User Satisfaction Evaluation of Malaysian E-Government Education Services

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Abstract— **This paper investigates user satisfaction evaluation of Malaysian e-government education services. Although different frameworks and methods have been used to evaluate the quality of online services e.g., SERVQUAL, SERVPERF and other practitioner-orientated tools, in this paper we propose the usefulness of importance-performance analysis (IPA). A major benefit of IPA is that it allows both importance and performance to be measured using a two-dimensional grid. More specifically, IPA is used to evaluate education online services in Malaysia from the user (citizen) perspective and to identify areas of strategic importance which can help to improve future online services in Malaysia. The paper raises the issue that despite the increased uptake of e-government in Malaysia, there is the need for more practical evaluation tools to gauge the perceptions of citizens in their use of e-government, particularly from an educational context.**

Keywords—information and communication technology (ICT), importance-performance analysis (IPA), online educational services, Malaysia.

I. INTRODUCTION

Electronic government (e-government), defined as the use of information and communication technology (ICT) to enhance how services are delivered, is increasingly being adopted by governments around the world as an avenue to reach stakeholders by providing electronic services through the Internet [1], [2], [3]. In e-government research, put broadly, stakeholders, or indeed stakeholder relationships, can be understood from both an internal and external perspective. Internal stakeholder relationships [e.g., government to employee (G2E) and government to government (G2G)] are dealings with stakeholders within inter-government and intra-government agencies. On the other hand, external stakeholder relationships [e.g., government to business (G2B), government to non-government organizations (G2N), and government to citizens (G2C)], are government associations with stakeholders from the business world and citizens. While we acknowledge that ICT has the potential to enhance both internal and external government relations, and argue that internal stakeholder relationships are as important as external stakeholder relationships, in this paper we focus on the external stakeholder relation, specifically G2C.

Increasing citizen expectations, as an outcome of improvements in ICT and internet infrastructure, have compelled governments to implement e-government as an alternative to existing brick-and-mortar government services, and to offer a higher quality of electronic facilities. Government reform holds real potential to enable citizen-centric transformation in government agencies and to deliver effective and efficient services to match various stakeholder expectations in the use of government services [4], [5].

Thus, it is important for governments as service providers to understand the needs and wants of its customers in order to provide a high quality of services [5]. Understanding customer needs enables service providers to use customer relationship strategies to improve customer satisfaction. Furthermore, given the considerable investment in ICT to modernize government, and the need to justify the return on investments, measuring and evaluating the performance of e-government services is becoming an important issue for governments throughout the world.

While a variety of evaluation methodologies have been applied to assess the quality of online services, such as SERVQUAL [6], [7], SERVPERF [8], [9], and other practitioner-orientated tools [10], [11], [12], in this paper we propose the usefulness of Importance-Performance Analysis (IPA) [13], as it allows users to plot the importance and performance associated to measured dimensions in a two dimensional grid [14], [15]. More specifically, we use a modified IPA to evaluate education online services in Malaysia from the perspective of the users. This is important given the need for more practical evaluation tools to gauge the perceptions of citizens in the use and implementation of e-government, particularly in the area of educational services from a Malaysian context [5].

Research in this area would allow policy makers and academics to identify areas in which they can allocate resources to the best effect. This research would also serve to guide and assist government in improving not only a higher return on investments but also a better return on relationships. Understanding the needs and wants of citizens will put the government in a better position to meet citizen expectations and to provide a better quality of service through electronic means.

II. E-GOVERNMENT RANKINGS IN ASIA

In terms of Internet penetration in Asia, as of 2016, Malaysia is ranked as number 10, whereas South Korea is ranked as number 1 with 92.1%, and is closely followed by Japan with 91.0%. A recent United Nations E-Government Development Index survey [16] reveals that the top three countries in Asia ranking highly in e-government are South Korea (rank 3rd), Singapore (rank 4th) and Japan (rank 11th). A comparative summary of e-government rankings is illustrated in Table I below. Since the introduction of the UN EGDI from 2001 - 2016, these three developed economies have been consistently ranked top three in Asia.

