Testing of a Model Evaluating e-Government Portal Acceptance and Satisfaction

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Abstract: e-Government has the potential to improve public administration efficiency by increasing convenience, performance and accessibility of government information and service to users. But knowledge about e-Government remains limited. To realize its potential, e-Government needs to be grounded on in-depth understanding of target users' needs, perceptions and other factors influencing its uptake. This cross-sectional study identifies and examines factors influencing e-Government portal satisfaction and adoption by individual citizens in Macao, three years after its inauguration. It is an adaptation to the e-Government context of a model developed for assessing e-commerce websites. To understand the determinants of e-government portal adoption, an integrated model of user satisfaction and technology acceptance is empirically tested. The integrated model involves four success factors -- information quality, system quality, perceived effectiveness and social influence -- which impact user satisfaction with the e-Government website, influencing intention to reuse. Overall, the study proposes that user perceptions about the e-Government portal influence user attitude towards the portal. An Internet survey collected data from 464 online users of Macao's e-government portal. The model was found to explain a large proportion of the variance in citizen's intention to reuse the portal. The portal partially mediates the relationship between success factors and intention-to-reuse. The results provide evidence that Information Quality, System Quality and Social Influence (but not Perceived Effectiveness) are success factors influencing user satisfaction and adoption. It is recommended that portal management needs to ensure ease-of-use, currency and accuracy of the supplied information. Timely information updating is a major concern for the e-Government portal in Macao. The content an e-government portal that is perceived by users to be easier to navigate is likely to facilitate satisfaction and reuse. Finally, the importance of social influence justifies, managerial actions aimed at improving e-Government portal acceptance by individual users and government employees.

Keywords: e-government portal, adoption, satisfaction, TAM, EUS

1. Introduction

E-Government has been comprehensively defined as "a broad-based transformation initiative, enabled by leveraging the capabilities of information and communication technology (ICT); (1) to develop and deliver high quality, seamless and integrated public services; (2) to enable effective constituent relationship management; and (3) to support the economic and social development goals of citizens, business, and civil society at local, state, national and international levels" (Grant & Chau, 2004,p. 8), although there are other definitions with varying emphasis and perspectives. Such a definition recognizes that the integration of a citizen / customer orientation with the adoption of the Internet and other ICT as new delivery channels may result in satisfaction for individual citizens and businesses alike (Ho, 2002). Moreover, e-Government has the potential to build better relationships between the government and its constituents, through citizen empowerment and increased transparency (World Bank, 2002).

Nevertheless, e-Government inherits the less positive characteristics of information systems (IS), including a high failure rate of information technology (IT) based projects (Schepers & Wetzels, 2007) and user adoption rates below expectations (Davis, 1993). Low adoption may be explained as a temporary characteristic of the transition process of users from the traditional public service delivery mode to the new e-version, and by reasons ranging from supply side imperfect dissemination of information about the new services and system complexity, to demand related user lack of proficiency in the use of e-services and resistance to innovation. E-Government deployment success depends on achieving a state of adoption that combines user satisfaction gains with the discontinuation of traditional processes. As long as users can choose between using e-Government and traditional

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methods to access public services, adoption can be expected to depend on external user attitudes and perceptions.

2. e-Government in Macao

Similar to other countries, Macao's SAR government, in 1999, had already deployed e-government initiatives decentralized at agencies level by providing information and service on Internet and Intranet (Janowski et al., 2004). A survey revealed that the norm is for government agencies to establish a web presence with little cross-departmental cooperation (Janowski et al., 2005).

The Macau SAR government portal was officially launched in December 2004, offering one single point of entry for government information targeted at residents, visitors, business and public servants (SAFP, 2004). Using United Nations' classification (UNPA & ASPA,2001), more than half of the e-services (58%) accessible in the portal are at the enhanced stage, with information being regularly updated and offering search capability and downloadable forms, while 38% are in the interactive stage, characterized by online forms submission, user log-in, and specialized databases. Only 4% of the e-services are in the transactional stage, where users can complete and pay for services online. This distribution supports the findings of Janowski et al., (2005) survey of Macao's e-government.

