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ABSTRACT

Most of nations, states and cities are implementing or have already implemented their e-government systems. China government is pursuing its e-transformation. It has distinctive characteristics different from developed countries because of its culture, political architecture and its changing economy. How should we evaluate its e-government effectiveness? Based on some theory and thorough analysis of China situation, this paper designs an assessment model of e-government in China, which consists of three dimensions, nine factors and 42 variables. This model could be used as the framework to set up specific assessment model for China different e-government systems.

Keywords

E-government, assessment model, China.

INTRODUCTION

As the advent of Internet has started to impact the way organizations think about and design their relationships with customers and partners, public sector organizations are now starting to understand the enormous benefits of leveraging Internet technologies to improve internal processes as well as interactions with external constituencies through electronic government systems (Chircu, 2003). E-government is about making the full range of government activities – internal processes, the development of policy and services to citizens – available electronically (Bourn, 2002).

According to the investigation of UNESCO (United Nations Educational, Scientific, and Cultural Organization), 89% of the countries in the world have promoted the development of e-government in different degrees. In China, the national government is making a point of e-government construction and realizing it as an effective way to promote the national modernization. In August 2001, former Premier Zhu Rongji proposed and established the National Information Working-Leading Group. On its first session, the five major policies about China's e-society were put forward. From then on, almost every provincial and local government has made their e-government strategies and plans. In Jan. 2002, National E-Government Standardization Committee was organized, which indicated the beginning of working on China e-government standardization. In April, the e-government application demonstration project came into operation. The General Office of the State Council and the Ministry of Science and Technology organized this project. Six central ministries and six local provinces and cities involved in it. The National Decree No. 17 issued as of July 2002 indicated a brand new stage of the whole planning and development of China e-government. The decree declared the framework of China e-government strategy, which announced two platforms, one portal website, four databases and twelve business systems would be built. In Sep. 2002, on the China E-Government Strategy and Planning Seminar, the preferential projects of the State level e-government were notarized, and one officer from the State Council Information Office expressed clearly that "three Networks, five Databases and 12 Systems" of e-government initiatives were the keystone of the State informationalization. In 2002, the two new released regulations-- "Provisional Regulations on the Bid Invitation and Tendering for Notional Key Construction Projects" and "Rules and Regulations on the People's Republic of China Government Purchasing" pushed the government public bidding into operation. The Service Center of E-Government has united the social organizations to set up the Evaluation and Validation Center of E-Government as well as the Consulting Expert Council of E-Government. The IT investment in e-government is increasing at annual rate of 20%. The whole market size of e-government in China has reached 34.38 billion, including 24.61 billion for hardware and 4.914 billion software, and 4.856 billion for information service in 2002. There have been 7200 government units who have set up their own websites. Official businesses online are in progress (China E-Government Report, 2003).

Existing research on the subject of e-government can be classified into a few broad categories on the basis of the issues that have been investigated. These categories are 1) IT implementation and adoption in the context of the government organizations, 2) local government use of Geographical Information Systems, 3) making government organizations more customer-oriented via e-government, 4) defining and measuring e-government success and 5) enabling democracy via e-government (Jain,2003). Measurement of e-government, as the IT effective measurement, is very important for making e-government strategy, improving the e-government effectiveness and increasing efficiency.

In the process of building China e-government, such questions are important and need to be answered: What are the objectives of e-government systems? What capabilities should an e-government system have? What are the measurements of e-government? How to build effective e-government systems? In order to answer these questions, we visited more than 30 China public sectors and investigated Chinese governments working process, their regulations, e-government strategies and some initiatives, and navigated government websites. Based on the investigation, we referenced some IT theory and current e-government research results to categorize the objectives of China e-government into three sets, one of which has its own sub-objectives and measurements. These factors constitute e-government assessment model.

In the second section, this paper reviews some IT measurement theories, analyzes existing practical measuring tools. In the third section, we analyze characteristics of China government administration, and put forward and present a three-dimension assessment model. Finally, we discuss the future research on the model.

