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Electronic Document Management System: Malaysian Experience

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ABSTRACT

Background: One of the seven flagships in Vision 2020 focuses on the area of record keeping and document management is Generic Office Environment-Electronic Government Document Management System (GOE-EGDMS). This study is designed to investigate the usage and effectiveness of the implementation of GOE-EGDMS adopting the IS Effectiveness Model from DeLone and McLean. Questionnaires were collected through web-survey and were analysed using Exploratory Factor Analysis, Confirmatory Factor Analysis and Structural Equation Modeling (SEM). **Objective:** to determine the level of service quality of MAMPU focusing at the Electronic Government Division; to determine the user satisfaction level of the GOE-EGDMS; to determine whether service quality and information quality in GOE-EGDMS has an effect on system usage; to determine if information quality, system usage and user satisfaction in GOE-EGDMS has an effect on individual impact; to determine the relationship between individual impact and organization impact in GOE-EGDMS. **Results:** Based on the analysis, six hypotheses were significant and supported. The major contribution of the study is the developed research instruments which can be further tested in other research settings. **Conclusion:** This study provided valuable information for the government in implementing GOE-EGDMS in the future. It is hoped that the system can help Malaysian government achieve its vision that is to effectively and efficiently deliver good services from the government to the people of Malaysia, and enabling the government to become more responsive to the needs of its citizens.

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INTRODUCTION

Document management systems have long been touted as the answer to many paper-related problems. They seem to offer the opportunity to exercise a high degree of control over the ways in which paper documents are handled. The latter are sometimes referred to as "enterprise or electronic document management systems". It is important to realize that document management systems do just that – they manage documents, not the information or knowledge contained within the documents. Thus, their impact on a business is in the efficiency they provide in document storage and retrieval and also information access. The time has never seemed to be right to opt for this system – there has always seemed to be such ongoing development that the "ideal" system must be just around the corner. As the awareness of computers as a tool for data processing increased, more organizations and institutions began to acquire computers for their record keeping.

Electronic Document Management System:

An electronic document management system (EDMS) is typically referring to a computerized system that facilitates the creation, capture, organization, storage, retrieval, manipulation and controlled circulation of documents in the electronic format.

This means that a typical EDMS system will consist of at least the following:

- a storage facility where electronic documents are kept;
- a method (or a number of methods) of adding documents to the storage area; and
- a method of identifying and retrieving the documents from the storage area.

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Raynes (2002) stated that the real benefits of an EDMS arise from the additional facilities that the system will include the functions of:

- *a process for check-in, check-out:* a control, locking mechanism that ensures that only one user can modify a document at a time;
- *version control and audit trail:* methods of recording and monitoring the changes made to a document over time;
- *document review:* enabling users to add their comments to a document without actually changing the document itself;
- *security processes:* to control which users have access to any document and for what purposes;
- *organizational processes:* methods of organizing documents into related groups, e.g. folders;
- *free-text searching*: facilities for identifying and retrieving documents according to the text they contain;
- *metadata:* the recording of information associated with the document (such as the author, the date it was created, the title, etc.);
- *workflow:* the ability to route documents from one user to another in a controlled fashion;
- *imaging:* methods such as scanning – for converting paper documents to an electronic format;
- *publishing:* the ability to combine documents in coherent collections in order to distribute them to their target audiences.

These functions describe what a document management system might do. In the case of document management, to make such a simple conversion would be extremely expensive. Indeed, any electronic storage system might be an expensive waste of resources. Every effort should be made to understand why such documents are filed in the first place.

Electronic Government in Malaysia:

The Electronic Government initiative was launched in 1996, to lead the country into the Information Age. With the implementation of Multimedia Super Corridor and Vision 2020, Malaysia ranked at 11th. place, according to a survey by the Brookings Institution in the United States (New Straits Times Press, 2009). Vision of Electronic Government is a vision for government, businesses and citizenry working together for the benefit of Malaysia and all of its citizens. The vision focuses on effectively and efficiently delivering services from the government to the people of Malaysia, enabling the government to become more responsive to the needs of its citizens. One of seven applications that focus on the area of record keeping and document management is Generic Office Environment-Electronic Government Document Management System (GOE-EGDMS).

