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Modelling Customer's Attitude Towards E-Government Services

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Abstract**—**e-Government structures permits the government to operate in a more transparent and accountable manner of which it increases the power of the individual in relation to that of the government. This paper identifies the factors that determine customer's attitude towards e-Government services using a theoretical model based on the Technology Acceptance Model. Data relating to the constructs were collected from 200 respondents. The research model was tested using Structural Equation Modeling (SEM) techniques via the Analysis of Moment Structure (AMOS 16) computer software. SEM is a comprehensive approach to testing hypotheses about relations among observed and latent variables. The proposed model fits the data well. The results demonstrated that e-Government services acceptance can be explained in terms of compatibility and attitude towards e-Government services. The setup of the e-Government services will be compatible with the way users work and are more likely to adopt e-Government services owing to their familiarity with the Internet for various official, personal, and recreational uses. In addition, managerial implications for government policy makers, government agencies, and system developers are also discussed.

Keywords**—**E-government, Structural Equation Modelling, Attitude, Service.

I. Introduction

E-GOVERNMENT has been defined as "the application of information and communications technology (ICT) to transform the efficiency, effectiveness, transparency and accountability of informational and transactional exchanges within government, between governments and government agencies at federal, municipal and local levels, citizens and businesses; and to empower citizens through access and use of information" [1]. In this digital era, governments are using the Internet to provide public services to its citizens, known as e-Government. The [2] defines electronic government, or e-Government as utilizing the Internet and the World Wide Web for delivering government information and services to citizens.

The [3] sees e-government as a process with five stages, which follow on from each other in increasing order of implementation difficulty, desirability for citizens, customers and society, and the levels of sophistication of the systems which are required:

1. A basic site holds electronic versions of the agency's Mayor print documents for public consumption. It gives basic information about the agency. Contact with the agency is by phone or mail, not e-mail. Site users cannot download forms or accomplish anything substantial online.
2. Electronic publishing occurs when the agency develops its external Web site to be an important element of its overall communications strategy. The agency begins to put a substantial part of its information online. Citizens or firms can download forms to fill in and post back, but cannot do online submissions.
3. Interactive e-publishing is reached when users can personalize how the site works for them. For instance, users can specify their address or postcode and see only relevant local information. All the agency's forms are downloadable, and some can be submitted online also. Extensive e-mail contacting of officials is encouraged.
4. A transactional Web site exists when users can accomplish specific dealings with the agency online. Users can authenticate themselves to the agency and register their identities reliably. They can then undertake a complete transaction with the agency online, for instance, making secure payments for a service, fee, fine, or tax using or not the agency's databases at various levels of security. At this stage, users can download and submit all forms online. The external Web site links fully to most of the agency's back-office systems.
5. Joined-up e-governance is achieved when public sector Web sites can facilitate 'one-stop shop' services online for citizens. Sites provide transparent access not just to the agency where people have logged on, but across central government agencies as a whole. Many agency processes use 'zero touch technologies', where transactions do not require any active intervention by a human employee to be accomplished. Agencies carefully research, analyze, and anticipate the needs of their users, for instance by alerting them proactively to opportunities for them to improve their welfare or to meet given deadlines (so-called 'zero stop shops').

The United Nations' Global e-Government Readiness Report [4] ranked Malaysia as second of the 11 countries in Southeast Asia for the e-Government readiness index in 2008, which is a composite index comprised of the web measure index, the telecommunication infrastructure index, and the human capital index. Malaysia received a score of only 0.6063, which is above the world average (0.4514) (see Table 1).

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TABLE I
E-GOVERNMENT READINESS FOR SOUTHEAST ASIA

Country	2008 Index	2005 Index	2008 Ranking	2005 Ranking
Singapore	0.7009	0.8503	23	7
Malaysia	0.6063	0.5706	34	43
Thailand	0.5031	0.5518	64	46
Philippines	0.5001	0.5721	66	41
Brunei	0.4667	0.4475	87	73
Vietnam	0.4558	0.3640	91	105

Three reasons can be found to justify Malaysia's commitment to implementing e-Government services. Firstly, the expectations of the customers' (specifically in the business sector) are rising with regard to improved government services. Nowadays, customers' at large are demanding better services from the government and wondering why it cannot employ ICT and multimedia technologies the way the business sector can. Secondly, having an e-Government in place may reduce costs for the government in the long run, particularly during economic downturns. Thirdly, e-Government may spearhead the growth of the business sector through its many "network effects". For instance, the business sector can apply leverage on e-Government, thus, making it more competitive, efficient and productive. The success of such initiatives is dependent not only government support, but also on citizens' willingness to accept and adopt those e-Government services [5]. Much of the writing on e-Government and ICT development in general suffers from a technological focus, seemingly forgetting that humans have to use and operate the systems [6, 7, 8]. In view of the lack of empirical studies on determinants of customers' acceptance in relation to e-Government, and in order to understand where Malaysia is in terms of public organizational support for e-Government, it was decided that a preliminary exploratory investigation should be undertaken. Government decision makers, therefore, need an understanding of the factors that would encourage use of electronic rather than more traditional service delivery methods. Hence, this study represents an initial attempt to address customer's attitude towards e-Government services.