THORETICAL AND PRACTICAL FOUNDATIONS

IT Benefit Measurements

Generally, e-government refers to the use of information and communications technologies (ICT) to fundamentally change and improve the functioning of government (Jain, 2003). By UN definition, e-government is utilizing Internet and the world-wide-web for delivering government information and services to citizens (UNPAN 2002). From this point of view, e-government is the IT application to public sector organizations.

The measurement of IT success or effectiveness is critical to the understanding of the value and efficacy of IT management actions and IT investments. This research has long been a subject of intensive research. In 1992, based on the communications research of Shannon and Weaver (1949) and the information "influence theory" of Mason (1978), as well an empirical MIS research studies from 1981-1987, a comprehensive, multidimensional model of IS Success-- D&M model was postulated by DeLone and McLean (1992). The model consists of six interrelated dimensions of success: SYSTEM QUALITY, INFORMATION QUALITY, SYSTEM USE, USER SATISFACTION, INDIVIDUAL IMPACTS, and ORGANIZATIONAL IMPACTS. From 1993 to mid 1999, 144 refereed journal articles and 15 papers from the International Conference on Information Systems (ICIS) that have referenced the D&M Model (2003). Among them, Seddon (1997) model is attractive. Barua et al. (1995) utilize a multistage, process-oriented study to measure the first-order and higher order impact of IT. Mukhopadhyay (1998) uses such an approach to understand how EDI benefits an organization. Subramaniam (2002) also uses such an approach to evaluate B2B e-procurement benefits to an organization. Weill (1992) classified IT investments based on the three types of organizational objectives: strategic, informational, and transactional. He suggested that it was possible for a single IS to have objectives of all three kinds. Mirani (1998) used such an approach to set up an instrument for assessing the organizational benefits of IT projects.

Measuring the value of information technology (IT) investments, in general, and e-government investments, in particular, is a relatively new concept in the public sector. Although a business case has long been an integral part of the IT investment process in private sector organizations, public sector entities are still in their infancy in the business value-oriented approach regarding their IT adoption decisions (Chircu, 2003). The following are some practical instruments and model for e-government assessment or development.

UNPAN E-Government Index

In determining what defines an enabling environment, UNPAN E-Government Index report analyses the critical issues by benchmarking the core areas endemic to national e-government programs. The final measure or e-government index attempts to: 1) objectively quantify these critical factors and 2) establish a "reference point" for which a country can measure future progress. The e-government index presents a more inclusive and less subjective measure of a country's e-government environment. It incorporates a country's official online presence, evaluates its telecommunications infrastructure and assesses its human development capacity. The index identifies underscores and weighs the importance of the requisite conditions which enable a country to sustain an e-government environment that ensures every segment of its population has unconstrained access to timely, useful and relevant information and services. The results of the index tend to reflect a

country's economic, social and democratic dimension of development. Industrialized nations, whose citizens enjoy the benefits of abundant resources, superior access to information and a more participatory relationship with their governments, rank well above the mean e-government. Now the Global Index is 1.62(UNPAN, 2002).

Accenture E-Government Index

Accenture uses overall maturity index to measure e-government (http://www.accenture.com). Overall maturity is a combination of service maturity and CRM. This measure gives a 70 percent weighting for service maturity and a 30 percent weighting for CRM. This weighting is reflective of the fact that, at this stage of e-government development, the existence and sophistication of service provision is more important than the style of delivery. Service maturity measures the dimension to which a government has developed an online presence. It takes into account the number of services for which national government is responsible that are available online (Service Maturity Breadth), and the dimension of completeness with which each service is offered (Service Maturity Depth). It has three sub-factors: 1) information publish, through which government information is published on the web sites; 2) interaction, through which government can communicate with public in one-way or two-way; 3) transact, through Internet all the services can be conducted. Service maturity overall is the product of service maturity breadth and service maturity depth. Customer Relationship Management is a measure of the sophistication of service delivery; thereby helping citizens gets the best value from their online interaction with government. There are five measures of CRM: insight, interaction, organization performance, customer offerings and networks.