Generic Office Environment-Electronic Government Document Management System (GOE-EGDMS):

GOE-EGDMS is one of the systems in Electronic Government (EG) Flagship Application. The systems have been used by MAMPU (Jun 2002), Prime Minister's Office (January 2003), Ministry of Finance (Mac 2003). It has been developed based on user needs and fulfilling the filing management process flowchart in the public organizations. Since December 2004, a total of 22 public organizations participated as pioneer agencies in the application of the electronic document management system with a total of 5055 users (MAMPU, 2008). GOE-EGDMS is very useful for public organizations towards effectiveness in their service because it can improve service quality to people who need information and records, provide better control of documents and the work done on the records, reduced costs and increase efficiency.

This study investigates the effectiveness and usage of the implementation of GOE-EGDMS that can provide a good impact in terms of storing, controlling, searching, accessing, ease of sending and receiving documents, and improve sharing and disseminating of information to the government and also the public using a model from DeLone and McLean (2003).

Conceptual Framework:

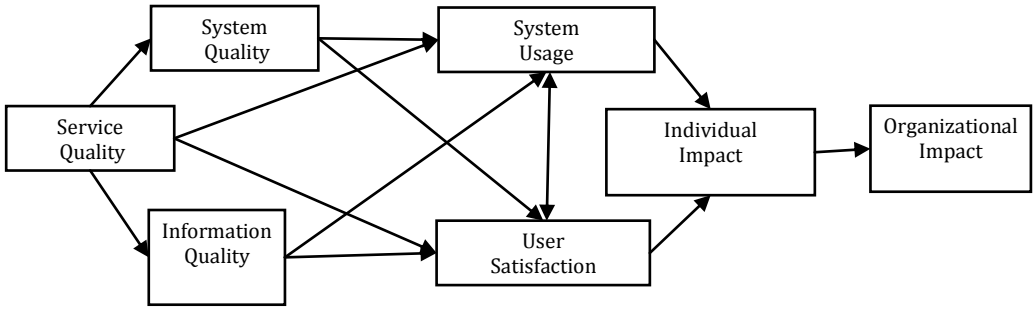

Fig. 1: The Conceptual Framework for Electronic Document Management System: Malaysian experience.
Note: Pitt & Watson (1997) Measuring Information Systems Service Quality: concerns for a complete canvas

Service Quality:

Service quality has been considered one of the primary antecedents of customer satisfaction (Kai, *et al*. 2000). When customers are satisfied with the service received, they are more likely to tell others of their favorable experience and thus engage in positive word-of-mouth advertising (Albert, 2002). DeLone & McLean (2003), after reviewing and evaluating this debate, agreed and decided to add service quality in their updated IS success model stating that 'the changes in the role of IS over the last decade argue for a separate variable – the 'service quality' dimension. Previous researchers introduced models to assess customer service quality experienced by customers such as the service quality gap model. This model developed by Parasuraman, *et al* (1986) in order to understand the factors that affect customers' perception of the quality of a service. In an organizational information management context, the customers are the different types of end-users in an organization which use information to support them in their work from senior management through employees across all departments and partners who access the company's information resources from outside the company.

Information Quality:

Information quality focus on the output produced by a system and the value, usefulness or relative importance attributed to it by the user. Most of the measures, therefore, are perceptual in nature. Seddon (1997) included accuracy, timeliness and relevance in his definition of information quality. However, he added the caveat that since not all IT applications produced information for decision-making, information quality is not a measurement factor that may be considered in all systems. Grover *et al* (2005) use the terms "accuracy" and "data quality" synonymously and include a category called content, which they consider to be broader than relevance and include such topics as data warehousing. The most current from Petter *et al* (2008) that defines information quality as the desirable characteristics of the system outputs; that are, management reports and Web pages. For example: relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness and usability.

