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E-government implementation: A macro analysis of Singapore's e-government initiatives

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Abstract

This paper offers a macro perspective of the various activities involved in the implementation of e-government through an interpretive analysis of the various e-government-related initiatives undertaken by the Singapore Government. The analysis lead to the identification of four main components in the implementation of e-government, namely (i) information content, (ii) ICT infrastructure, (iii) e-government infostructure, and (iv) e-government promotion. These four components were then conceptually integrated into the e-Government Implementation Framework. This paper suggests that this framework can either be used as a descriptive tool to organize and coordinate various e-government initiatives, or be used as a prescriptive structure to plan and strategize e-government implementation. Moreover, specific insights on each of the four components were also generated to provide further learning points to e-government practitioners.

1. Introduction

Within the public sector, the utilization of Information and Communication Technology (ICT) has been well regarded as an indispensable component in reinventing the government. In particular, it has been highlighted that ICT possessed the catalytic property to transform the capability of governments in serving their citizens (Bekkers, 2003). Some of

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the transformative improvements that have been touted to be a result of ICT applications include increasing customer focus, enhancing efficiency, improving effectiveness, and reducing bureaucracy (Chan et al., 2003). In view of this, it is unsurprising that many governments in both the developed and developing countries have committed billions of dollars to various e-government initiatives (AFP, 2003).

However, despite all the hype revolving around e-government, a number of studies have alluded that the promised benefits of e-government continue to be an elusive dream for many governments in various jurisdictions (Accenture, 2004). Therefore, it is argued that more emphasis should now be dedicated towards facilitating e-government practitioners in their pursuit of the promised benefits of e-government. As a response to this call, this paper reports of a research which attempts to generate insights from the e-government implementation effort made by Singapore. As it is important to learn from the experience of those who has been successful, Singapore was deemed to be an apposite choice as it has regularly been rated as a leading nation for its e-government efforts by a number of distinct studies.[1] It is esteemed that through this paper, e-government practitioners will be able to obtain a macro perspective of the various activities involved in the implementation of e-government and thus be able to take appropriate actions in the strategic planning and managing of their respective e-government implementation initiative towards the achievement of the desired outcomes.

The rest of this paper is organized into five sections. The next section will provide a brief review on e-government implementation before moving on to Section 3, where the research method employed in this study will be described. The following section will then present the e-government implementation efforts made by the Singapore Government. Before bringing this paper to a conclusion, the analysis and insights that were generated will be discussed.

2. E-government implementation

Since the emergence of modern ICT, the public sector has been utilizing ICT to support its operations (Bozeman and Bretschneider, 1986). But along with the arrival of the Internet, a new sense of opportunity for the government to exploit ICT in expanding their service provision capabilities has been accentuated by both scholars as well as practitioners (Evans and Yen, 2005). New terminologies such as "online government" (Peled, 2001), "digital government" (Mandelson, 1999), and "NetState" (Lawson, 1998) had been coined to emphasize this novel phenomenon. Notwithstanding, the term that eventually gained wide acceptance is "e-government."

[1] For example, see Dutta, S., Lanvin, B., Paua, F. (2004) *Global information technology report 2003–2004*, World Economic Forum; EIU (2004) *Singapore risk: Infrastructure risk*, Economist Intelligence Unit-RiskWire, 15 Dec; UN and ASPA (2002) *Benchmarking e-government: A global perspective,* United Nations and American Society for Public Administration.

In a relatively short period of time, this nascent e-government phenomenon has already attracted the interest of researchers from different disciplines such as public administration,[2] management,[3] and information systems.[4] Among these researchers, it was observed that those who took a particular keen interest in studying the implementation of e-government were generally from the information systems discipline. However, even among those who focused on the implementation of e-government, very few took an interest in conducting a macro analysis of the e-government implementation.[5] Most of the existing empirical studies on e-government implementation either assumed a single e-government project as the unit of analysis[6] or focused exclusively on the issue of e-government adoption.[7] Given such a deficiency of knowledge, it is understandable that many countries experienced difficulty in attaining any significant degree of success in their e-government implementation effort. Moreover, there have also been appeals for more empirical and practice-relevant research to be done as it is observed that the bulk of existing e-government literature is too theoretical in nature (Devadoss et al., 2003).

As this research attempts to provide a macro analysis of the implementation of e-government in Singapore, it also addresses the knowledge deficiency noted earlier. In addition, responding to the appeals for more empirical and practice-relevant research on e-government, this research also analyzed the actual e-government implementation initiatives undertaken by the Singapore Government. The insights that were generated were targeted chiefly at e-government practitioners.

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[2] An example is Moon, M. J. (2002). The evolution of e-government among municipalities: Rhetoric or reality?, *Public Administration Review*, 62(4), 424–433.