II. LITERATURE REVIEW

A. Theory of Technology Acceptance Model

The Technology Acceptance Model (TAM) is an influential extension of Ajzen and Fishbein's Theory of Reasoned Action (TRA). It was introduced and developed by Fred Davis in 1986 [9]. TAM is a model derived from a theory that addresses the issue of how users come to accept and use specific technology. The model suggests that when users are presented with, for instance, a new software package, a number of variables influence their decisions about how and when they will use it. There are two specific variables, perceived usefulness and perceived ease of use, which are hypothesized to be fundamental determinants of user acceptance [10].

The Technology Acceptance Model (TAM) [9, 11] was widely used and accepted to explain the relationship between perceptions and technology use [12, 13]. According to TAM, individuals accept a particular system if they believe in the system. These believe are perceived usefulness (PU) and perceived ease of use (PEOU). PU is defined as the user's perception of the degree to which using the system will improve his or her performance in the workplace. PEOU is defined as the user's perception of the amount of effort they need, to use the system. Past research have provided evidence of the significant effect of perceived ease of use and perceived usefulness on behavioural intention (BI) [11, 12, 14, 15, 16, 17, 18]. In the e-Government literature, various studies (e.g. [19, 20] have also adopted TAM in their model to test or evaluate the citizen adoption of e-Government services.

Perceived usefulness and perceived ease of use were found to be significant constructs in the e-Government adoption literature (e.g. [5, 19]. Past research was inconsistent on whether perceived usefulness (PU) or perceived ease of use (PEOU) was the stronger determinant. According to Davis [9], perceived usefulness (PU) is shown as a primary determinant and perceived ease of use (PEOU) as a secondary determinant of intentions to use a certain technology. [21, 22] found that behavioral intention was largely driven by perceived usefulness. However, Wang [20] found that perceived ease of use (PEOU) was a stronger predictor of people's intention to e-file than perceived usefulness (PU). Perceived ease of use was found to have positively influenced the behavioural intention to use a system [23, 24, 25].

Compatibility is an 'integration factor' and is defined as "the degree to which an innovation is perceived as consistent with the existing values, past experience, and needs of potential adopters" [26]. As the user's utilisation of the target technology deepens, the compatibility will gradually change influencing in complex interaction with both PU and PEOU. [12] found that the degree to which potential adopters are prepared to accept an Information Technology is affected by the way they are accustomed to work. Moreover, the compatibility construct was also found to be a significant determinant in citizen's intention to use an e-Government service [10, 19, 27].

Attitude in [28]'s paradigm is classified into two constructs: attitude toward the object and attitude toward the behavior. The latter refers to a person's evaluation of a specified behavior. This evaluation of a specified behavior leads to certain behavioral intention that further results in certain behavioral action. Adapting this general principle, attitude toward use in the TAM model is defined as the mediating affective response between usefulness and ease of use beliefs and intentions to use a target system. In other words, a prospective user's overall attitude toward using a given system is an antecedent to intentions to adopt [9]. In user participation research, it is also believed that prior to system development, users are likely to have vaguely formed beliefs and attitudes concerning the system to be developed [29]. For the same reason, in consumer research, attitude is the construct that receives most attention and is used most widely for predicting consumers' likelihood to adopt a new technology [30].

Based on the literatures mentioned above, the following hypotheses were formulated:

H1. Perceived usefulness is significantly related to customer's attitude towards e-Government services.
H2. Perceived ease of use is significantly related to customer's attitude towards e-Government services.
H3. Compatibility is significantly related to customer's attitude towards e-Government services.
H4. Attitude is significantly related to customer's intention towards e-Government services.

III. METHODOLOGY

200 respondents (i.e. employees who work in Bayan Baru, Bayan Lepas, Sg. Dua, and Universiti Sains Malaysia staff, all located in Penang, Malaysia) were selected as the target sample using simple random sampling methods (as it requires only one stage of selection). They were chosen because they posses the information for the research project. The proposed research model and hypotheses were tested using Structural Equation Modeling (SEM) via the Analysis of Moment Structure (AMOS 16) computer program, a second-generation multivariate technique. It is used in confirmatory modeling to evaluate whether the data collected fit the proposed theoretical model.