E-GOVERNMENT ASSESSMENT MODEL IN CHINA

We use practical investigation and theoretical analysis methodology to set up the e-government assessment model because China e-government has different characteristics from developed countries. We visited more than 30 China central or local government departments, such as central and local People's Congress Committees, People's Political Consultative Committees, Commissions for Discipline Inspection, Departments of Supervise, and Audit Bureaus, Police bureaus, Offices of Receiving Claims from People. We focused on collecting information about their working objectives, performances and future reform possibility. Because these are the basis of variables of e-government assessment model in this paper. Through investigation, we find China e-government is obviously different from the western developed country because China, as a developing country, lags behind the Western developed country and has unique political system and economic system. E-government relates to every aspect of the society and the change of life styles of people directly. So we must fully consider China's unique tradition culture, social ideology, economic reform and education foundation of population. China has five particularities in the process of building e-government (Luo, 2002; Gong, 2002). Firstly, the information infrastructure of China lags far behind Western developed country, such as USA and Britain. Secondly, China's regional disparity is enormous, which means digital gap. The gap of the information infrastructure between developed area and undeveloped area is very huge. It is the reality in China that the internationalized cites such as Beijing and Shanghai, and poor areas such as Gan Su and Tibet coexist. Thirdly, the policy of developing economy is crucial for China government. China should deal with e-government as economic development impetus. Fourthly, China has its unique political system. China e-government should accelerate the process of China democratization. Lastly, because China government is of centralized state power system, monitoring and supervising are very important for effectiveness and efficiency of government.

Then, we analyze some theories about e-government. There are many views on the objectives of e-government. Linden (1994) thinks all organizations are struggling to meet the tough new competitive standards—speed, convenience, efficiency, increased productivity- in order to become more competitive, flexible and profitable. The federal government's use of information technologies is to exchange information and services with citizens, businesses, and other arms of government (White House, 2003). The use of Internet is to bring constituents, information, suppliers, public sector employees and governmental agencies together (City of Fullerton CA Website). The use of digital technologies is to transform government operations in order to improve effectiveness, efficiency, and service delivery (CFOC, 2001) (Jain, 2003). It is believed that e-government has the potential to reduce the size of government, reduce the cost of government, save citizens time and make convenience in dealing with government, empower citizens to take greater control of governmental legislative and administrative affairs and make government more accountable, responsive and customer focused (CEG 2001) (Jain,2003); and preliminary evidence indicates that government agencies have saved money and increased accuracy of data by offering forms online (Schwarz 2003). The public sector organization's objectives also are the objectives of implementation of e-governance (OECD, 2003):

- e-administration- refers to improving of government processing and of the internal workings with new ICTs.

- **■** e-democracy- implies greater and more active citizen participation and involvement enabled by ICTs in the decision-making process.

- **■** e-services- refers to improved delivery of public services to citizens and private organizations. Some examples of interactive services are requests for public documents, requests for legal documents and certificates, issuing permits and licenses. Through e-services, public organizations will gain and make social and economic benefits.

Considering China government's characteristics we put forward the exploratory assessment model of e-government. This model reflects three objectives of China government and e-government--to increase the efficiency through internal office automation, to be more transparent and democracy by monitoring from different level entities, to make more social and economic benefits through providing e-services, which are consistent with the above objectives by OECD (2003) These three objectives are the three dimensions of China e-government assessment model. First dimension is the maturity of e-administration. Second dimension is the monitoring and supervising. Third dimension is the social and financial benefits. Each dimension consists of three different factors. Each factor could be explained by several variables. These variables are flexible, so different e-government systems can select different variables to measure maturity of specific e-government. This exploratory model is only a framework for e-government assessment.

Maturity of E-Administration

Maturity of e-administration reflects the efficiency of processing and of the internal workings with ICT in governments. Three factors are office-automation maturity, e-collaboration maturity and e-service maturity.

Office-automation maturity is the degree of government office automation. We can measure it with the following variables, such as the internal communication, information publish, information sharing, automation of work flow, automation of document management, distance office, IT training for staff.