[3] An example is Clark, E. (2003). Managing the transformation to e-government: An Australian perspective, *Thunderbird International Business Review*, 45(4), 377–397.

[4] An example is Watson, T. R., & Mundy, B. (2001) A strategic perspective of electronic democracy, *Communications of The ACM*, 44(1), 27–30.

[5] A possible exception is Ke, W., & Wei, K. K. (2004) Successful e-government in Singapore, *Communications of The ACM*, 47(6), 95–99.

[6] Examples are Burn, J., Robins, G. (2003). Moving towards e-government: A case study of organisational change processes, *Logistics Information Management*, 16(1) 25–35; Pan, G. S. C., Pan, S. L., Flynn, D., Newman, M. (2006). Escalation and de-escalation of commitment: A commitment transformation analysis of an e-government project, *Information Systems Journal*, 16(1), 3–12.; Tan, C. W., Pan, S. L. (2003) Managing e-transformation in the public sector: An e-government study of the Inland Revenue Authority of Singapore (IRAS)," *European Journal of Information Systems*, 12(4), 269–281; Ya, N. A., Ho, T. K. A. (2005) Challenges in e-government development: Lessons from two information kiosk projects, *Government Information Quarterly*, 22 (1), 58–74.

[7] Examples are Akman, I., Yazici, A., Mishra, A., Arifoglu, A. (2005) e-Government: A global view and an empirical evaluation of some attributes of citizens, *Government Information Quarterly*, 22(2), 239–257; Carter, L., Bélanger, F. (2005). The utilization of e-government services: Citizen trust, innovation and acceptance factors, *Information Systems Journal*, 15(1), 5–25; Reddick, C. G. (2005) Citizen interaction with e-government: From the streets to servers?, *Government Information Quarterly*, 22(1), 38–57; Tung, L. L., Rieck, O. (2005) Adoption of electronic government services among business organizations in Singapore, *Journal of Strategic Information Systems*, 14(4), 417–440; Warkentin, M., Gefen, D., Pavlou, P. A., Rose, G. M. (2002) Encouraging citizen adoption of e-government by building trust, *Electronic Markets*, 12(3), 157–162.

3. Methods

The intention of this exploratory study was to understand the implementation of e-government from a macro perspective through an analysis of the concerted e-government implementation effort made by the Singapore Government. As such, the data for such a macro oriented study were obtained from a variety of sources. The primary source of data was collated from publicly available government documents and publications as well as press reports. Similar sources of data were also employed in other studies with a macro orientation (Tan and Teo, 1999). Furthermore, interviews were also conducted with officers from the Ministry of Finance (MOF) (MOF is the overall owner of the e-government initiatives in Singapore) and the Infocomm Development Authority of Singapore (IDA) (IDA is the manager of the e-government initiatives in Singapore). Relevant insights were revealed in some of these interviews and were used in supplementing the primary source of data.

A data grounded interpretive stance were adopted in the analysis of the data (Strauss and Corbin, 1998). The data from the different sources were first triangulated to provide a comprehensive and consistent picture of what has actually transpired in the e-government implementation process undertaken by the Singapore Government. This was then analyzed in an iterative manner, likened to the much referenced open coding technique articulated by Strauss and Corbin (Strauss and Corbin, 1998). Based on this open coding technique, themes were inductively generated to arrive at the macro conceptualization of e-government implementation. Through such an approach of data analysis, it was possible "to stay very close to the original data and [was] therefore high in accuracy" (Langley, 1999). Through a series of selective coding (Strauss and Corbin, 1998), the generated themes were then consolidated and generalized to achieve the desired quality of parsimony.[8] This resulted in the conceptualization of the four main components in the e-Government Implementation Framework, which will be revealed later in this paper. Moreover, the analysis also revealed certain insights on each of the four components.

4. E-government implementation in Singapore

The concerted endeavor to utilize ICT within the Singaporean Government can be traced back to the early 1980s when the government embarked on the Civil Service Computerization Programme. This program was intended to transform the Singapore Government into a world-class exploiter of ICT and focused particularly on improving the efficiency of internal operations through work process automation and paperwork reduction. Consequently, early applications concentrated in the area of transaction processing, data modeling, and database management. Though these may seem like mundane technology by current standards, they were certainly regarded to be state-of-art technology back in the 1980s. More importantly, the

[8] Sometimes also known as simplicity. For example, Weick, K. (1989). Theory construction as disciplined imagination, *Academy of Management Review*, 14(4), 516–531.