3. Purpose and theoretical framework

Notwithstanding significant investment by many governments, knowledge about e-Government remains limited. To realize its potential, e-Government initiatives need to be grounded on an in-depth understanding of potential users' needs, perceptions and other factors influencing its uptake. Still in its infancy, e-government lacks a theoretically grounded and empirically proven model to evaluate its effectiveness based on external user satisfaction. This study seeks to identify and examine factors influencing the satisfaction and ultimately adoption of the e-Government portal by individual citizens in Macao. The theoretical framework used in this study is an adaptation to the e-Government context of a model developed by Schaupp et al., (2006) for assessing e-commerce websites. Hence the paper examines an existing research model applied elsewhere and tests its applicability in the Asian e-Government context of Macao. The model integrates measures from the technology acceptance model or TAM (Davis, 1989; Davis et al., 1989) and end user satisfaction (EUS) theories (DeLone & McLean, 1992; Doll et al., 1995), examining user satisfaction when using a computer application.

Both the TAM and the EUS approaches are theoretically grounded and empirically supported (Wixom & Todd, 2005). Although providing limited guidance about how to influence usage through design and implementation (Taylor & Todd, 1995) and assuming that all behaviour is under an individual's complete volitional control (Furneaux, 2006), TAM identifies perceived usefulness and ease of use as factors influencing IS adoption. The strength of EUS is in its ability to link design characteristics with user satisfaction (Wixom & Todd, 2005), despite of its inability to link attitude to behavior and to fully capture the significant determinants of satisfaction (Au et al., 2002). It is proposed that taking both approaches into account may yield a better understanding of user acceptance and adoption (Melone, 1990 and Seddon, 1997). The integrated model used in this research identifies four success factors -- information quality (IQ), System Quality (SQ), perceived effectiveness (PE) and social influence (SI) -- which impact user satisfaction with a e-Government website (SAT), influencing intention to reuse (IU). IQ is defined as the degree to which information on the e-Government portal is perceived to be accurate, relevant, complete and in the format required by the user (Schaupp et al., 2006). SQ is defined as the degree to which the e-Government portal is easy to use to accomplish a desired goal. It involves three dimensions, namely access (the speed and availability of the website when users attempt to use it), usability (the extent a website is visually appealing, consistent, fun and easy to use) and navigation (the extent to which the website allows a user to easily find needed information (Huizingh, 2000; McKinney et al., 2002). PE is the degree to which a user believes the website to be useful, or the website enables users to gather information about government services quickly and enhances users' effectiveness in searching for and using government services on the Internet. It is similar to 'perceived usefulness' (Davis et al., 1989), usefulness and relativeness (Moore & Benbasat, 1991) and 'performance expectancy' (Venkatesh et al., 2003). SI refers to user perception of peers' expectations about their use of the website. Deemed to be a significant predictor of IT adoption (Moore & Benbasat, 1991), SI is equivalent to 'social norm' (Seddon, 1997) 'subjective norm' (Thompson & Higgins, 1991) and 'image'.

The outcome measures are user satisfaction with the e-Government portal (SAT) and user intention to reuse (IU). Overall, the study proposes that user perceptions about the e-Government portal, influence user attitude towards the portal. The following research questions are examined:

- RQ1: What factors affect SAT?
- RQ2: What factors influence the e-Government portal adoption individual citizens?
- RQ3: Are there relationships between the identified factors in the explanation of portal acceptance by Macao citizens?

The following four hypotheses were developed from the literature to address the questions:

- H1: The effect of IQ on IU is mediated by SAT
- H1a: IQ is positively related to IU.
- H1b: IQ is positively related to SAT.
- H1c: SAT significantly predicts IU after controlling for IQ.
- H2: The effect of SQ on IU is mediated by SAT.
- H2a: SQ is positively related to IU.
- H2b: SQ is positively related to SAT.
- H2c: SAT significantly predicts IU after controlling for SQ.
- H3: The effect of SI on IU is mediated by SAT.
- H3a: SI is positively related to IU.
- H3b: SI is positively related to SAT.
- H3c: SAT significantly predicts IU after controlling for SI.
- H4: The effect of PE on IU is mediated by SAT.
- H4a: PE is positively related to IU.
- H4b: PE is positively related to SAT.
- H4c: SAT significantly predicts IU after controlling for PE.
- H5: Together with SAT, the success factors (IQ, SQ, SI) are a good predictors of IU.

