



## Assessing web services of emerging economies in an Eastern country – Taiwan's e-government

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### ABSTRACT

Accessibility of much country-level information and many web services, originating from governments are a global standard. The governments of emerging economies in the eastern countries especially need to adopt, without undue delay, the advanced technologies for providing better web services to their citizens. However, consideration and evaluation of the effectiveness and efficiency of governments' web services is currently lacking in previous literature. Thus, this study first adopts a computational approach suggested in the literature to measure the *effectiveness* of Taiwan's established, city- and county-level (25 cities and counties, and 1411 governmental units) governments' websites. Then, by considering the IT-related input and output resources as suggested by the experts of e-government during several in-depth interviews, data envelopment analysis (DEA) evaluates the *efficiency* of Taiwan's governmental web services. This study reveals that the well-developed web services provided by Taiwan's government are apparent in two geographically dispersed cities (north and south) and one county in the northern region of Taiwan. In addition, six cities and counties appear to be ineffective and inefficient in providing web services to Taiwan's citizens due to their geographical remoteness from the capital and small regional populations. An additional finding confirms the significant effect of population size on Taiwanese services for e-government in each city and county. Finally, this study suggests applying more attention to website designs for different levels or regions of governments and building alternative communication channels for citizens with different backgrounds. Consequently, providing citizens' most-requested services becomes easier, and the resources' distribution becomes effective and efficient for those in different geographical locations. This study's findings represent a reference for providing better electronic publicly accessible services, and a benchmark for scholars conducting further research in this area.

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### 1. Introduction

The importance of the internet for communication between the government and the public has been growing (Miranda, Sanguino, & Banegil, 2009). Since the initial proposal of the concept for e-government, numerous researchers focused on relevant issues. In the subject areas of policy-making, strategic planning, success factors for implementation, and system development, researchers have mainly discussed theories for e-government and proposed insightful suggestions. However, most prior studies utilized qualitative research methods in general and emphasized theoretical reinforcement without attention to practical applications (Heeks & Bailur, 2007).

The studies exploring the issues related to the development of e-governmental systems have become increasingly important since people's use of e-governmental systems is more common (Shan, Wang,

Wang, Hao, & Hua, 2011). For example, every administrative agency or unit in Taiwan already has its own website. Taiwanese people's lives currently appear to be typically more convenient than before due to some well-developed web services. Since the web services have become more popular in Taiwan, city and county governments are accessible, on-demand, and available to serve local populations. To this end, an imperative is assessing the development of systems for e-government. However, Taiwanese counties' and cities' e-governmental services differ greatly from each other in terms of developmental levels and quality due to the influences of geography or populations' environments. Cardo and Williams (2004) indicated that the studies assessing effectiveness and efficiency of e-governmental systems are relatively rare.

To compensate for the gaps in assessing effectiveness and efficiency, the purpose of the current study is to evaluate Taiwan's e-governmental services by measuring both city- and county-level websites according to their electronic performances. The degree of success of Taiwanese e-government services, relating to effectiveness and efficiency, can become a reference-point for practical operation and implementation by governmental agencies in other countries and for scholarly studies in the future.

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## 2. Literature review

### 2.1. e-Government

e-Government began to receive attention and rapid development when the internet began to commercialization in the 1990s. With the development of more and more web-based technologies, governments of emerging economies (in eastern countries especially) quickly adopted the new methods for improving levels of service to become comparable with other western or more developed countries, and importantly, for providing better and more extensive services. Taking advantage of the electronic processes, the goal for governments' operations should be to achieve, internally, enhanced administrative efficiency and reduce costs. Externally, services should offer, the public and businesses access, to include, 24-hour all-weather services or so called "single-window" services, improve public participation, update democratic mechanisms, and so on (Gil-Garcia & Pardo, 2005; Gore, 1993; OECD, 2003; Reschenthaler & Thompson, 1996; Scholl, 2005; West, 2004). People's perceptions and their relationships with governments' web services have, consequently, changed in several aspects. For example, people develop more trust in governments, since the web services afford rapid delivery of information to people, and availability of more transparent information retrieved from the governments' websites (Moon, 2003; Tolbert & Mossberger, 2006). As populations, including press groups, interest groups, and political parties, have more channels of communication with governments, willingness to become involved in the public decision-making processes or supportive of instituted policies increases; this expanded participation needs propagation in different regions of the country (Chadwick, 2003; Korac-Kakabadse & Korac-Kakabadse, 1999). Overall, e-governmental services allows *effective* management of internal information (e.g., personnel, budgets, and procurements) as well as provision for *effective* services (e.g., application for documents, solving problems of military services, and filing tax returns).