Table 1
Statistics on government e-service usage and Internet users in Singapore

	2002	2003	2004
Percentage of government e-services usage among Internet users	42.1%	42.2%	56%
Absolute numbers of Internet users	2,063,000	2,135,034	2,421,782
Percentage of Internet users in the population	49.5%	51%	57%

Civil Service Computerization Programme helped to set the stage for the subsequent widespread proliferation of ICT utilization by the Government of Singapore.

By 1999, the emergence of the Internet coupled with the rapid progress in technological innovation had vastly changed the climate of technology usage internationally. A manifestation of this is the emergence of e-commerce. ICT was no longer solely applied to support back-end operations, but it was also increasingly being used for facilitating front-end transactions with both customers as well as business partners. Being swift in responding to this prevalent paradigm shift in technology exploitation, the Singapore Government promptly launched the first e-Government Action Plan in 2000 to supersede the Civil Service Computerization Programme. The total budget allocated to the first e-Government Action Plan amounted to $1.5 billion.

In the first e-Government Action Plan, the focus was on the employment of ICT to facilitate the transactions between the government and its three primary stakeholder groups, i.e., citizens, businesses, and employees. In doing so, the objective of e-government in Singapore was "to be a leading e-Government where it can better serve the nation in the digital economy." In 2003, most of the front-end services catering to the needs of citizens, businesses as well as government employees had already been successfully made available online. Moreover, Singapore was also increasingly becoming recognized as an international leader in e-government. Notwithstanding their successes, the Singapore Government further heightened their pursuit of greater excellence in their e-government effort by launching the e-Government Action Plan II (eGAP II) in 2003 "to transform the public service into a Networked Government that delivers accessible, integrated and value-adding e-services[9] to customers." Through the eGAP II, the government had envisioned that an e-lifestyle will be prevalent in Singapore by 2006. According to the official statistics (IDA, 2004, 2005) shown in Table 1, it can be observed that progress has indeed been made as more and more Singaporeans are already transacting with the government online.

When the government embarked on the first e-Government Action Plan, they were determined to build an integrative turnkey technological system to develop, deploy, and operate all the e-services offered by the various government agencies in Singapore. This integrative turn-key technological system was aptly named as the Public Service Infrastructure

[9] e-Service refers to the online version of conventional public service, which in most cases were traditionally delivered over the counters of government agencies.

(PSi) as it has since became the underlying infrastructure where citizens can access any desired government e-services anytime, anywhere, as long as they have access to the Internet.

Besides simply having e-services available on the PSi, the Singapore Government has also been constantly making effort to improve the sophistication of the various e-services running on the PSi. For instance, during the early days of e-government implementation, the focus was on publishing more informational e-services on PSi. However, with the progress that has been made in the sophistication of e-services over the years, the focus has now been switched to integrating related individual e-services into a single integrated e-service. Moreover, such a focus on having integrated e-services was also deemed to be in sync with the eGAP II intent of transforming "the public service into a Networked Government that delivers accessible, integrated and value-adding e-services to customers."

The government has also been trying to ensure that the various e-services were easily accessible by the public. To achieve this, they have been employing a centralized Web portal as the single gateway to all the different government e-services. Thus, the public will only need to recall the URL of this Web portal when they need to access any of the e-services. Moreover, as a further effort to boost the usage of the e-services, the government has also been making a broad range of promotional initiatives in encouraging the public to utilize the e-services.

5. Analysis and insights

In analyzing all these effort made by the Singapore Government from a macro perspective, four main component themes were generated. These four component themes were found to be parsimoniously sufficient in encompassing the various e-government implementation initiatives undertaken by the Singapore Government. These four component themes are (i) information content, (ii) ICT infrastructure, (iii) e-government infostructure, and (iv) e-government promotion. Each of these four components will be described in further details in the following subsections with direct references made to how each was essentially manifested in the experience of Singapore. In addition, the analysis also yielded four specific insights, providing further elucidation on each of the four components in the implementation of e-government.

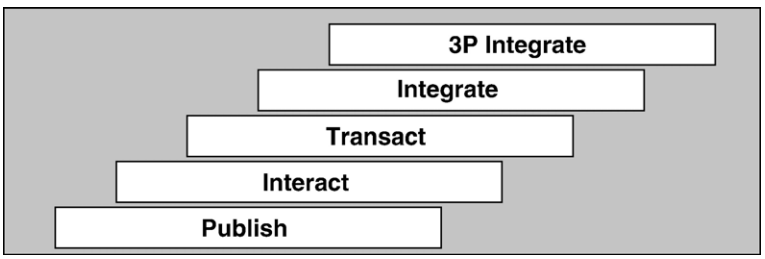

Fig. 1. Five stage e-service content development model.

