Benchmarking e-Government: A comparison of frameworks for computing e-Government index and ranking ☆

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ABSTRACT

Countries are often benchmarked and ranked according to economic, human, and technological development. Benchmarking and ranking tools, such as the United Nation's e-Government index (UNDPEPA, 2002), are used by decision makers when devising information and communication policies and allocating resources to implement those policies. Despite their widespread use, current benchmarking and ranking tools have limitations. For instance, they do not differentiate between static websites and highly integrated and interactive portals. In this paper, the strengths and limitations of six frameworks for computing e-Government indexes are assessed using both hypothetical data and data collected from 582 e-Government websites sponsored by 53 African countries. The frameworks compared include West's (2007a) foundational work and several variations designed to address its limitations. The alternative frameworks respond, in part, to the need for continuous assessment and reconsideration of generally recognized and regularly used frameworks.

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1. Introduction

International organizations, such as the United Nations and the World Bank, regularly undertake significant studies to produce rankings of countries on a wide range of features, including information and communications technology. The benchmarked facets include healthcare (World Health Organization, 2000), education (Dill & Soo, 2005), press freedom (Reporters Without Borders, 2009), corruption and governance (World Bank, 2009), e-readiness (Hanafizadeh, Hanafizadeh, & Khodabakhshi, 2009), e-responsiveness (Gauld, Gray, & McComb, 2009), peace (Institute for Economics and Peace, Economist Intelligence Unit, 2010), happiness (New Economics Foundation, 2009), sports (e.g., FIFA, 2010), and – of primary importance to this paper – e-Government (United Nations, 2010, 2008, 2005, 2004, 2003; West, 2007a; UNDPEPA, 2002). The rankings draw on various types of indices, such as the human development index (UNDP, 2009; Haq, 1995), the e-readiness index (United Nations, 2005), the global peace index (Institute for Economics and Peace, Economist Intelligence Unit, 2010), and the e-Government index (UNDPEPA, 2002).

Benchmarking indices and indicators are generally quantitative in nature, and collectively form a framework for assessment and ranking.

Some frameworks are based on measurable characteristics of the entities; others use one or more subjective measures; a few employ a combination of both. Frameworks based on grounded and broadly applicable measures tend to attract fewer criticisms. Those based on subjective measures often result in controversies and complaints, especially from those countries or institutions who believe that they were not accurately characterized. To maximize the acceptability of results, rankings should be based on well understood and supported frameworks and indices, and sound computational procedures.

e-Government indices are benchmarking and ranking tools that retrospectively measure the achievements of a class of entities, such as government agencies or countries, in the use of technology. Policymakers and researchers use e-Government benchmarking studies to help monitor implementation of e-Government services, using the information to shape their e-Government investments (Heeks, 2006; Osimo & Gareis, 2005; UNDPEPA, 2002). The results of benchmarking and ranking studies, particularly global projects conducted by international organizations, attract considerable interest from a variety of observers, including governments (ITU, 2009). e-Government benchmarks are used to assess the progress made by an individual country over a period of time, and to compare its growth against other nations.

Among the first organizations to propose an e-Government index and rank countries on the basis of their e-Government service delivery was the United Nations Division for Public Economics and Public Administration (UNDPEPA, 2002). The United Nations followed up revisions and other proposals (United Nations, 2010, 2008, 2005, 2004, 2003; UNDPEPA, 2002). Others have also contributed proposals for

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benchmarking e-Government (West, 2007a, 2007b, 2004; Bannister, 2007; Ojo, Janowski, & Estevez, 2007) and e-readiness (United Nations, 2008; Bakry, 2003).

Despite their wide use, the current procedures for computing e-Government indices have significant limitations. For instance, they do not differentiate between websites that provide static information and those that are full-service portals (e.g. highly interactive). Further, the frameworks tend not to account for the stages of e-Government development and whether websites are proportional to the nation's level of development.

In this paper, we propose a number of procedures for computing e-Government indices, expanding the current frameworks by introducing techniques that account for the stages of development of e-Government services, as suggested by Al-adawi, Yousafzai, and Pallister (2005); Affisco and Soliman (2006), and others United Nations (2010, 2008); UNDPEPA (2002); Layne and Lee (2001). As a foundation for our presentation, we review various classification models of e-Government development, then discuss benchmarking generally and in terms of e-Government. The article continues with an overview of the sample data. We then present and compare six separate frameworks for computing e-Government indices, each accounting for slightly different factors. Finally, we offer some conclusions and recommendations for future work.

2. Background

This section provides a definition for e-Government as it will be used throughout the article. Following this definition, e-Government service development classifications are explained. The final two sub-sections address benchmarking e-Government and West's framework.