System Quality:

System quality typically focus on performance characteristics of the system under study and have been operationalized in a number of ways. Seddon (1997) considers system quality to be concerned with "bugs" in the system (system reliability), user interface consistency, ease of use, documentation quality, quality and maintainability of the program code. Among the latest measures of system quality is based on the desirable characteristics of an information system such as ease of use, system flexibility, system reliability and ease of learning, as well as system features of intuitiveness, sophistication, flexibility and response times (Petter, *et al*, 2008).

User Satisfaction:

Seddon (1997) defined user satisfaction measure the net benefits perceived by the information system's stakeholders (individuals, groups of individuals, management of organizations, and society). He builds on earlier research, and concludes that 'IS Use' is actually used as a proxy for 'Benefits from Use' and defines measurement factors for IS use as being hands-on-hours, hours spent analyzing reports, frequency of use, number of user or use/non-use. However Mahmood *et al*, (2001) studied the effect of 11 factors on IT Usage (perceived usefulness, perceived ease of use, organizational support, skill level, organization size, strategic applications, information technology maturity, positive attitude, training level, professional level and education level) also concluded usage of IT systems has strong correlations with: the perceived usefulness of the system by the user, the perceived ease of use, skill level and the level of positive attitude of the individual toward IT systems within the organization.

Individual Impact:

Individual impact of IS referring to the effect of information on the behavior of the recipient of that information and is best measured via improvements in the individual recipient's performance or decision making productivity. Millman & Hartwick (1987) used a questionnaire to investigate the perceptions of middle managers regarding the impact of automated office systems on their jobs and work. Although the study focused on the impacts of office automation, a specific class of IT, the items are easily modified to assess the impact of any specific class of IS. The items that make up the questionnaire assessed a variety of potential individual impacts, including impacts on job performance, on effectiveness and on quality of work. The final two items (impact on department's and organization's effectiveness) are more appropriately included in the measurement of organizational impact of IS.

Organizational Impact:

Jarvenpaa & Ives (1990) suggested using CEOs' views about IT (as published in letters to shareholders) as a possible surrogate measure for IT impact on an organization or industry. The authors reason that if IT-related

events are noticed by the CEO and discussed and related to strategy in shareholders' letters, strategic IT may have had some positive impact on organizational performance. Jarvenpaa & Ives suggested a reciprocal relationship between profit and IT investment: investment in IT may lead to greater profits and greater profits may then increase the organization's willingness to invest in IT. Mahmood & Soon (1991) developed and validated an instrument that assesses the potential impact of IT on the organization and suggested that individual groups of items from the model (instrument) can be used to separately measure IS effects on any of the variables that measures IT impact on internal efficiency.

Interrelationships Between Variables:

Petter *et al* (2008) in their study have discussed the empirical support for the relationships between the success dimensions. The purpose of their literature review is to suggest areas that deserve additional research. An update to the variables addressed the criticism that an information system can affect levels other than individual and organizational levels because IS success affects workgroups, industries and even societies Their study replaced the variables, individual impact and organizational impact, with net benefits, thereby accounting for benefits at multiple levels of analysis. Petter *et al* (2008) most striking finding is that they found strong support for the relationship between net benefits and user satisfaction, while Sabherwal *et al*. (2006) had a non-significant path for this relationship. One difference between these studies is their assessment of net benefits on studies that measured perceived usefulness. Importantly, the literature review also reveals that increased net benefits lead to a higher degree system use and to a higher level of user satisfaction. Although a qualitative literature review is subject to the interpretation of its authors, the overall assessments of IS success measurement formed as a result of this review are consistent with, and extend beyond the results of the quantitative methods that have been employed previously.

Methodology:

Population and Sampling:

This study involves 22 public organizations (Table 1) that are currently implementing GOE (MAMPU, 2006). The population of this study is all users of GOE-EGDMS that work in the public organization which could provide meaningful input to this research. The population size is 5055.

Sampling Technique:

Considering the 82 statements to be used in structural equation modelling using the ratio of 5:1, this study required a minimum sample size of 410 respondents. According to Hair *et al*. (2006) the ratio of observations to independent variables should not fall below five (5:1) although the preferred ratio recommended should be 10 respondents for each independent variable (minimum ratio of observation to variables is 10:1).