5.1. Information content

In Singapore's case of e-government implementation, the e-services that are being offered by the various government agencies in Singapore were observed to be the *information content*. In developing the *information content*, the Singapore Government employed a "Five Stage e-Service Content Development Model" (see Fig. 1) in achieving progressive enhancement to the content of the e-services. In particular, the focus of this progressive enhancement has been on the degree of integration sophistication as well as customer orientation afforded by the e-services.

The first and most basic stage is the "publish" stage, where the focus is on rolling out informational content, such as the procedures and guidelines for the various public services offered by the respective government agencies. For example, a citizen may visit the Web site of the Immigration and Checkpoint Authority in Singapore to find out about the procedures and the supporting documents required in applying for a new passport. For those agencies which already had certain hardcopy informational brochures and pamphlets on the services offered, the "publish" stage can be achieved through a simple conversion of the existing hardcopy informational brochures and pamphlets into a corresponding Web format and have them available on their agency's Web site.

After the "publish" stage comes the "interact" stage. During the "interact" stage, part of the transaction in utilizing a public service can be fulfilled online. For instance, an applicant for a business license can download the application form online and then submit it via postal mail or at the counter. In this way, the applicants will save one trip to the agency since the need to collect the application forms from the agency will be eliminated. Moving up from "interact" is the "transact" stage. In the "transact" stage, the entire e-service can be fulfilled online, without requiring the applicant to make any physical visit to the agency. Following the business license application example noted above, an applicant can thus submit the application for the business license online and perhaps even make the necessary payment online. Upon completing the application process, the application result, or sometimes even the license itself, may be mailed to the applicant subsequently. This totally eliminated the need for the applicant to show up physically at the agency to fulfill any part of the transaction.

Between 2000 and 2003, the Singapore Government decidedly focused on the implementation of all feasible services up to the "transact" stage. Since 2003, the focus has been escalated to concentrate on the integration of the services, giving rise to the "Integrate" stage. The motivation for such integration laid in the vision of "Many Agencies, One Government." In detailing this vision, a senior government officer once proclaimed that "Agencies must embrace the idea of 'boundarylessness' between them. There must be 'horizontal' thinking between agencies for the sake of the customer, not 'vertical' thinking just for the sake of the agency." Therefore, in the "integration" stage, related individual services have been integrated together in a seamless and customer-centered manner. An example of this is the One-Stop Public Entertainment Licensing Centre (OSPEC),[10] where the application of

[10] See the following for other studies conducted on OSPEC: Chan, C. M. L. (2004) Singapore police force: one-stop public entertainment licensing centre (OSPEC). In S-L. Pan (ed.), *Managing strategic enterprise systems and e-government intiatives in Asia: a casebook* (pp. 87–102), Singapore: World Scientific.

all licenses related to the setting up of a public entertainment outlet can be fulfilled with just one online application. Moreover, all the information on the various licenses is also presented to the public in an integrated manner.

To further enhance the degree of customer service as well as to extend the integration among different but related services, a new stage of "3P Integration" has been introduced in October 2004. In an address by a Government Minister, it was highlighted that "if we (i.e., the Government) want to serve our customers in the best possible way, we would have to go beyond integration within the government, to integration with the private and people sectors." This has been the underlying motivation for "3P Integration."

In "3P Integration," the services to be integrated do not only come from among the government agencies, but also from the private sector and the people sector (e.g., non-governmental organizations and community organizations). Thus, "3P Integration" effectively represented "Public, Private and People Sectors Integration." As described in the "3P Integration" Web site (3P Integration, 2005): "The public sector provides many essential services, but the reality is that our customers have much more contact with the private/people sectors. So integration within the public sector alone is not good enough. Integration must extend to offering services to our customers which are provided by the private/people sectors." For instance, when someone applies for a business license, chances are that the person may also be searching for shop space to run his new business. Through "3P Integration," the e-service for applying the business license may also be integrated with appropriate e-services from property dealers that can help the applicant to locate suitable shop space.

Therefore, from this analysis, the *information content is* defined to be the actual substance which both induces and satisfies the need and/or desire of those people who transact with the government. It exists in the form of certain information or services offered by government agencies to the citizenry. Moreover, it may be presented in a variety of formats, ranging from static Web pages, to multimedia content and even complex transactional e-services.

5.1.1. Insight 1: Customer centric and integrated information content

From the example of Singapore, it was observed that an evolutionary development of *information content was* taking place. The early stages in the development of *information content* concentrated on having more "interactive" and "transactional" e-services. As the e-services matured in being more "interactive" and "transactional," the focus progressed towards the "integration" of related individual e-services. The basis of the relationship among the e-services identified for "integration" was established from a customer centric approach. This produced integrated e-services that served the needs of customers having a certain profile. Often, the integrated e-services also cut across different functional silos of the government, such as the example of OSPEC noted earlier.