4. Methodology

Using a web questionnaire, this cross-sectional study is an ex post evaluation of Macao's e-Government portal, three years after its inauguration (Doherty & King, 2004). Estimated to exceed 260,000 online population (RTHK, 2007), the target is the set of all non-business users of Macao's e-Government portal, 18 years or older self-reported to have used the portal more than once. Table 1: The instrument used in this research was adapted from instruments previously tested for validity and reliability (see Table 1). All scales were phrased as questions on a five-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. The satisfaction construct used a five-point semantic scale from 'very dissatisfied' to 'very satisfied', 'very displeased' to 'very pleased', 'frustrated' to 'contented' and 'disappointed' to 'delighted' to gauge the degree of satisfaction.

Table 1: Source of scales and their reliabilities

	Construct	Source of Scale	Dimensions	Cronbach's Alpha
Success	Information quality	Doll & Torkzadeh's,1988)		0.92
	System quality	Cheung & Lee, 2005; McKinney *et al.,* 2002	Access	0.8
			Usability	0.97
			Navigation	0.86
	Perceived Effectiveness	Carter & Belanger, 2005; Gefen *et al* .,2002		0.8827
	Social influence	Venkatesh *et al.,* 2003		0.92
Outcomes	Intention-to-reuse	Carter & Belanger, 2005; Gefen *et al* ., 2002		0.9195
	Portal satisfaction	Cheung & Lee, 2005; McKinney *et al* ., 2002		0.98

A web-link to the survey was made available on the e-Government portal and the questionnaire was posted on the web-hosting QuestionPro.com website for publicizing the research and collecting data. An information letter about the purpose of the survey was sent to four local organizations and community groups requesting their participation in the survey. Potential participants learnt about the survey either through their self-initiated contact with the website hosting the questionnaire, or by email via the referred organizations. Using self-selection (Ticehurst & Veal, 200) non-probability sampling, data collection took place August 15 to September 16, 2007. Data processing and analysis was performed using SPSS 13.0. To ensure data accuracy and completeness, invalid responses were excluded. Perception scales were replaced with the median for responses with missing values. The negatively worded item (PU3) was recoded.

Table 2: Frequency distributions of demographic variables of repeated users

Variables		*Frequency*	*%*	*Variables*		*Frequency*	*%*
Gender				**Macau Resident or Not**			
Valid	male	243	52.83	Valid	yes	440	95.65
	female	217	47.17		no	20	4.35
	Total	460	100.00		Total	460	100.00
AgeGroup				**Internet Usage Frequency**			
Valid	18-27	223	48.48	Valid	at least once a day	368	80.00
	28-37	118	25.65		several times a week	82	17.83
	38-47	78	16.96		once each week	1	0.22
	48-57	25	5.43		several times a months	4	0.87
	>=58	2	0.43		once a month	3	0.65
	Total	446	96.96		less than once a month	2	0.43
	Missing	14	3.04		Total	460	100.00
	Total	460	100.00				
Occupation				**Internet Experience**			
Valid	public servant	138	30.00	Valid	< 1 yr	1	0.22
	other	4	0.87		1 - 3 yr	84	18.26
	prof./ exec./ managerial	91	19.78		4-6 yr	99	21.52
	clerical/ service worker	85	18.48		7-9 yr	147	31.96
	production worker	1	0.22		>=10 yr	128	27.83
	self-employed	14	3.04		Total	459	99.78
	student	115	25.00		Missing	1	0.22
	homemaker	4	0.87		Total	460	100.00
	unemployed	8	1.74				
	Total	460	100.00				
Education Level				**Macau Government Portal Usage Frequency**			
Valid	primary school	1	0.22	Valid	1 or 2 times a year	32	6.96
	secondary	49	10.65		several times a year	166	36.09
	college	126	27.39		once a month	70	15.22
	>=University	278	60.43		once a week	76	16.52
	Total	454	98.70		more than once a week	116	25.22
	Missing	6	1.30		Total	460	100.00
	Total	460	100.00				

5. Data analysis and findings

The web-questionnaire was visited 1932 times, with 849 attempts to answer the questionnaire. In addition to 25 responses from once-users and 103 from non-users, 460 usable web-survey questionnaires were received from repeat users (the sample), for a total 588 questionnaires. Table 2 depicts the characteristics of the sample.

Though being incongruent with the profile of Macao's population distribution, the respondents in the sample seems to be compatible to the demographic characteristics of the online population in Macau. Respondents were found to be mostly young, Macao residents, highly educated, experienced and frequent users of the Internet. The gender and age distributions were similar to the Internet user profile gathered for the Macao Internet Usage Survey (Cheong, 2007) and there is support for another

Internet Usage study indicating that the higher the education, the more frequent the Internet usage (China.com.cn, 2006).