SEM facilitates testing of the psychometric properties of the scales used to measure a variable, as well as estimation of the parameters of a structural model. In other words, it enables measurement of both the strength as well as direction of the relationships among the model variables [31]. This specific quality made SEM the most robust technique to analyze the flow construct; a construct whose dimensions which have been operationalized in various ways in literature [32]. As recommended by [33], multiple indicators of latent variables were used, so that measurement error can be estimated in an analysis, reducing the biasing effects of random and systematic errors. The instruments used for hypotheses formulation are presented in Table 2.

IV. FINDINGS AND DISCUSSION

A. Demographic Profile of Respondents

The demographic profile of the surveyed respondents is presented in Table 2. The total sample for the survey consists of 200 respondents. The gender distribution of the survey respondents is 53.5% males and 46.5% females. The results also reveal that the respondents are predominantly aged between 30 and 55 years, which is 63.5% of the sample. More than 60% of the respondents are married. The majority of the respondents have been educated to college or higher education level: 41.5% are diploma holders, while 47% have Bachelor degrees or professional qualifications. In addition, 73.5% of the respondents used the Internet a few times a week; 35.5% of the respondents have dial-up connections at home; 52.5% of the respondents have broadband at work; and only 4.5% have no computer in their homes.

TABLE II
DEMOGRAPHIC PROFILE OF RESPONDENTS

	Frequency	Percentage
Gender		
Male	107	53.5
Female	93	46.5
Age		
18 - 29 years old	73	36.5
30 - 55 years old	127	63.5
Marital status		
Single	66	33.0
Married	134	67.0
Have any children		
No	70	35.0
Yes	130	65.0
Race		
Malay	95	47.5
Chinese	49	24.5
Indian	56	28.0
Level of education		
Secondary school	21	10.5
Diploma	83	41.5
Professional	53	26.5
Bachelor degree	41	20.5
Masters degree	2	1.0
Sector of occupation		
Government	69	34.5
Non-government	125	62.5
Not applicable	6	3.0
Salary range		
Not applicable	6	3.0
> RM 1000	20	10.0
RM 1000 to RM 2000	115	57.5
RM 2001 to RM 3000	52	26.0
RM 3001 to RM 4000	4	2.0
< RM 4000	3	1.5
Internet usage		
Never	15	7.5
Less than per month	10	5.0
Once a month	10	5.0
Once a week	18	9.0
Few times a week	147	73.5
Network facilities at home		
No computer	39	19.5
Have / cannot connect to Internet	44	22.0
Dial up	71	35.5
Broadband	46	23.0
Network facilities at work		
No computer	9	4.5
Have / cannot connect to Internet	19	9.5
Dial up	39	19.5
LAN	28	14.0
Broadband	105	52.5

B. Structural Equation Modeling

The research model was tested using structural equation modeling (SEM) techniques via the AMOS 16 computer software. SEM is a model analysis technique encompassing methods such as covariance structure analysis, latent variable analysis, confirmatory factor analysis, path analysis and linear structural relation analysis [34]. SEM is also particularly useful in this paper because it can estimate "a series of separate, but interdependent, multiple regression equations simultaneously" in a specified structural model [34]. Therefore, SEM is the most suitable analysis to estimate the strength of casual relationship of these constructs.

C. Reliability ad Validity

Convergent validity was assessed with three tests recommended by [35]. Table 3 lists the standardized loadings, composite reliabilities, and variance-extracted estimates. Standardized factor loadings are indicative of the degree of association between scale items and a latent variable. The loadings were highly significant. Composite reliabilities, similar to Cronbach's alpha, range from 0.829 to 0.960, all meeting or exceeding the minimum limit of 0.70. Variance-extracted estimates are measures of the variation explained by the latent variable to random measurement error [34] and ranged from 0.668 to 0.933 (see Table 3), all exceeding the recommended lower limit of 0.5 [31]. All tests supported convergent validity of the scales. Thus, all factors in the measurement model had adequate reliability and convergent validity.