E-collaboration maturity is degree of collaboration between different government departments with ICT. E-collaboration helps different government work in an integrated process, improving whole government efficiency. We can measure it with the following variables, such as information sharing between units, access authority, information delivery timely, information delivery safely, compatibility of different systems.

E-service maturity measures government delivery of its services online. We can measure it with the following variables, such as access ways, distribution of access terminals, breadth of services, depth of services, data security, and privacy protection.

The evaluation variables and factors of maturity of e-administration are shown in Table 1.

Monitoring and Supervising

The evaluation of monitoring and supervising assess the improvement of monitoring with ICT in governments. It includes supervising maturity, monitoring maturity and public involvement maturity. This dimension also means e-government transparency and democracy. So, it could be called transparency maturity.

Supervising maturity is the degree of the effectiveness of high-level government supervising low-level government with ICT in order to ensure the deployment of government policies. The supervisors may be governments of high level, people's congress committees of high level, people's political consultative committees of high level, and commissions for discipline inspection of high level. We can measure this factor with the following variables, such as effect of polices delivery, transparency of key projects, working flow into the open, supervising the evaluation by the goal, tracking and supervising of achievement.

Monitoring maturity is the degree of the effectiveness of monitoring in the same level with ICT in order to get rid of corruption and improve operation standardization. The monitors may be commissions for discipline inspection, departments of supervise, and audit bureaus. We can measure this factor with the following variables, such as personnel appointment and remove into the open, transparency of working flow, leaders' economic situation into the open, standardized audit of public sectors.

Public involvement maturity reflects the effectiveness of supervising governments by public with ICT in order to ensure the government objectives for meeting public requirement. The participators are citizens, who select their deputies—people's congress committee, people's political consultative committee, and office of receiving claims from people. We can measure this factor with the following variables, such as complains from public, the system of addressing inquiries by people's congress committee, people's political consultative committee, suggestions from people, the system of taking advice from

people's congress committee, people's political consultative committee, the system of processing letters and visits from people.

The evaluation variables and factors of the monitoring and supervising are shown in Table 2.

Social and Financial Benefits

The social and financial benefits are the e-government's impact on people, society, and economy.

E-government implementation will make economic benefits for local and State economy development. We can measure this factor with the following variables, such as the increase of consumption and investment, and decrease of interaction cost of private organization and government operation cost.

E-government implementation will make social benefits because it will improve the social environment and public daily life. We can measure this factor with the following variables, such as promotion of transparency of government, nationalization and internationalization of government, simplification, rapidness and accuracy of public administration, flat organization and simple structure of government, reduction of corruption in government, improvement of investment environment, reduction of cheating, increase of credit, and improvement of social safety.

E-government implementation will make public benefits for people. We can measure this factor with the following variables, such as enlarging scope of public service, improvement of the response to public requests, improvement of flexibility of using ICT to get public service, promotion of public involvement, integration of some related affairs to simplify procedures to people, promotion of the participation of people in poverty level, improvement of public information sense and skill.

The evaluation variables and factors of the social and financial benefits are shown in Table 3.

CONCLUSION

After reviewing the papers about IT investment and effects, and some practical e-government assessment model, and investigated China governments, we set up the preliminary assessment model of China e-government. This model consists of three dimensions, nine factors, and 42 variables. There are the following roles of this model. Firstly, it could be used as guidance for China e-government initiatives. Secondly, it could be used to make e-government strategy. Thirdly, different government departments could select some variables from 42 ones to set up special assessment model suitable for them. As the example of the application, China Labs Ltd (www.chinalabs.com) has issued this assessment model to some China local governments. Some provincial governments have designed their own assessment system based on this framework, such as Si Chuan province. China Labs Ltd has also used this model to evaluate China provincial e-government and given its rank.

But there are some limitations of this model. Most importantly, the validation of this model is not sure because we have not done empirical study on this model. On the hand, this model cannot measure the effectiveness and convenience of e-government portal website. E-government portal website must be easy for public. Thirdly, this model cannot assess the integrity of many e-government systems. Lastly, some variables need to be defined accurately.