While existing literature has mentioned about the development of *information content* up to the "Integrate" stage,[11] the Singapore Government has further advanced onto a higher

[11] For example, Ebrahim, Z., Irani, Z., Al Shawi, S. (2004). A strategic framework for e-government adoption in public sector organizations, *Proceedings of the 10th AMCIS*, 1116–1124; Layne, K., Lee, J. (2001). Developing fully functional e-government: A four stage model," *Government Information Quarterly*, 18(2), 122–136.

innovative stage of "3P Integration." In the "3P Integration" stage, e-services are not only integrated across the functional silos in the government, but the degree of integration proceeded even further to traverse into the private and people sectors as well. This effectively signaled a new stage in the evolutionary development of e-government *information content*. Thus, e-government practitioners should consider incorporating "3P Integration" in developing their respective *information content*.

Furthermore, drawing from the evolutionary development stages of e-government *information content* in Singapore, it was found that the evolutionary development progressed along the two axes of customer centricity and the degree of integration. Thus, e-government practitioners who aspire to further expand the boundary of *information content* development beyond the "3P Integration" stage may do well by advancing innovatively along the two axes of customer centricity and the degree of integration.

5.2. ICT infrastructure

In the case of Singapore, the Public Service Infrastructure (PSi) is identified as the *ICT infrastructure*. The construction of PSi was motivated by the desire to provide an integrative turn-key technological system for the various agencies within the Singaporean Government to develop, deploy, and operate e-services in an efficient and speedy manner. The creation of PSi was also intended to enhance the quality of public service to the citizens. For example, through the PSi, citizens are able to access any desired government e-services anytime, anywhere as long as they possessed access to the Internet.

Conceptually, PSi is composed of four distinct environments of Development, Testing, Quality Assurance and Production (see Fig. 2 for the "Conceptual Architecture of PSi"). As implied by its name, the development environment is used for the development of new e-services. Once a new e-service was developed, the system integration testing will be done in the testing environment. Prior to the actual launch of the e-service, the e-service will first be hosted on the Quality Assurance Environment where user acceptance testing will be conducted before the e-service is finally migrated to the Production Environment to go "live." In ensuring

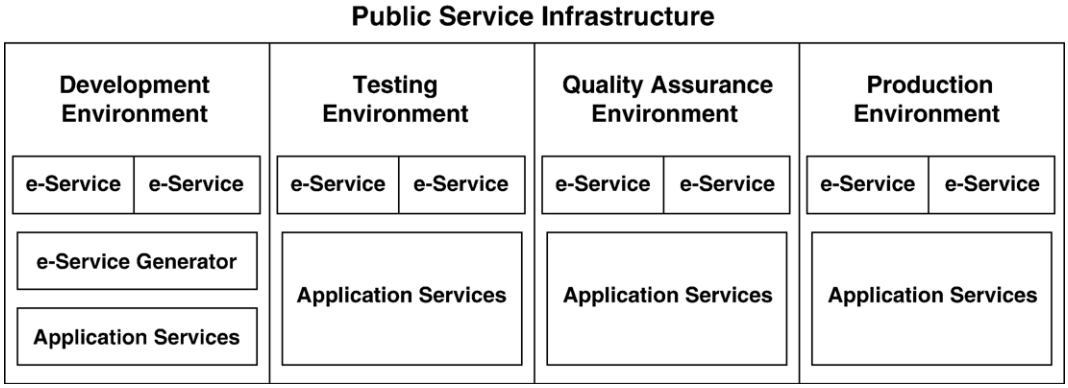

Fig. 2. Conceptual architecture of PSi.

a high availability, the availability level of PSi has been set at 99.95% for the production environment and 99.9% for the remaining three environments.

Within the development environment is an "e-Service Generator," which is a platform that allowed the rapid development or modification of e-services. Through the "e-Service Generator," e-service developers are able to develop the user interface, build in the required business logic, link up with the necessary databases, and even to leverage on the existing "application services" available in the infrastructure. The "application services" comprised of a number of commonly used features such as online payment services and authentication services. As these features will be used repeatedly in developing different e-services on the PSi, they are packaged as "application services" so that the design and development cost can be reduced and the speed of e-service development can be expedited. As a newly developed e-service progressed across the four environments, the "application services" continued to be available in supporting the e-service throughout its progression across the four environments of the PSi.

Moreover, with such a component-based design, new "application services" such as short messaging services (SMS) and wireless application protocol (WAP) services were also added subsequently without much disruption to existing e-services. In fact in designing the PSi, one of the design considerations was for it to have the capability to add on new "application services" as new technologies emerged.