Table 3: VARIMAX rotated loading,reliability and overall reliability of 24 items instrument

ITEMS	Construct	Manifest Variable	FACTOR				
			SQ	IQ	SAT	SI	UI
SAT1	SAT	satisfied			0.68		
SAT4		delighted			0.72		
SAT2		pleased			0.79		
SAT3		contented			0.77		
USA1	SQ	simple layout	0.66				
USA2		ease of use	0.76				
USA4		clear design	0.71				
USA5		user friendly	0.74				
NAV1		ease to go back and forth	0.64				
NAV2		locate information with a few click	0.55				
NAV3		easy to navigate	0.78				
SI4	SI	influential people				0.61	
SI2		important people				0.63	
SI3		senior management of SAR				0.72	
SI1		Macau SAR government				0.62	
UI2	UI	Intend to use					0.71
UI1		predict to use					0.79
ECS2	IQ	relevance		0.63			
ECS3		applicable		0.70			
ECS4		sufficient information		0.53			
ECS5		information accuracy		0.76			
ECS6		accuracy		0.75			
ECSB		timely		0.66			
ECSC		up-to-dated		0.67			
	Sum of Square (eigenvalue)		4.29	4.20	2.95	2.27	1.64
	Percentage of trace		17.86	17.49	12.30	9.46	6.82

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 6 iterations.

5.1 Principal component analysis

Exploratory factor analysis using principal component factoring with Varimax-rotation was conducted to examine the factor structure of the 38 items in the questionnaire. The ratio of sample size to number of scale items was 16:4, exceeding the minimum 10:1 ratio recommended by Kerlinger (Doll & Torkzadeh, 1988). After iterative factor analysis and item deletion, the number of items was reduced to 24 in the final instrument (as shown in Table 3), with an overall reliability of 0.94, representing 63.93% of the variance of the dataset with five factors, one less than the Schaupp et al., (2006) model used.

Table 4: Mean, standard deviation, internal reliability and correlation coefficients for the latent constructs

Component		*No. Items*	*Mean*	*S.D.*	*IQ*	*SQ*	*SI*	*IU*	*SAT*
Success Factors									
1	**IQ**	7	3.18	0.65	**0.88**				
2	**SQ**	7	3.21	0.67	0.66	**0.89**			
3	**SI**	4	2.89	0.63	0.55	0.52	**0.7**		
Success Measures									
4	**IU**	2	3.17	0.63	0.47	0.41	0.36	**0.61**	
5	**SAT**	4	3.77	0.68	0.67	0.64	0.54	0.42	**0.9**
Correlation is significant at the 0.01 level (2-tailed).									
Cronbach Alpha is shown on the diagonal in boldface									

Table 3 shows that accuracy, relevance, completeness and timeliness are valid sub-dimensions of IQ while usability and navigation are important proportions of SQ. Calculated by using the means of the items that belonged to the scale, the descriptive statistics for the composite scale are reported in Table 4. The analysis reveals that Macao's repeat users were satisfied with the e-government portal. Comparing with SQ, users were less satisfied with the information and service provided within the portal.

Table 5: Correlation matrix of measurement model (n = 460)