TABLE I. E-GOVERNMENT RANKINGS

	2001	2003	2004	2005	2008	2010	2012	2014	2016
Malaysia	59	43	42	43	34	32	40	52	60
Japan	27	18	18	14	11	17	18	6	11
China	93	74	67	57	65	72	78	70	63
South Korea	15	13	5	5	6	1	1	1	3
USA	1	1	1	1	4	2	5	7	12
UK	7	5	3	4	10	4	3	8	1
Singapore	4	12	8	7	23	11	10	3	4

Source: United Nation E-Government Development Index (UN EGDI) from 2001 to 2016

Malaysia's e-government ranking has slipped from 32nd position in year 2010 to 60th in year 2016 [16]. The UN E-Government Development Index is comprised of three indices, namely Online Services Index (OSI), Telecommunication Infrastructure Index (TII) and Human Capital Index (HCI). In the recent UN EGDI (2016) report, it reveals that Malaysia has dropped 8 places on the EGDI, and is now ranked 60th compared to 52nd in 2014, with the OSI ranking dropping from 31st to 42nd and TII falling from 67th to 70th. The HCI index was the only indicator which improves 3 places from 96th to 93rd.

Given that Online Services (OSI) dropped 11 places to 42nd in year 2016 [16] it creates a sense of immediacy to assess customer satisfaction and service quality of government online services in Malaysia.

III. E-GOVERNMENT IN MALAYSIA

Malaysia, one of South East Asian's new industrialized countries (NIC's), has experienced unparalleled growth and prosperity during the last two decades. This socio-economic growth has progressed through successive attempts by Malaysian government to improve not only the country's infrastructure, but also the social aspects, including promoting greater wealth through sustainable job creation, education and health programs, as well as investments in ICT. With the advancement of ICT, Malaysia has successfully shifted its economy from agrarian to industrial and now to the information age or knowledge-economy era. According to Internet World Stats, as of June 2016, 68.1% of Malaysia's population are Internet enabled, and this constitutes about 1.1% of Asia's total Internet users.

In Malaysia, the ICT program for reform began in 1991, and it is the objective of 'Malaysia Vision 2020' to achieve the status of a fully-developed country. The Multimedia Super Corridor, better known as MSC, was first launched in August 1996 by the Prime Minister. The policy of the MSC was developed and designed to meet the challenges and goals of Vision 2020. MSC is regarded as 'a global facilitator of the Information Age, a carefully constructed mechanism to enable mutual enrichment of companies and countries using leading technologies and the borderless world' [17]. Seven MSC flagship applications have been developed, including E-Government, National Multi-Purpose Card, Smart Schools, Telehealth, R&D Clusters, E-Business and Technopreneur Development. More particularly, seven other key projects were recognized as important to realizing the E-Government flagship application, including: Project Monitoring System (SPP II); Human Resource Management Information System (HRMIS); Generic Office Environment (GOE); Electronic Procurement (EP); Electronic Services (E-Services); Electronic Labor Exchange (ELX); and E-Syariah (see figure 1). As it would be unworkable to examine all the MSC flagships, the focus of this paper is on e-government, and more specifically e-services, particularly the educational services offered via e-government websites.

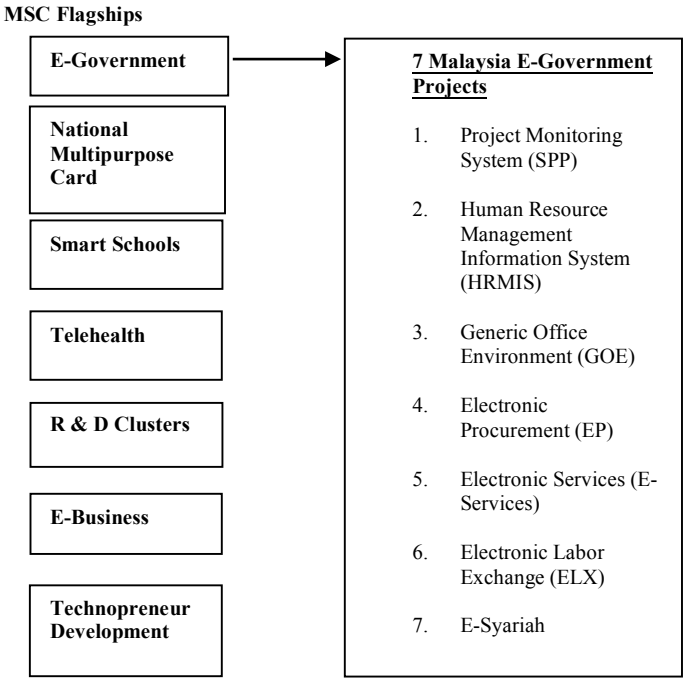

Fig. 1. MSC flagship applications and e-government projects

E-government, the first flagship of MSC, is envisaged as using ICT to transform the way government interacts and operates