However, even though people are living in an information society, the digital divide may remain characteristic of some regional governments, due to limitations of IT-related budgets and unequally distributed resources. In addition, the Research, Development and Evaluation Commission of the Taiwan's Executive Yuan (The Executive Yuan is the executive branch of the Taiwan government) initiated a four-stage promotion project in 1998, with a completion target of 2016, for Taiwan's e-governmental services (Note: Except for the first stage, each stage is four years). As a result, this promotion project implemented in Taiwan is currently at the last stage: Towards High Quality e-Government Services. The core concept of the fourth-stage's promotional project, called DNA, consists of three components: Device, network and application. The DNA objectives over three areas: to provide active services to the public and to enrich citizens' quality of life, to provide universal e-government services to citizens and help develop a caring society, and to strengthen citizens' interaction with government and enhance public participation. In the current fourth stage of the promotion project, Taiwanese governments' outreach with public relations has become more and more important, and the expectation is that Taiwanese citizens will interact with various levels of governments by utilizing various web services, such as email, message boards, forums, etc. When providing those interactive tools, the governments should include evaluation of their websites' designs (i.e., *effectiveness* and *efficiency*) in order to provide customized, user-centered features to citizens.

### 2.2. Assessment methods

#### 2.2.1. Effectiveness

Regarding current indicators used to assess the operational performance of e-governmental services, three different trans-national professional organizations are conducting research of the developmental status and effectiveness of the governments in their e-services offerings around the world: NRI (the Network Readiness Index),

BEG (the Benchmarking E-Government), and GES (the Global E-Government Survey). All three indicators contain the same evaluation concepts for the fundamental structures of e-governmental services. However, BEG does not include specific assessment items related to effectiveness of web services provided by the governments; NRI does not include the developmental dimensions of human resources and developmental stages for governmental websites. Only the GES developed by the World Market Research Center and Brown University (U.S.A.) contains 24 user-oriented assessment items, which target effectiveness of a given government's web services. Specifically, GES gives each kind of government's services a point for assessing effectiveness since all web services have the potential of inclusion as an e-governmental service.

The GES overall assessment report evaluates each country according to the categories: (1) The basis of information services, such as address and phone contact information, database, audio and video services, index page, and links to other sites; (2) Advanced services, such as e-mail updates, links to portals and digital signatures, and online broadcasts; (3) Other thoughtful services, such as designs offering foreign languages, privacy, disability access, and security. West (2007) from Brown University adopted the GES assessment method to evaluate effectiveness of governments' web services among 198 countries, including Taiwan, over a seven-year period (2000 to 2007). The GES assessment method calculates the average of points gained from the summation total points possible, multiplied by four to the numbers of well-done items designed on governments' websites plus the numbers of available online services provided by the governments. As a result, West's research found a strong force from Asian countries, which represent emerging economies. Three of the top four in the ranking are: South Korea, Singapore, and Taiwan, in that order. The United States, ranked fourth in the rating for e-government, precedes the United Kingdom and Canada. In addition, GES is not only applicable for comparing countries, but also is suitable for assessing cities and counties within a country. For example, Rorissa and Demissie (2010) adopted the GES assessment's methods to analyze the effectiveness of web services provided by every city government in the South Africa. Rorissa and Demissie were then able to provide concrete suggestions to regional governments.

Thus, several reasons exist for adopting GES in the current study: First, GES has a high degree of feasibility for analyzing individual websites. Second, collecting detailed data from governments to complete the assessment is difficult, but easier when accessing their websites. Third, identical assessment items for regional governments achieve fairness due to differences among different counties and cities. Last, the website, a bridge of communication between governments and populations, renders ranking regional governments' web services meaningful.

#### 2.2.2. Efficiency

Prior studies usually assess a company's efficiency by calculating its productivity. The main purpose is to determine the company's economic efficiency, divisible according to two efficiency indexes: Technical efficiency (TE) and allocative efficiency (AE) (Farrell, 1957). Thus, several financial indexes allow conducting varied statistical analyses, such as analysis of variance and factor analysis, for assessing a company's overall operational performance. Currently, scholars frequently adopted Farrell's concept of *efficiency frontier* to propose other assessment methods for calculating efficiency. One method, parametric approach, can produce a production function to assess efficiency by using statistical analysis. The other method, developed by Charnes, Cooper, and Rhodes (1978), is the non-parametric approach or data envelopment analysis (DEA). In specific, Charnes, Cooper and Rhode used linear programming techniques to assess efficiency without predicting any function or considering terms for errors. They developed the CCR model emphasizing the selection of variables for inputs and also only measuring a company's overall TE. However, without considering a company's AE, the CCR model does not account

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