TABLE III
RELIABILITY AND FACTOR LOADINGS

Constructs /Measurement Items	Standardized Loadings	CR	AVE
Perceived Usefulness (PU)		0.960	0.822
use4	0.842		
use1	0.979		
use2	0.93		
use3	0.87		
Perceived Ease of Use (PEOU)		0.892	0.776
ease3	0.679		
ease2	0.603		
ease1	0.973		
ease4	0.849		
Compatibility (COM)		0.952	0.933
com3	0.956		
com2	0.919		
com1	0.924		
Attitude (ATTITUDE)		0.829	0.668
attitude3	0.95		
attitude2	0.184		
attitude1	0.754		
attitude4	0.782		
Intention to Use (INTENTION)		0.883	0.755
intention3	0.591		
intention2	0.775		
intention1	0.898		

To examine discriminant validity, we compared the shared variances between factors with the average variance extracted of the individual factors. Table 4 shows the inter-construct correlations off the diagonal of the matrix. This showed that the shared variance between factors were lower than the average variance extracted of the individual factors, confirming discriminant validity [31]. In summary, the measurement model demonstrated discriminant validity.

TABLE IV
CORRELATIONS BETWEEN VARIABLES

	1	2	3	4	5
(1) COM	0.966				
(2) PEOU	0.562	0.880			
(3) PU	0.703	0.463	0.907		
(4) ATTITUDE	0.547	0.310	0.423	0.817	
(5) INTENTION	0.443	0.283	0.376	0.574	0.869

D. Structural Model

[36] suggested a similar set of fit indices used to examine the structural model. The Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Normed Fit Index (NFI), and Root Mean Square Error of Approximation (RMSEA) were used to judge the model fit.

CFI: The Comparative Fit Index is a recommended index of overall fitness [35]. This index compares a proposed model with the null model assuming that there are no relationships between the measures. CFI values close to 1 are generally accepted as being indications of well-fitting models [37]. A CFI value greater than 0.90 indicates an acceptable fit to the data [38].

RMSEA: The RMSEA provides information in terms of discrepancy per degree of freedom for a model. The index used to assess the residuals. It adjusts the parsimony in the model and is relatively insensitive to sample size. According to [39], RMSEA must be equal to or less than 0.08 for an adequate model fit.

GFI: The Goodness of Fit Index measures the fitness of a model compared to another model. The index tells what proportion of the variance in the sample variance-covariance matrix is accounted for by the model. This should exceed 0.90 as recommended by [34] for a good model.

AGFI: Adjusted GFI is an alternate GFI index in which the value of the index is adjusted for the number of parameters in the model. Few number of parameters in the model relative to the number of data points. AGFI value greater than 0.80 indicates an acceptable fit to the data [40].

NFI: The Normed Fit Index measures the proportion by which a model is improved in terms of fit compared to the base model [34]. The index is simply the difference between the two models' chi-squares divided by the chi-square for the independence model. Values of 0.90 or higher indicate good fit. NFI values of 0.90 or greater indicate an adequate model fit [38].

As suggested in the literatures [41, 42, 43] the model fit was assessed using these indices. The accepted thresholds for the indices χ^2/df ratio should be less than 3; the values of GFI, NFI, CFI, and IFI should be greater than 0.9; and RMSEA is recommended to be up to 0.05, and is acceptable up to 0.08 [44]. RMSEA should be below 0.10 [45]. As shown in Table 5, all of the model-fit indices exceed the respective common acceptance levels suggested by previous research, demonstrating that the model exhibited a good fit with the data collected. Thus, we could proceed to examine the path coefficients of the structural model.

E. Analysis of Paths

The results of the model imply that all the variables in the model were statistically significant as well. These parameters provide evidence of strong support for overall stability of the model. Furthermore, the squared multiple correlations for the structural equations index, which indicate the relative amount of variance of the dependent variable explained by the explanatory variables (see [42]) was 33%. The results show that a moderate proportion of variance (R^2 = 33%) is explained in the customers' intention to use e-Government services. Having established the adequacy of the model's fit, it

is appropriate to examine individual path coefficients. This analysis is presented in Table 6.

TABLE V
MODEL FIT SUMMARY FOR RESEARCH MODEL

Fit Indices	Benchmark	Value
Absolute fit measures		
CMIN (χ^2)		8.788
DF		3
CMIN (χ^2)/DF	3	2.929
GFI (Goodness of Fit Index)	0.9	0.983
RMSEA (Root Mean Square Error of Approximation)	0.10	0.098
Incremental fit measures		
AGFI (Adjusted Goodness of Fit Index)	0.80	0.915
NFI (Normed Fit Index)	0.90	0.976
CFI (Comparative Fit Index)	0.90	0.984
IFI (Incremental Fit Index)	0.90	0.984
RFI (Relative Fit Index)	0.90	0.922
Parsimony fit measures		
PCFI (Parsimony Comparative of Fit Index)	0.50	0.295
PNFI (Parsimony Normed Fit Index)	0.50	0. 293

The effect of Perceived Usefulness on Attitude was not significant (β = 0.076; p>0.05). Properties of the causal paths (standardized path coefficients) are shown in Table 6. Thus, *H1* was not supported: using the e-Government services would minimally improve users' performance and productivity. To them, the degree to which the e-Government services is perceived to be less useful to influence their attitudes: where the impression is not good, users form attitudes and are less inclined to use the system. Users anticipated finding the e-Government services less useful though it would enhance their effectiveness. The result is contrary to [21, 22] who found that behavioral intention was largely driven by perceived usefulness.