between its internal government agencies (G2G), the way government interacts with its external businesses (G2B) and citizens (G2C) [18]. With a citizen-centric approach, the Malaysian Administrative Modernization and Management Planning Unit (MAMPU), the leading agency of this e-government initiative, ensures that government agencies are developing e-government services around the need of the citizen. The primary aim of this initiative is to enhance the quality of services, which includes improved accessibility, convenience of use (24/7 hours), and better interaction with users.

As a way of realizing the e-government flagship, the e-services project was launched in May 2002, and the interactions were mainly focused between government and customers. The traditional government services approach delivered through the brick-and-mortar of government buildings, face-to-face interactions, mail and forms, are currently complemented with electronic services delivery, and these e-services are accessible using multiple e-channels, such as websites, kiosks, interactive voice response (IVR), telephone and Internet channels via web television and computer.

IV. E-Government Evaluation Tools

Governments around the world are using evaluation tools to assess e-government performance to deliver better quality of services to its customers. To improve the quality of government online services, a variety of evaluation tools and methodologies have been applied. Some of the commonly used evaluation tools by researchers include SERVQUAL [6], [7], SERVPERF [8], [9] and IPA [13]. Other practitioner evaluation tools that have been used have been developed by Crook *et al.* [10], Sharrard *et al.* [11]; and Eggers and Goldsmith [12]. Notwithstanding the importance of these various evaluation tools and methods, the use of SERVQUAL has been criticized for not being able to be replicated easily, as well as issues of its inability to assign importance to each of the measured dimensions [9], [14], [19]. Likewise, SERVPERF measures only the performance level of the service quality and lacks the ability to measure the importance associated to each of the dimensions [8], [9]. Unlike SERVQUAL and SERVPERF, IPA allows users to plot the importance and performance associated to each of the measured dimensions on a two-dimensional grid [14], [15]. In addition, the IPA grid is useful as it is easy to use and can be adopted by practitioners to quickly identify areas of strategic focus for improving future Malaysia government online services.

V. RESEARCH METHODOLOGY

For this study an online survey was used to gauge user's satisfaction and motivation in the use of educational related online services. The focus of the study is on the education sector. Educational related online services are categorized into three groups: (1) Pre-School and Primary School; (2) Secondary / Technical Vocational Education and Training / Special Education; (3) Higher Education. Seven modified questions (seven Dimensions of the Website Experience [20], and another seven Benefits of Using Online Services [21] were devised, and for each question a 5-point Likert item from "very satisfied" to "very dissatisfied" was used. The overall sample size consisted of 229 respondents. Cronbach's Alpha was used to test for internal consistency (or reliability). The reliability score revealed a Cronbach's Alpha of 0.952 for seven dimensions of the website experience and a Cronbach's Alpha of 0.955 for seven benefits of using online services, which indicates a high level of internal consistency with our scale (a score of 0.7 or higher is considered an acceptable reliability coefficient).

After the online survey questionnaire was finalized, a survey link with an online banner of MUSE was posted on the following government sites:

- Ministry of Education website http://www.moe.gov.my
- The Government of Malaysia's Official website http://www.malaysia.gov.my
- Malaysia Administrative Modernisation and Planning Unit website: http://www.mampu.gov.my

These websites were chosen in order to increase the probability of gaining high response rates from citizens who are reasonably IT literate and therefore most likely to have used online education related services. Online surveys offer considerable amount of benefits over traditional methods. For example, using online survey, it costs less than manual methods [22], is more attractive with multimedia [23], has data in digital format [24] and shows real time results [23]. The survey was carried out on the abovementioned websites for two weeks in November 2016. A total of 229 citizens completed the online survey, which reflects a 59.5% response rate from a total of 385 people who clicked on the survey link.

VI. FINDINGS

A. Demographic Profiles

The findings as shown in table II reveals that the majority of the online respondents were Malay (83%), followed by Chinese (10%) and Indian (3%) which represents the three largest ethnic groups in Malaysia. As expected, the majority of the online respondents are from urban areas (77%) as they are more Internet enabled compared to the rural areas with only 2% online respondents. Out of 229 online respondents, the majority are female (68%), educated to at least degree and above (62%), aged between 30-39 years old (51%), work in government or statutory bodies (64%), and have a household income of between RM3000 to RM5000. Table II provides further information about the demographics of the survey respondents.