Data Collection:

Data for the study was collected via, structured questionnaire using web application survey (www.surveymonkey.com). The questionnaires were distributed to selected sample of public organizations with the assistance of the information technology (IT) officers who provided the list of user email address in their organization. The research instrument survey contained 82 statements pertaining to Service Quality, Information Quality, System Quality, User Satisfaction, System Usage, Individual Impact, Organizational Impact and 10 demographic questions. A Likert scale measurement (one to three, one to five and one to seven) was used for this statement where 1 indicated a very negative point of view (Strongly Disagree) and 7 indicate a very positive view (Strongly Agree). Individual Impact used 1, 2 and 3.

Research Findings and Discussions:

Missing value:

Missing value was replaced using the median substitution method. This is the most frequently used approach and moderates the problem that often occurs when averages were used on skewed populations.

Reliability and Normality Tests:

The Cronbach's Alpha values are high, ranging from 0.756 for System Usage to 0.982 for Satisfaction (System Quality). Therefore, the various statements and reliability for measuring the perceptions of the respondents on the seven dimensions related to the effectiveness of GOE-EGDMS in public organizations in Malaysia are accepted.

Exploratory Data Analysis (EDA):

Exploratory data analysis (EDA) was used to see if there are any outliers that may be causing the poor model fit and negative variances in this study before moving to the next stage. The data analysis started with data cleaning stage, which involved detecting outliers, finding and replacing missing value. The missing value

can damage the best modeling efforts and destroy well-conceived research findings. This study used a moderate and frequently used approach which is the median substitution for the missing values.

Table 1: List of Public Organization That Implement GOE-EGDMS.

No.	Agency	GOE License User
1	Kementerian Pertahanan	471
2	Kementerian Kewangan	384
3	Jabatan Akauntan Negara Malaysia	359
4	Lembaga Kemajuan Ikan Malaysia (LKIM)	459
5	Kementerian Pertanian & Industri Asas Tani Malaysia	450
6	Jabatan Kastam diRaja Malaysia	319
7	Kementerian Perdagangan Dalam Negeri & Hal Ehwal Pengguna (KPDNHEP)	65
8	Institut Penyelidikan Perhutanan Malaysia (FRIM)	330
9	Lembaga Kemajuan Pertanian Muda (MADA)	391
10	MAMPU, Putrajaya	370
11	Pejabat Setiausaha Kerajaan Negeri Melaka	219
12	Jabatan Meteorologi Malaysia (Kajicuaca)	200
13	Kementerian Pelancongan	188
14	Kementerian Perusahaan Perladangan & Komoditi	183
15	Bahagian Pengurusan Perkhidmatan & Sumber Manusia (BPPSM), Jabatan Perdana Menteri	227
16	Jabatan Arkib Negara	160
17	Pejabat Ketua Setiausaha Negara (Pej. KSN)	11
18	Jabatan Kebajikan Masyarakat Malaysia	87
19	Jabatan Perpaduan Negara & Integrasi Nasional	80
20	Institut Penyelidikan Hidraulik Kebangsaan Malaysia (NAHRIM)	57
21	MAMPU Cawangan Sarawak	25
22	MAMPU Cawangan Sabah	20
	TOTAL	5055

Note: MAMPU (2006) *Laporan Tahunan 2006*

Table 2: Cronbach's Alpha by Dimension.

Dimension	No. of statements	Cronbach's Alpha
1. Service Quality	20 (SQ1-SQ20)	0.959
2. Information Quality	10 (IQ21-IQ30)	0.975
3. System Quality	8 (SysQ31-SysQ38)	0.982
4. User Satisfaction	19 (US39-US57)	0.960
5. System Usage	4 (SU58-SU61)	0.756
6. Individual Impact	13 (II62-II74)	0.944
7. Organisational Impact	8 (OI75-OI82)	0.976

Exploratory Factor Analysis:

Exploratory Factor Analysis (EFA) was then used to test whether or not the questionnaire items load most strongly on the appropriate factors of the DeLone and McLean Information System Effectiveness Model. Cronbach's Alpha for each constructs confirmed the unidimensionality of each construct, Six-factor solution was derived from VARIMAX rotation.