Thus, *ICT infrastructure* is defined to be the underlying ICT system architecture that supports the operation, and sometimes even the implementation, of e-government. The *ICT infrastructure is* also where the *information content* is hosted. It is essentially made up of a cluster of ICT hardware as well as certain accompanying ICT software. At an even more elementary level, *ICT infrastructure* can be broken down into technological equipment and devices such as computer servers, network routers, firewalls, and their respective operating systems.

5.2.1. Insight 2: Robust and scalable ICT infrastructure

From the analysis of Singapore's e-government implementation effort, it was discovered that two of the prime characteristics of its *ICT infrastructure* were robustness and scalability. The PSi is designed to be a centralized and integrated government-wide *ICT infrastructure* to support the development, deployment, and operations of the various e-services from the different government agencies in Singapore. Should the PSi fail to operate, then all the e-services from the different government agencies in Singapore would also be going out of service. Such a scenario is certainly not acceptable, especially when some of the public services offered by the government are only available online. Therefore, the *ICT infrastructure* will have to be sufficiently robust to ensure a high availability of the e-services.

Besides robustness, another prime characteristic of the *ICT infrastructure* was found to be scalability. The PSi is designed to allow new e-services to be dynamically added even as existing e-services are deployed and operate on it. Thus, the PSi has to be scalable in terms of possessing the capacity to take on added load of new e-services that are being added periodically. In addition to being scalable in terms of load handling, the PSi also possesses

functional scalability as new functionality such as SMS services, WAP services, authentication, and other security services can also be added into the PSi without much disruption to existing e-services. In PSi, such functional scalability is achieved through employing a component-based architectural design where new functional services can be added. The need for scalability is even made more important given the rapid rate of technological advancement, with new technology being rolled out constantly.

Hence, e-government practitioners who are considering the implementation of a centralized and integrated government-wide *ICT infrastructure* should ensure that their *ICT infrastructure* will also possess the characteristics of robustness and scalability.

5.3. E-government Infostructure

To be practically useful, the *information content* will have to be put together with the *ICT infrastructure* in forming the *e-government infostructure*. Up till 2004, the e-Citizen Portal (eCitizen, 2005) was positioned as the *e-government infostructure* in Singapore. Since its launch in the late 1990s, it was projected as "the" gateway to all government services in Singapore. The e-Citizen Portal was originally designed using the metaphor of a citizen's life-journey, where citizens can access all the e-services they will need as they journeyed through life "from cradle to grave." However, as e-government progressed in greater sophistication and maturity in Singapore, this life journey metaphor of the e-Citizen Portal had proven to be a limitation towards the further development of e-government in Singapore. This was because the life journey metaphor directed focus solely to individual citizens and was not germane to the fact that government existed to serve not only citizens, but also to serve businesses and even non-residents (e.g., visa applications).

In offering business-related e-services, a Web site (Business.gov.sg., 2005) dedicated to serve the business community was created to be "a gateway to a host of government services ranging from accessing information that is pertinent to businesses, exploring governmental assistance, to filling in important forms needed to start or grow a business." Thus, the e-Citizen Portal and this business oriented Web site existed alongside each other to serve two sets of distinct needs. What was perhaps more worrying was that the co-existence of these two *e-government infostructures* contradicted with the e-government vision of "Many Agencies, One Government" and also went against the global trend of having one-stop portals in the implementation of e-government.

In resolving this situation, the Singapore Government Online Portal (SINGOV Government Information, 2005) was introduced to be the new *e-government infostructure* in Singapore. The Singapore Government Online Portal was positioned as an amalgamated one-stop launch pad to all e-services provided by the Singapore Government. Thus, the e-Citizen Portal and the business oriented Web site converged and the notion of a one-stop portal was re-instituted once again.

In all, more than 1,600 e-services are currently available through the Singapore Government Online Portal. In terms of the organization of all these e-services, they were spread among the four sections of the portal. The first section, labeled as the "government" section, consisted of e-services pertaining to the Singapore Government. Examples of these are press releases and

the government directory search application. The next section is known as "Citizens and Residents," which essentially contained what was originally in the e-Citizen portal. Obviously, the e-services available under the "Citizens and Residents" section are all dedicated to the needs of citizens and residents of Singapore. Following this is the "Business" section, which consisted of e-services that were previously available on the business oriented Web site. Lastly is the section called "Non-Residents," which consisted of e-services aimed at non-residents who were interested in finding out more about Singapore or needed to transact with the Singapore Government.

Thus, *e-government infostructure* is understood to be a platform, portal, or gateway where the spectrum of e-services offered by the government can be accessed.