	ECS2	ECS3	ECS4	ECS5	ECS6	ECSB	ECSC	USA1	USA2	USA4	USA5	NAV1	NAV2	NAV3	SI1	SI2	SI3	SI4	SAT1	SAT4	SAT2	SAT3	IU1	IU2
ECS2	1																							
ECS3	0.58	1																						
ECS4	0.52	0.49	1																					
ECS5	0.53	0.6	0.43	1																				
ECS6	0.49	0.55	0.39	0.71	1																			
ECSB	0.56	0.65	0.48	0.6	0.53	1																		
ECSC	0.55	0.49	0.4	0.5	0.53	0.5	1																	
USA1	0.36	0.32	0.37	0.29	0.26	0.32	0.27	1																
USA2	0.4	0.49	0.32	0.43	0.38	0.46	0.32	0.46	1															
USA4	0.42	0.41	0.33	0.45	0.43	0.41	0.37	0.53	0.6	1														
USA5	0.5	0.5	0.39	0.44	0.46	0.53	0.4	0.49	0.68	0.65	1													
NAV1	0.39	0.42	0.29	0.39	0.37	0.46	0.32	0.38	0.6	0.49	0.58	1												
NAV2	0.5	0.53	0.42	0.38	0.38	0.5	0.34	0.47	0.49	0.43	0.49	0.44	1											
NAV3	0.48	0.42	0.33	0.38	0.4	0.4	0.34	0.5	0.65	0.59	0.67	0.56	0.58	1										
SI1	0.34	0.37	0.3	0.33	0.28	0.41	0.28	0.24	0.31	0.33	0.32	0.32	0.35	0.28	1									
SI2	0.32	0.33	0.3	0.25	0.28	0.34	0.34	0.28	0.27	0.21	0.26	0.21	0.31	0.26	0.43	1								
SI3	0.26	0.24	0.29	0.25	0.26	0.31	0.32	0.26	0.24	0.28	0.26	0.3	0.33	0.27	0.35	0.29	1							
SI4	0.31	0.33	0.26	0.37	0.29	0.41	0.32	0.29	0.31	0.37	0.36	0.27	0.3	0.3	0.38	0.34	0.41	1						
SAT1	0.52	0.47	0.42	0.45	0.45	0.52	0.39	0.34	0.46	0.51	0.51	0.46	0.44	0.44	0.37	0.33	0.32	0.38	1					
SAT4	0.51	0.48	0.42	0.48	0.43	0.51	0.45	0.37	0.48	0.49	0.5	0.46	0.43	0.48	0.34	0.37	0.34	0.4	0.7	1				
SAT2	0.5	0.45	0.38	0.47	0.44	0.49	0.39	0.33	0.44	0.42	0.44	0.45	0.42	0.43	0.36	0.27	0.3	0.35	0.64	0.7	1			
SAT3	0.49	0.5	0.41	0.47	0.43	0.48	0.38	0.34	0.48	0.41	0.48	0.44	0.42	0.44	0.33	0.33	0.3	0.43	0.65	0.7	0.77	1		
IU1	0.27	0.23	0.26	0.28	0.26	0.26	0.25	0.2	0.18	0.2	0.23	0.22	0.25	0.22	0.28	0.27	0.08	0.21	0.29	0.28	0.33	0.27	1	
IU2	0.43	0.39	0.3	0.34	0.37	0.38	0.32	0.28	0.29	0.3	0.32	0.35	0.37	0.36	0.31	0.28	0.09	0.27	0.31	0.36	0.34	0.34	0.44	1
**	Correlation is significant at the 0.01 level (2-tailed).																							

5.2 Reliability and validity testing

Scale reliability was assessed using Cronbach's coefficient alpha analysis. The 24-item instrument had an overall coefficient alpha of 0.94 (Table 3), showing that all the items measured the same construct as intended. In addition, Table 4 shows the reliabilities of five summated scales were between 0.9 (SAT) and 0.61(IU). All scales exceeded the 0.70 threshold except for IU(0.61), which is still an acceptable level for newly developed constructs (Hair et al., 2006). Convergent, discriminant and criterion-related validity were assessed using factor and correlation analyses, to ensure the instrument only correlated with the expected variables. In factor analysis, significant loading of all the items on the single factor indicated unidimensionality while no cross-loading items supported instrument discriminate validity (Wang et al., 2001). These results were confirmed using the correlation approach reported in Table 5. Finally, criterion-related validity was assessed to examine the correlation between total scores (sum of 20 items) and the measure of global rating of satisfaction

(sum of SAT items), using Doll & Tokzadeh's (1988) approach. Since r= 0.72 and p <.001, the instrument was deemed capable of measuring user satisfaction.

In summary, the observed convergent and discriminate reliability and criterion validity jointly indicated that the psychometric properties for the measurement model warranted further analysis. Hypotheses testing was then conducted with user perceptions as independent variables, portal satisfaction (SAT) as mediator and usage intention (IU) as the dependent variable.

5.3 Hypothesis testing

Hypothesis were tested to examine the factors affecting e-Government portal satisfaction and adoption, as expressed in the research questions and hypotheses stated earlier. Following Baron & Kenny (1986)'s procedures, mediation analyses were conducted to understand how user perceptions affect adoption. Sobel Statistics (1982, cited in Preacher and Hayes, 2004) and bootstrapping (Precher & Hayes, 2004) were also adopted to compare and estimate the indirect effect defined as the reduction of the effect of the independent variable on the outcome (Kenny, 2006). Finally, an exploratory multiple regression analysis was carried out to better understand the mechanism underlining the adoption of an e-government portal, a relationship not previously examined (H5).

