seems to have more strength at the national level because it is comprehensive and has three indexes of measurement: online service, telecommunication infrastructure, and human capital (see Table 3). But this applies only under one condition: to think of the stages as components. At the local level, the UN Digital Governance in Municipalities seems to be the most solid because it is comprehensive and assesses five important components (security and privacy, usability, content, services, and citizen participation). It could stand one improvement, however: the evaluation criteria under each component should be amended based on validated metrics, such as the HHS guidelines.

The field of local e-Government needs further research. The general country structure is important in the development of an evaluation model, as online services differ from country to country due to differences in political and economic systems (Moraru, 2010; Montserrat, 2010; Flak et al., 2005). Thus, each country can determine its e-services by reviewing its political system and conducting polls to determine citizens' needs.

E-Government is not delivered through websites only and not restricted to a specific technology. As technology evolves, e-Government is extending to different delivery channels, such as mobile devices (e-Government) and new platforms like social media (Twitter, Facebook, etc.). Montserrat (2010) stated that local administrations are introducing web 2.0 technologies into e-services, and yet there are no e-Government stage models that take them into account. Sandoval-Almazan and Gil-Garcia (2012) reckoned that without a plan and set of rules, social media could become disorganized and provide poor results. Therefore, we intend to address this subject in a future paper.

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