TABLE II. RESPONDENT DEMOGRAPHICS

		Number	%
Gender	Male	73	32
	Female	156	68
Ethnic Background	Malay	190	83
	Chinese	23	10
	Indian	7	3
	Bumiputra Sarawak	5	2
	Bumiputra Sabah	2	1
	Other	2	1
Age	<15	11	5
	15-19	2	1
	20-29	30	13
	30-39	117	51
	40-49	50	22
	50-59	18	8
	>59	0	0
Area	Urban	176	77
	Suburban	48	21
	Rural	5	2
Employment	Government/Statutory	147	64
	Private	32	14
	Self-employed	11	5
	Non-Government Organisation	2	1
	Student	25	11
	Other	11	5
Household Income	<RM1000	21	9
	RM1,000 - RM3,000	44	19
	RM3,000-RM5,000	60	26
	RM5,000 - RM7,000	41	18
	RM7,000-RM9,000	21	9
	>RM9,000	44	19

B. Categories of Educational Related Online Services

The research reveals the categories of educational related online services used by the respondents, and out of 229 users the majority of the users used the Pre-School and Primary School online services (72.05%, or 165 users), followed by Higher Education online services (18.78%, or 43 users), and Secondary/ TVET or Special Education (18.34%, or 42 users). Respondents were allowed to choose more than one category of educational related online services ranging from Pre-School and Primary School, Secondary / TVET / Special Education to Higher Education (mandatory), and the different types of online services offered in each of the educational categories (optional as only selected online services were listed). The most frequently used online service at the Pre-School, Primary School (highest 66.67%) and Secondary / Special Education School (highest 51.28%) is the "Exam Result Update or Online Checking via SAPS" system. At Higher Education level the highest usage of online services is "Application for IPTA & TVET" with 40.54%. In general, the majority of the online respondents surveyed were satisfied (37.12%) or very satisfied (41.92%) with the education cluster online services. 7.85% of respondents were unsatisfied, and only 1.75% felt very unsatisfied with educational cluster online services. 11.35% provided a neutral response.

C. Importance-Performance Analysis

IPA developed by Martilla and James [13], gives respondents the opportunity not only to record their satisfaction levels but also to rank the relative importance of the attributes associated with a product or service offering. In the IPA model, data is plotted on a two dimensional grid, with the level of *performance* along the X-axis and the level of *importance* on the Y-axis. Four quadrants are created with each quadrant being labelled as "Concentrate Here", "Keep up the Good Work", "Low Priority", and "Possible Overkill" (see Figure 2). In the **first quadrant**, "Concentrate Here", the attributes are considered as very important to the customers, but the performance levels are below satisfaction. Therefore, the service provider needs to concentrate and improve on all the attributes that fall into this quadrant. The **second quadrant**, "Keep up the Good Work", denotes attributes that are perceived to be very important to the customer, and the performance of the service provider in the delivery of these benefits is perceived to be satisfactory. The **third quadrant**, which is "Low Priority", shows attributes that have low importance and performed below the level of satisfaction. The last or the **fourth quadrant**, named "Possible Overkill" consists of attributes that have low importance but have relatively high performance. Here, it seems, there is an overemphasis in the allocation of resources on attributes that are perceived to be unimportant and it is time to consider divesting investment in these areas.