5.3.1 Mediation analyses

Success factors (IQ, IQ and SI) were the independent variables; SAT was the mediator and IU the dependent variable. Several regression analyses were performed to test [condition 1] significance of the total effect of the independent variable on the dependent variable; [condition 2] significance of the effect of the independent variable on the mediator; and [condition 3] that the mediator significantly predicts the dependent variable, controlling for independent variable.

H1: The Effect of IQ on IU is mediated by SAT

Using Baron and Kenny (1986)'s causal steps, all conditions were met thus all three sub-hypotheses were supported. The results were:

- H1a) IQ significantly predicted IU (b=0.49, p < 0.01).
- H1b) IQ significantly predicted SAT (b=0.65, p < 0.01).
- H1c) IQ and SAT significantly predicted IU (b=0.21, p < 0.01 and b=0.35, p < 0.01)

This means when IU is regressed on both SAT and IQ, the mediator significantly predicts IU, while the predictive utility of the independent variable is reduced from b=0.49 to b=0.35; SAT and IQ together explained 24.1 percent of the variance in IU (significant based on the ANOVA table F(1, 458)=72.67, P<0.01). That is, holding IQ constant, the effect of SAT on IU and the direct effect of IQ on IU were significant. Furthermore, the Sobel and bootstrap tests supported the mediation. The former estimated the existence of the indirect effect (Z=3.43, P<.001) and the estimated indirect effect of IQ on IU through SAT was 0.13. The latter confirmed an indirect effect between .04 and 0.22 at a 95% confidence level. The indirect effect is significantly different from zero at p < 0.01 (two tailed). The overall conclusion is that SAT mediates the relationship between IQ and IU. Hypothesis 1 is supported.

H2: The effect of SQ on IU is mediated by SAT.

Using Baron and Kenny (1986)'s causal steps, all conditions were met thus all three sub-hypotheses were supported. The results were:

- H2a) SQ significantly predicted IU (b=0.41, p < 0.01:);
- H2b) SQ significantly predicted SAT (b=0.60, p < 0.01);
- H2c) Both SQ and SAT significantly predicted IU (b=0.30, p < 0.01 and b=0.23, p < 0.05); the positive relationship between SQ and IU (b=0.41) is smaller after controlling for SAT (b=0.23) with R-square =0.21).

Results suggest that SAT mediates the effect of SQ on IU. The indirect effect is.18 using the Sobel test (Z =4.88, p < 0.01); the bootstrap estimate is that the indirect effect lies between .10 and 0.26, at

95% confidence level. The overall conclusion is that SAT mediates the relationship between SQ and IU and hypothesis 2 is supported.

H3a: The effect of SI on IU is mediated by SAT.

Using Baron and Kenny (1986)'s causal steps, all conditions were met thus all three sub-hypotheses were supported. The results were:

- H3a) SI significantly predicted IU (b=0.38, p < 0.01);
- H3b) SI significantly predicted SAT (b=0.54, p < 0.01);
- H3c) SAT and SI significantly predicted IU (b=0.35, p < 0.01 and b=0.20, p < 0.01). SI predictive utility fell from b=0.38 to b=0.20. R-square =0.20).

Both the partial effect of SAT on IU after controlling for SI and the direct effect of SI on IU are statistically significant. The indirect effect is.19 using the Sobel Test (Z=5.85, p < 0.01); the bootstrap estimate is that the indirect effect lies between .11 and 0.26, at 95% confidence level. The overall conclusion is that SAT mediates the relationship between SI and IU and hypothesis 3 is supported.

H4: The effect of PE on IU is mediated by SAT.

This hypothesis was not supported, as Perceived Effectiveness was not a construct of the measurement model of this research.

5.3.2 Exploratory multiple regression analysis

Since support for H1 to H3 took into account the effect of one independent variable, multiple regression analysis was performed to explore whether SAT is the significant predictor of IU in the presence multiple independent variables IQ, SQ, PE, SI and to determine the strengths of effect of the independent variables on the dependent variable (identified as H5). The objective was to better understand the mechanism underlining adoption of the e-Government portal.

H5: Together with SAT, the success factor (IQ, SQ, SI) is a good predictor of IU.