5.3.1. Insights 3: Strategically aligned e-government infostructure

In resolving the contradiction between the e-government's vision of "Many Agencies, One Government" and the co-existence of two *e-government infostructures*, which existed separately as the e-Citizen Portal and the business-oriented Web site, The Singapore Government Online Portal was therefore created to merge the two *e-government infostructures* into one centralized gateway. Such a move not only re-aligned the *e-government infostructure* with the vision of "Many Agencies, One Government," but it was also in line with the international trend for one-stop portal in e-government implementation.

Therefore, e-government practitioners will do well by ensuring that strategic alignment existed between the *e-government infostructure* and their e-government vision. This will not only contribute to the realization of strategic e-government goals but will also provide a certain degree of consistency among various e-government initiatives of the government. In addition, it will also be a good practice to ensure that a strategic alignment existed between the *e-government infostructure* and international trends in e-government implementation as this will help to assure that the *e-government infostructure is* in line with state-of-the-art development in e-government.

5.4. E-government promotion

In Singapore, the government understood that even with the most superb *e-government infostructure*, the widespread adoption and use of the *e-government infostructure* cannot be assured. It was recognized that it is insufficient for any e-government initiative to exclude the component of *e-government promotion* in its implementation. From the analysis of Singapore's *e-government promotion* effort, a three-prong approach of awareness, assistance, and assurance was observed.

The first prong of awareness referred to the various publicity activities and strategies employed by the Singapore Government to boost the public's awareness to the government e-services. On a periodic basis, publicity activities such as road shows, exhibition, and even advertisements on newspapers, radio, and public billboards were held to ensure that the public were aware of the different e-services that were available to them online. Moreover, whenever new e-services were launched, promotional efforts were also made through some form of media release. In its most basic form, these media release may exist as a simple written press

statement sent to the local media. Nevertheless, whenever a potentially high impact e-service was launch, the occasion was often marked with some degree of pomp and pageantry, graced by the presence of some senior government official. Such an approach helped in capturing the attention of the media to cover the launch as well as in driving up the public awareness towards the new e-service.

In their attempt to create greater awareness and induce the utilization of the e-services, the Singapore Government has also introduced various incentive schemes. One such incentive scheme was to design the e-services in a manner that allowed it to offer a shorter processing time or even a cheaper fee as compared to traditional services that were delivered manually over the counter. For instance, it will cost a citizen $50 to apply for passport using e-service, whereas it will cost $60 to do the same transaction over the counter. Apart from offering shorter processing time and cheaper fees, another incentives scheme to capture the awareness of the citizens was through conducting lucky draws. For example, when the e-filing of tax returns was first introduced, attractive lucky draw prizes were set up to entice the adoption of this new e-service. More recently, another lucky draw was held, offering all who had transacted online during the promotional period an opportunity to win the first prize of a free air ticket to Paris.

Once the awareness was created, some public may find themselves to be ill-equipped to use the e-services even if they wanted to do so. In Singapore's three-prong approach, this was addressed by the second prong of assistance, where the government provided assistance to the public in helping them to acquire the means to utilize the e-services. As not everyone is ICT literate, the government carried out a National IT Literacy Programme to equip the masses with basic ICT literacy skills so that they can carry out online transactions and utilize the e-services independently. Under this National IT Literacy Programme, the non-ICT literate were taught basic computer skills as well as skills in navigating the Internet and completing simple e-service transactions online.

In addition to providing the needed skills to use the e-services, the assistance provided by the government also included the provision of Internet access to those who were deprived of it. The e-Citizen Helper Service (eCitizen Helper, 2005a) was one such initiative to provide free assistance to those who wish to use the e-services but did not have access to the Internet. Under the e-Citizen Helper Service, arrangements were made with various community organizations (e.g., community clubs and residents' committees), public libraries, and even certain private organizations where free Internet access was made available. In some cases, assistance was also provided for those who needed help in completing their e-service transactions.

The final prong in the three-prong approach was assurance. Assurance referred to the provision of privacy and security assurance to the users of e-services. Appreciating that concerns over privacy and security issues remained as one of the key impediments to the widespread usage of e-services, the Singapore Government made effort in providing certain degree of assurance on the privacy and security of the government e-services available online. On top of building in various securities features into the *e-government infostructure* such as firewall, PIN and password authentication, and audit trail. A third party was also sought to accredit the privacy protection and security features of the Singapore Government Online

portal. The portal was awarded the TrustSg seal[12] as it complied with the TrustSg core principles of practice. Moreover, data protection practices and guidelines were also established among the government agencies to provide the public a greater sense of assurance on the privacy and security of the e-services.