Factors	Variables	Meaning of Variables
Office- Automation maturity	Internal communication	Means of communication, easy of use, reliability of the communication systems
	Information publish	Frequency of using, visiting numbers
	Information sharing	Record numbers in database and its quality, data in the database as the percentage of all data
	Automation of work flow	Extent of automation of work flow
	Automation of document management	Structure of database, retrieval convenience, percentage of document in database
	Telecommuting	Types of communication for telecommuting and its performance
	IT training for staff	Amount of investment in training and times
E-collaboration maturity	Information sharing between units	Numbers of submitting the same information to different government units
	Access authority	Completeness of authority system
	Information delivery timely	Speed of file delivery
	Information delivery safely	Technology used in encrypt
	Compatibility of different systems	Frequency of compatible accidents
E-service maturity	Access ways	Number of access ways and their usability
	Distribution of access terminals	Number of telephones, mobile phones, online PC
	Breadth of services	Online services as a percentage of the whole services
	Depth of services	Level of practical service as a percentage of objective level
	Data security	Data backup, encryption, access authority, firewall, antivirus tools
	Privacy protection	Policy of privacy protection

Table 1. Index of Maturity of E-Administration

Factors	Variables	Components of Variables
Supervising maturity	Effect of polices delivery	Breadth and depth of polices delivery
	Transparency of key projects	Level of database development of key projects, convenience of supervising the key project with ICT
	Working flow into the open	Degree of working flow electronically, design of decision making process
	Supervising the evaluation of goals	Degree of goal meeting
	Tracking and supervising of achievement	Feedback ways and effects
Monitoring maturity	Personnel appointment and remove into the open	Working flow of the appointment and remove, feedback way
	Transparency of working flow	The number of electronic working flow as the percentage of the whole working flow
	Leaders' economic situation into the open	Number of realization ways and effects
	Standardized audit of public sectors	Maturity of electronic audit
Public involvement maturity	Complains from public	Degree of electronic interaction for processing complains, speed of processing complains
	The system of addressing inquiries by people's congress committee, people's political consultative committee	Number of electronic inquires, and speed of feedback
	Suggestions from people	Number of people using ICT to communicate with government as the percentage of the whole people, speed of feedback to suggestions
	The system of taking advice from people's congress committee, people's political consultative committee	Convenience of electronic tracking of processing advices
	The system of processing letters and visits from people	Number of receiving approaches, processing speed, percentage of electronic processing

Table 2. Index of the Monitoring and Supervising

Factors	Variables	Components of Variables
Economic benefits	Increase of consumption	Amount of direct investment, investment objective
	Investment Multiplier effect	Multiplier effect of government investment, or the multiplicative effect
	Decrease of corporation cost	Decrease of direct expense, time saving
	Decrease of public cost	Time saving
	Decrease of government operation cost	Cost of paper(reduction) and postage (reduction) and personnel(cut down)
Social benefits	Promotion of transparency of government	Rate and extent of public administration into the open
	Nationalization and internationalization of government	External citation rate of government information, Number of minority languages and foreign language editions on website
	Simplification, rapidness and accuracy of administration	Decreasing rate of documents, conferences and business trip, loss rate of documents, turnover rate of document
	Flat organization and simple structure of government	Number of government departments
	Reduction of corruption in government	Number of corruption cases, number of cases settled
	Improvement of investment environment	Satisfaction to environment of the investment from investors
	Reduction of cheating, increase of credit	Number of cheating cases
	Improvement of social safety	Number of security events and reaction speed to them
Public benefits	Enlarging scope of public service	Number of people in urban areas using ICT to get public services
	Improvement of the response to public requests	Speed of processing affairs
	Improvement of flexibility of using ICT to get public service	Flexibility in time, space and mode
	Promotion of public involvement	Whether there is a message board or an online forum, and the frequency of asking for advice online.
	Integration of some related affairs to simplify procedures to people	Capabilities of web sites, the extent of information sharing between related government departments
	Promotion of the participation of people in poverty level	Percentage of poverty people using e-government, easy of use by them
	Improvement of public information sense and skill	Click rate of e-g website, average access time

Table 3. Index of Social and Financial Benefits

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