The analysis (table 6), shows that SAT (b = .14, p <.05) and IQ (b=0.28, p < 0.01) significantly predict IU while the effects of SQ (b=0.10, p > 0.05) and SI (b=0.10, p > 0.05) became insignificant in the presence of three success factors and SAT. This suggests that the effects of SQ and SI on IU are a complete mediation (becoming zero after controlling for IU), whereas the effect of IQ is a partial mediation (its effect is reduced but different from zero) when the mediator is controlled (Kenny, 2006). IQ is deemed the best predictor due to its higher standardized regression coefficient. That is, when all three success factors were taken into consideration concurrently to predict e-Government portal adoption, only IQ and SAT were significant. The models explained 25.3% of the variance and the overall model was significant (F (4,455) =38.47, p<.001).

Finally, the multiple regression assumptions of normality, linearity and homoscedasticity and independence of residuals were tested and the integrity of the assumptions was not questioned. Hypothesis 5 is partially supported as the exploratory regression analysis found that when all the variables were included in the regression SQ and SI became insignificant in predicting IU, whereas the effect of IQ was still positive, significant and larger than SAT. This is in line with Shrout & Bolger (2002)'s claim that one possible explanation for partial mediation is that the independent variable has a specific and direct effect on the dependent variable, in addition to an indirect effect through the mediator. Users' perception of the reliability of the information available in the portal plays a vital role in influencing IU. Overall, IQ, SQ and SI are deemed as significant predictors of SAT, itself a significant predictor of IU.

Table 6: Multiple regressions – using success factors to predict intention-to-use

	Unstandardized Coefficients		Std. Coefficients	t	Sig.	Collinearity Statistics		Statistics
	B	Std. Err.	Beta			Tolerance	VIF	
Constant	1.85	0.16		11.5	0			
SAT	0.14	0.06	0.13	2.17	0.03	0.46	2.19	R Square =0.2527
SQ	0.1	0.06	0.1	1.68	0.09	0.48	2.08	Adjusted R Square =0.2462
SI	0.1	0.05	0.09	1.75	0.08	0.63	1.6	F = 38.47
IQ	0.28	0.06	0.27	4.36	0	0.43	2.3	P < 0.01
Dependent Variable: IU								

6. Conclusion and implications

This research tested an integrated model of e-Government satisfaction that incorporated constructs from the technology acceptance model (TAM) and end-user satisfaction (EUS). The model was found to explain a large proportion (63.93%) of the variance in citizen's IU. Empirical results provided support for the hypothesis that SAT partially mediates the relationship between success factors and IU. As in prior literature, IQ, SQ and SI (but not PE) were confirmed as determinants of the adoption of, and satisfaction with the e-Government portal. IQ is the most important element of SAT in Macao while SAT is a significant predictor of IU. This suggests that a 'good' portal from a web designer's eye might not be able to attract users' adoption. Portal satisfaction is a requirement for intention-to-reuse the portal.

In terms of theoretical implications, empirical testing of existing measures of ICT adoption and user satisfaction in an Asian e-Government context indicate that the determinants of website satisfaction vary and depend on the objectives set for the website. This supports the importance of portal design in terms of IQ and SQ, without overlooking the impact of SI as a direct and positive influencer of SAT. Therefore, portal management needs to ensure ease-of-use, currency and accuracy of the supplied information. The findings also indicate that the content an e-government portal that is perceived to be easier to manage is likely to indirectly facilitate citizens' adoption intention and satisfaction. Timely information updating is a major concern for the e-Government portal in Macao. Given the importance of social influence, managerial actions should aim at improving e-Government portal acceptance by individual users and government employees. This might be achieved by combining the development of a support program directed at managing internal resistance to change with a program of integrated marketing communications focused on promoting awareness of and benefits from using the portal. In addition, it appears sensible to actively seek citizen input and feedback on how to improve the design of the e-Government portal. Estranged from the development process, potential users may lack in-depth understanding of portal capabilities, with negative implications for portal adoption.

In terms of limitations, while self-selection sampling captured online users, of Macao's e-Government portal, who are interested in responding to a web-survey, generalization to Macao's population is not warranted. Since the research promoted access to target respondents by engaging with four local organizations or community groups (including one higher education institution), the sample may reflect participation by institutional members. Another limitation is that IU is subjective to respondents' statement of their intentions. No objective measures were used. Since data was collected for one only portal over a short period of time, different portals, and portals at different stages of development and different time periods may have yielded different responses.

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