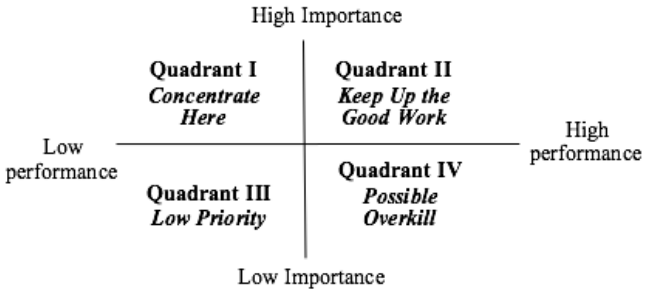

Fig. 2. The Original IPA Framework

D. IPA on 7 Dimensions of Website Experience

A modified Importance-Performance (or satisfaction) Analysis [13] was used in evaluating user experience of educational online services. Respondents were initially asked to rate the importance they attached to each of the attributes, followed by a satisfaction rating of these attributes using a five-point Likert scale. Finally, the seven dimensions of the website experience (as shown in table III and figure 3) were used to interpret the results of the study. This enabled the identification of key focus areas to support the development of future Malaysian government online services strategy. Referring to figure 3, in the first quadrant (I), "Concentrate Here", no attributes were listed in this area of concern. In the second quadrant (II), "Keep up the Good Work", the following attributes were deemed as important, namely (1) Site Performance; (2) Trust online Transaction; and (3) Content. These attributes are considered to be very important and are perceived to be satisfactory by users. The third quadrant (III), "Low Priority"

shows the following attributes, namely, (1) Navigation; (2) Look and Feel; and (3) Search. These attributes have low importance and performed below the level of satisfaction. The last or the fourth quadrant, named "Possible Overkill" quadrant consists of an attribute, namely Functionality. This attribute has low importance but has relatively high satisfaction. In this quadrant, it seems, there is an overemphasis in the allocation of resources on sufficient guideline attribute that are perceived to be unimportant and obviously it is time to consider reducing investment in this area.

TABLE III. MEAN IMPORTANCE AND PERFORMANCE OF THE 7 DIMENSIONS

Dimensions of the Website Experience	Importance	Performance
Navigation. Ease of navigation between website pages.	4.61	4.04
Search. The quality and relevance of search results available on the site.	4.60	4.00
Trust Online Transaction. Trust in the level of online transaction security and data privacy.	4.67	4.10
Functionality. Sufficient guidelines and alert notification for each transaction.	4.59	4.07
Look and Feel. Organized, consistent layout and appearance throughout the website made it easy for me to find what I am looking for.	4.62	4.05
Content. The accuracy, quality and freshness of news, information and content on the website.	4.63	4.10
Site Performance. Speed, consistency, and reliability of loading pages and online services.	4.66	4.07
Average	**4.63**	**4.06**

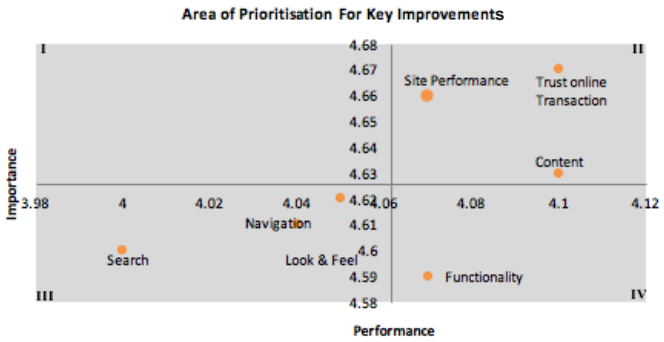

Fig. 3. IPA on 7 Dimensions of the Website Experience

E. IPA on 7 Benefits of Using Online Services

The study also examines users' motivation in using the online services and a list of 7 benefits were identified (see Table IV). In the benefit evaluations shown in Figure 4, two attributes were identified in the "Concentrate Here" quadrant (I). These attributes are perceived to be important by users, but performed poorly in the performance satisfaction ratings. They include (1) Responsiveness and (2) Security and Privacy. In the "Keep Up the Good Work" quadrant (II), the following citizen direct benefits were identified (1) Accessibility and (2) Save Cost. In the "Possible Overkill" quadrant (IV), only one benefit attribute was identified (less bureaucratic) and this is a consequence of adopting online services and has a clear success from the perspective of the user. In "Low Priority" quadrant (III), which in this case provides skewed impressions as they are important because they all scored over 4.0, interestingly are perceived as benefits which users are not yet satisfied. Benefits in this quadrant are (1) Personalized and Friendly Services and (2) Active Participation.