2.1. e-Government defined

The definition of e-Government varies from the very generic—"use of ICTs and its application by the government for provision of information and public services to the people" (Curtin, 2007); "any use of ICT in public administration and services" (Bannister, 2007, p. 172) – to the more specific – "the delivery of government information and services online through the internet or other digital means" (West, 2004, p. 16); the "delivery of government services over the internet in general and the Web in particular" (Bannister, 2007, p. 172). For this effort, we adopt West's (2004) definition – the delivery of government services over the internet – because it focuses on "front-office" services, specifically, those available over the World Wide Web. Even in the context of this slightly narrower conceptualization, the implementation of e-Government services can take various forms ranging from a single website with contact information (address, telephone and fax numbers, email address, etc.) to an interactive, consolidated gateway to integrated services at all levels of government, from local to federal/national. To adequately discuss benchmarking, the definition of e-Government must be supplemented by a classification of e-Government service development.

2.2. e-Government service development classifications

Several classifications for e-Government development have been proposed, but four of the most prominent studies are discussed here. One of the earliest e-Government development classifications, created by Layne and Lee (2001), featured four stages: (1) cataloging, (2) transaction, (3) vertical integration, and (4) horizontal integration. At the cataloging stage, the website provides an online presence with cataloged information (e.g., phone numbers and addresses) and downloadable forms. A transaction stage website offers online transactions, supported by a database (e.g., citizens may renew their licenses and pay fines on-line). A website at the vertical integration stage links local and higher-level systems (e.g., a drivers' license registration system at a state department of motor vehicles is linked to a national

database of licensed truckers). At the final horizontal integration stage, the website assimilates different functions and services across government agencies (e.g., a business can pay its unemployment insurance to one state agency and its state business taxes to another state agency, using the same interface or without uploading information several times).

In their studies, the UNDPEPA (2002) and the United Nations (2008) described e-Government service development in five stages: (1) emerging (an official government online presence is established), (2) enhanced (government websites increase; information becomes more dynamic), (3) interactive (users can download forms, email officials, and interact through the website), (4) transactional (users pay for services and conduct other transactions online), and (5) seamless (e-services are fully integrated across administrative boundaries). In their 2010 e-Government survey, the United Nations (2010) merged "interactive" with "transactional," and renamed "seamless" as "connected," establishing a four-stage order of emerging, enhanced, transactional, and connected.

The four-stage, e-Government service development presentation of Affisco and Soliman (2006) and Al-adawi et al. (2005) creates the following order: (1) publishing (web presence), (2) interacting, (3) transacting, and (4) transforming (integration). According to this classification, a website at the publishing stage presents only static information, while one at the interacting stage has features such as form download, search, and simple data collection. At the transacting stage, the website features online task processing without a requirement that citizens travel to the relevant offices. At the transforming or integration stage, a single-point portal integrates all e-Government services by all branches of government at all levels. The first two stages are "relatively easy to achieve, as supplying information, application forms and email addresses online involves no great effort or any change in existing operations. The development of the real transaction services, however," is more difficult, requiring significant investments in back-office systems (Kunstelj & Vintar, 2004, p. 133).

In all the classifications discussed above, the technological and organizational complexity and the integration of services and functions increase as the websites move from lower to higher stages. In general, as e-Government websites advance through the stages, "they pass through many thresholds in terms of infrastructure development, content delivery, business re-engineering, data management, security and customer management" (United Nations, 2008, p. 14). We chose Affisco and Soliman (2006) and Al-adawi et al. (2005) four-stage model because it captures the essence of most of the models in Table 1 and it is one of the most cited.

2.3. Benchmarking e-Government

Benchmarking compares two or more institutions or entities using a set of indicators. It has long been used to evaluate and improve businesses. The first benchmarking activity was conducted at Xerox, leading to the adoption of processes that helped the company lower costs and improve performance (Watson, 1993; Camp, 1989).

Over the years, benchmarking methods and frameworks devised for businesses have been adopted by and/or applied to public sector and

Table 1
A comparison of classifications of the stages of e-Government development.

(Layne & Lee, 2001)	(United Nations, 2008; UNDPEPA, 2002)	(United Nations, 2010)	(Affisco & Soliman, 2006; Al-adawi et al., 2005)
Cataloging	Emerging	Emerging	Publishing (web presence)
	Enhanced	Enhanced	
Transaction	Interactive	Transactional	Interacting
	Transactional		Transacting
Vertical integration	Seamless/networked	Connected	Transforming (integration)
Horizontal integration			