Confirmatory Factor Analysis (CFA):

Confirmatory factor analysis (CFA) was then carried out to test the measurement model. CFA results confirmed that the measured variables (items) are measuring the construct well. Reliability and validity check via variance extracted (VE) and construct reliability (CR) was satisfactory except for System Usage construct. CFA results show that all the constructs have positive correlation. There is a strong correlation between Service Quality and Information Quality (0.715), and User Satisfaction and Organizational Impact (0.699) while a moderate correlation exists between User Satisfaction and Information Quality (0.631). All dimensions were significantly and correlated with each other except for the correlations of other dimensions with System Usage. Due to the standardized factor loading in System Usage that is more than 1 and the System Usage construct to have only two items instead of the minimum three items per construct requirement (Hair *et al.*, 2006). The System Usage constructs was removed when testing the structural model. Some studies have reported the weakness in the System Usage measures that though the relationship with System Usage was positive, but it is low or insignificant (Petter *et al*, 2008).

Structural Equation Modeling (SEM):

Structural Equation Modeling (SEM) was then used to test the research hypotheses using the revised model. The overall model Chi-square (χ^2) was 6523.146 with 1319 degree of freedom. The p-value associated with this model is less than 0.05 significance level. As a result, the model does not fit the data well. However, other measures were used to determine the acceptability of the model's goodness of fit. Root mean square error of association (RMSEA) measure was used as an alternative to the chi-square test in the case of large samples (Hair *et al*., 2006). Other widely used fit indices are Tucker-Lewis Index (TLI), incremental fit index (IFI), and comparative fit index (CFI), goodness of fit index (GFI) and adjusted goodness of fit index (AGFI). RMSEA values of about 0.101 or less would indicate a close fit of the model in relation to the degrees of freedom while values of TLI, IFI and CFI higher than the threshold of 0.9 indicate a good fit suggested by (Hair *et al*., 2006). GFI values close to 1 indicate a perfect fit and AGFI values of 1 indicate a perfect fit. For this model, the RMSEA = 0.103, TLI = 0.784, IFI = 0.793, CFI = 0.793, GFI = 0.616 and AGFI = 0.583 and hence the model can be considered acceptable. There is no single "magic" value for the fit indices that separates good from poor models, and it is not practical to apply a single set of cutoff rules to all measurement models and for that matter, to all SEM models of any type (Hair *et al*., 2006).

Table 3: Summary of Findings.

H1.	Service Quality has a positive correlation with Information quality.	Supported
H2.	Service Quality has a positive effect on User Satisfaction.	Supported
H3.	Information Quality has a positive effect on Individual Impact.	Supported
H4.	Information Quality has a positive effect on User Satisfaction.	Supported
H5.	User Satisfaction has a positive effect on Individual Impact.	Supported
H6.	Individual Impact has a positive effect on Organizational Impact.	Supported

As expected, Service Quality is found to have positive effect on User Satisfaction. To gain User Satisfaction, MAMPU has to emphasize on giving better Service Quality. Service Quality relates to user's perception or judgment of services. MAMPU should pay attention to users and their needs. Three previous researches support these findings: Coombs, *et al* (2001); Thong *et al* (1996) and Thong *et al* (1994). SEM results also show that Information Quality has a positive and significant effect on Individual Impact and User Satisfaction. The findings on Information Quality with Individual Impact were consistent and positive based on the study by Farhoomand & Drury (1996); Teo & Wong (1998); Wixom & Watson (2001) and a mixed result by Bradley *et al* (2006). SEM results also show that Individual Impact has a positive and significant effect on Organizational Impact. Hence, the hypothesis of the effect of Individual Impact on Organizational Impact is supported. Five empirical studies have been investigated the relationship between Individual Impact with Organizational Impact. Two previous research reported positive result (Gelderman, 1998; Law & Ngai, 2007) but another three results were mixed (Jones & Beatty, 2001; Premkumar *et al*, 1994; Teo & Wong, 1998). As the Individual Impact constructs items was measured using Likert scale 1 – 3, the responses were reported using frequencies to find which statements have a high response in terms of increased effect on users of GOE-EGDMS system. More than half of the respondents indicated that there is increased effect, especially in terms of importance of job, skill needed on the job, responsibility for results of work, knowledge of performance on the job, personal effectiveness, and accuracy demanded on the job.