TABLE IV. MEAN IMPORTANCE AND PERFORMANCE OF THE BENEFITS OF USING ONLINE SERVICES

Benefits of Using Online Services	Importance	Performance
Save Cost. I no longer need to travel to government office hence save fuel, parking and postage cost.	4.61	4.33
Accessibility. System is accessible at high speed hence reduce my queuing time, and the time spent traveling to the agency.	4.61	4.26
Less Bureaucratic. Makes my interaction with government less bureaucratic and reduce the need for face to face interaction.	4.56	4.22
Active Participation. Government encourages active participation from the citizen via online channel.	4.51	4.1
Responsiveness. Provide prompt service, and helpful response to my requests.	4.68	4.07
Security and Privacy. Keep my personal data and financial information private and protected.	4.69	4.17
Personalized and Friendly Services. User friendly, easy to use and personalized services.	4.54	4.17
Average	4.60	4.19

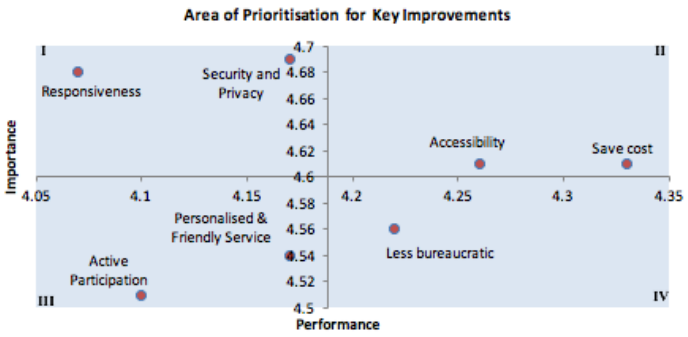

Fig. 4. IPA on Benefits of using Online Services

F. *Respondents Experience of Using Government Online Services*

The online survey also featured an open question section which asked the respondents to obtain their thoughts about government online services. Some comments are positive and government should keep up the good work in this area. For example, one respondent comments:

> *'It's a good way to know some up-to-date educational news and policies, and it does provide students with convenience so that students could apply for scholarship online'.*

Another respondent feels compromised when using the online services to navigate and look for study loan application.

> *'I have been using the site to apply for private school and private university and found the site and response to be satisfactory; however, when dealing with government agencies i.e. study loan application, the sites were slow and difficult to navigate'.*

Some users in comparing the online services provided by the private and public sector find online services provided by the private sector to be much better:

> *'Most online services provided by private [sector] are quite good, but government sites can upset the user'.*

The following are quotes from users who say online services are the way forward and they have no choice but to use the services provided by the government, which is seen as a form of government control:

> *'Considering my busy schedule, I have to access online services because it is not a choice anymore… but the level of service the government is providing is far from satisfactory'.*

> *'We have to keep using the online services because we have no choice'.*

Another user complains about the quality of the website:

> *'Unstructured. Very siloed and disjointed from other agencies'/departments' websites. Information is not always up-to-date… not easy to find links to online services'.*

G. *Suggestions For Improvement*

The following findings based on the survey results can serve as a basis for recommendations and suggestions to improve government online services. One of the respondents suggest that the educational websites should also provide information to foreign students who plan to embark on their education in Malaysia:

> *'The site should add more useful information for international students, improve translation (English), and provide more information on navigation bar'.*

Another user suggests that there should be proper information architecture to allow data sharing across universities, ministries and agencies to provide better services to the public:

> *'Look at service design processes. May need to change information architecture and share data across universities, ministries and agencies'.*

A respondent suggested that the government should hire the right staff to do the right things and get rid of those who underperform:

> *'Fire existing staff and employ somebody who has passion to do this task properly'.*

Loading speed and navigation on the site are also some of the issues highlighted by users. One user suggested:

> *'To increase bandwidth so that during peak times pages can be loaded quickly. First page of website should be in one page only i.e., no scrolling so that it would be easier to navigate our way around to see the available information'.*

Some of the users highlight the importance of citizen engagement in providing online services to the public:

> *'The government needs to know the citizen better. Do a user research or user engagement before developing a service'.*

Another user concurs:

> *'Government should do user research before coming up with online services…or please do like UK where there's only one government website and has all the services for citizen'.*

VII. CONCLUSIONS

This study uses a modified IPA to solicit key themes and issues surrounding user satisfaction of online educational services in Malaysia. The analysis shows that most of the users were satisfied or very satisfied with the government online service website experience. Nevertheless, the IPA reveals that users are still dissatisfied in relation to security and privacy and responsiveness, representing two key strategic focus areas which the government should concentrate on. To measure government websites, it is recommended that the Malaysia government consider the following website elements, namely Navigation, Functionality, Look and Feel, Search, Online Transparency, Site Performance and Content [20] which is consistent with the American Customer Satisfaction Index (ACSI) E-Government survey. Finally, although this is an initial pilot study, it is hoped that the findings can provide further impetus for e-government studies in this area.

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