Hence, *e-government promotion* is defined as any activities or initiatives undertaken to promote the adoption and usage of the *e-government infostructure as well as the associated information content.*

5.4.1. Insights 4: Comprehensive e-government promotion

In many countries, the implementation of e-government have either totally overlooked the need to promote the completed *e-government infostructure* or at most attributed little emphasis to it. This has resulted in cases where the launched e-services were under utilized.[13] Appreciating the importance of *e-government promotion*, the Singapore Government undertook several promotional activities to boost the adoption and usage of the e-services. The analysis of their promotional activities revealed the three-prong approach, covering the three aspects of awareness, assistance and assurance.

The first prong of awareness focused on the publicity and the introduction of various incentives schemes to create public awareness and ultimately attracting them to use the e-services. The second prong of assistance targeted at closing the chasm of the digital divide through enhancing ICT literacy, providing free Internet access and offering guidance to those who needed help in transacting online. The third and final prong of assurance attempted to address trust-related concerns such as privacy and security issues through the employment of technological advances, certification by a neutral third party and the adoption of certain privacy and security best practices. Thus, this three-prong approach is observed to be dealing with three sets of common concerns raised on the issue of e-services adoption and usage, i.e., public awareness, digital divide as well as privacy and security concerns.

Given the contextual diversity among different jurisdiction, the exact *e-government promotion* activities may have to vary according to actual contextual situation. Nevertheless, it is posited that e-government practitioners will do well by planning their *e-government promotion* activities around this three-prong approach and progress adaptively according to their contextual needs.

5.5. E-Government Implementation Framework

As demonstrated in the preceding subsections, the implementation of e-government in Singapore was conceptualized as comprising the four components of *ICT infrastructure*, *information content*, *e-government infostructure*, and *e-government promotion*. A graphical illustration of how these four components are associated to one another is shown in Fig. 3 as

[12] TrustSg is a nation-wide trustmark program administered by the industry-led National Trust Council of Singapore. Under this program, local organizations with sound e-business practices will be accredited and awarded with the TrustSg seal.

[13] An example is the UK: Economist. (2003). No thanks, we prefer shopping, *Economist*, 366(8305), 45.

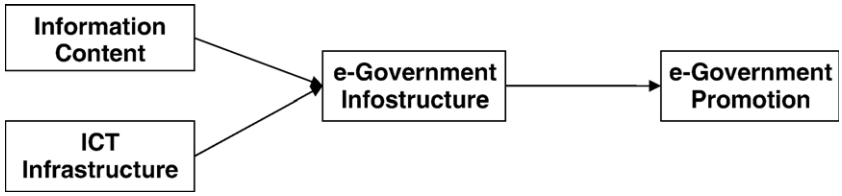

Fig. 3. E-government implementation framework.

the e-Government Implementation Framework. Essentially, the *ICT infrastructure* provides the underlying ICT system architecture where the *information content* is hosted or even developed. These two components come together to form the *e-government infostructure*, which provides the gateway to the spectrum of e-services offered by the government. Furthermore, it was observed from the e-government implementation effort made by the Singapore Government that the fourth component of *e-government promotion* is employed to ensure a widespread utilization of the e-government.

While the e-Government Implementation Framework was derived from the single case of Singapore, it is posited that it can also be used by e-government practitioners as a conceptual tool to facilitate their planning and management of various e-government initiatives. First of all, for those governments that have already embarked on their e-government journey, the framework provides a descriptive tool to organize and coordinate their various e-government initiatives in an integrative manner. Through applying the framework to analyze their existing e-government implementation effort, practitioners will be able to identify any weakest link in their existing endeavor and fine-tune the initiatives under the appropriate component(s) accordingly. On the other hand, for those governments that are going to embark on their e-government journey, the framework offers a prescriptive structure to plan and strategize their e-government implementation effort in a broad yet concerted manner. Appropriate initiatives should be devised under each of the four components in the e-Government Implementation Framework and be executed accordingly.

6. Conclusion

Based on the case of Singapore, this study addresses the existing deficiency of knowledge by offering a macro perspective of the various activities involved in the implementation of e-government in the form of the e-Government Implementation Framework. The framework reveals the existence of four main components, namely, *information content*, *ICT infrastructure*, *e-government infostructure*, and *e-government promotion*. Taken as a whole, this framework can be used either as a descriptive tool in organizing and coordinating various e-government initiatives in an integrative manner, or as a prescriptive structure to plan and strategize e-government implementation effort in a broad yet concerted manner. In addition, further examination of each of the four main components discloses peculiar insights that were posited to be beneficial to e-government practitioners in planning and executing their e-government implementation in their respective jurisdiction. It is aspired that the revelations

generated from this study will help e-government practitioners to realize the promised benefits of e-government so that people in both the developed and the developing countries can reap the benefits sowed with their tax money.

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