Conclusion:

This study investigated the factors influencing usage and effectiveness of the document management system in public organizations. The results show that Service Quality and Information Quality are significant correlated. The Service Quality provided by MAMPU is not satisfactory. MAMPU should not take Service Quality lightly. Each public organization must determine ways to encourage every user to use and utilize the system in their daily operations.

This study provided valuable information for the government in implementing GOE-EGDMS in the future. User Satisfaction has a positive effect on Individual Impact and Individual Impact has a positive effect on Organizational Impact. This implies that public organizations should place greater emphasis on achieving high levels of usage and effectiveness of using the GOE-EGDMS system so that the aims of implementing the system towards an electronic government will be achieved. The use of document management system technology presents a potential method to increase worker efficiency, reduce the number of employees, improve service, reduce storage space, consolidate or eliminate duplication of work by different government offices but the e-government implementation is not an easy process. This project is rather a very long and complex process in which the whole government needs to change the way it is doing the day-to-day activities, and as a result, all government's activities need to be reengineered accordingly. Since the implementation is a long term process, the Malaysian government needs to periodically conduct evaluations on its work processes and the current technical and organizational status in order to achieve all its goals and objectives. It is hoped that the system can help Malaysian government achieve its vision that is to effectively and efficiently deliver good services from the

government to the people of Malaysia, and enabling the government to become more responsive to the needs of its citizens.

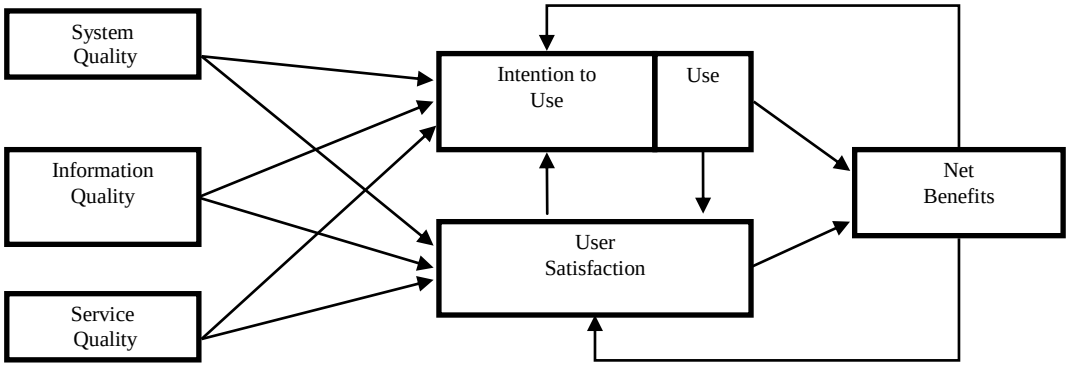

Fig. 2: Updated DeLone and McLean IS Success Model.

More work could be carried out pertaining to information system usage and effectiveness. Some areas of future research such as comparison with private sectors, with other countries, conducting a case study, developing system usage measures, using the qualitative approach or using the new updated information system success model by DeLone and McLean.

The evaluation of information system effectiveness has been an important area of information system research for three decades. Through continued interest and work in this area, researchers are approaching the goal of being able to comprehensively measure and evaluate the effectiveness of information system implementations. This goal has yet to be attained, but the findings of the present study contribute to the progress toward achievement of that goal. It is hoped that research in this area will continue and each new discovery will improve and perfect the measurement and evaluation of information system effectiveness.

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