TABLE VI
PATH COEFFICIENTS AND HYPOTHESIS TESTING

	Path			Estimate	S.E.	C.R.
H1	ATTITUDE	<---	PU	.077	.076	.915
H2	ATTITUDE	<---	PEOU	-.004	.099	-.060
H3	ATTITUDE	<---	COM	.495*	.064	5.517
H4	INTENTION	<---	ATTITUDE	.574*	.035	9.890

* p< 0.05

Next, Perceived Ease of Use had a negative insignificant influence on Attitude (β = -0.004; p>0.05). Thus, *H2* was also not supported. Learning to use the e-Government services would be less beneficial to them as they would find it not easy to get better service via the system. Moreover, it would be difficult for them to become skillful at using the e-Government services. Hence, the finding is divergent to [20, 23, 24, 25]'s study who found that perceived ease of use (PEOU) was a stronger predictor of people's intention to the system usage than perceived usefulness (PU).

In line with the theoretical expectations, Compatibility had a strong positive and highly significant influence on Attitude (β = 0.495; p<0.05), suggesting support for *H3*. In coherence to prior researchers, compatibility construct was found to be a significant determinant in citizen's intention to use an e-Government service [19, 27]. From these results it seems that the setup of the e-Government services will be compatible with the way users work and are more likely to adopt e-Government services owing to their familiarity with the Internet for various official, personal, and recreational uses.

H4 was also supported as p<0.05 (β = 0.574). Attitude had a strong positive and highly significant influence on Intention to use e-Government services. Encouragingly, users found that using the e-Government system would be a pleasant experience for them, as it is a good idea. They would be able to use the e-Government system well because they have the resources, knowledge and ability to use it successfully.

V.CONCLUSION AND IMPLICATIONS

An empirical study was conducted to examine customer's attitude towards e-Government services. The results demonstrated that e-Government services acceptance can be explained in terms of compatibility and attitude towards e-Government services. In addition, managerial implications for government policy makers, government agencies, and system developers were also discussed. The findings make which are both customer-oriented and evidence-based. For governmental policy makers responsible for future strategic planning of e-Government services, this study makes further recommendations.

e-Government can increase citizen satisfaction, improve government efficiency, and drive down transaction costs as it represents the free flow of information that improves knowledge, opportunity, relationships, time effectiveness, and even encourages the standardization of products and ideas because citizens view a common set of information.

Accordingly, to effectively evaluate the performance of e-Government services, policy makers can improve strategic planning for e-Government service investments through monitoring these four factors as intention indicators. Subsequently, in order to ensure e-Government service users' loyalty, policy makers need to concentrate on the following when devising their marketing strategies for e-Government services: improving user interface with e-Government services, enhancing services security mechanisms, employing mass media marketing, and increasing the availability of necessary hardware and software for e-Government service use. Furthermore, when promoting and marketing e-Government service adoption, policy makers should advertise users' successful experiences to attract non-users.

For governmental agencies responsible for developing implementation strategies for e-Government services, this study provides several recommendations. The important determinants of e-Government services use are compatibility and attitude. To successfully implement e-Government services given resource constraints, it is recommended that governmental agencies set priorities based on the relative importance of the factors. Next, to foster positive attitudes towards e-Government services, governmental agencies should develop implementation strategies that emphasize the usefulness of e-Government services, work style compatibility, and user trust.

For system developers responsible for e-Government services design, it is worth taking note that attitude and compatibility are key factors influencing user acceptance of e-

Government services. Therefore, system developers should provide a user-friendly interface, reinforce security mechanisms for e-Government services, and design a suitable information system flow more compatible with user work styles. Furthermore, to support e-Government service adoption, system developers should focus on developing effective user guidance, continuously improving security mechanisms, and using the practicing Internet community for promoting e-Government services and sharing use experience.

In order to ensure that future research is more accurate and reliable, studies should be based on more than the four variables used here as e-Government is affected by many factors. This is because these four variables cannot fully explain the factors influencing customers' acceptance of e-Government services. Consequently, future findings might be inconclusive. e-Government will continue to be an important topic to monitor, as it will dramatically affect the life of the individual citizen and their governments on a global scale.

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