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UNDERSTANDING SUSTAINABILITY: AN EXPLORATION OF THE IS LITERATURE

[1]HASLINDA SUTAN AHMAD NAWI, [2]OTHMAN IBRAHIM, [3]NUR SYUFIZA AHMAD SHUKOR, [4]SITI FATIMAH OMAR, [5]IRNY SUZILA ISHAK, [6]AZIZAH ABDUL RAHMAN

[1,2,3,5,6] Faculty of Computing, Universiti Teknologi Malaysia, Johor Bahru, Malaysia

[1,3,4,5] Faculty of Computer Science and Information Technology, Universiti Selangor, Selangor, Malaysia

E-mail: [1]haslindasan@unisel.edu.my, [2]othmanibrahim@utm.my, [3]nur_syufiza@unisel.edu.my, [4]ctpatimah@unisel.edu.my, [5]irny@unisel.edu.my, [6]azizahar@utm.my

ABSTRACT

Government all over the world are increasingly realizing that implementing and sustaining their electronic service delivery is the way forward to achieve efficiency savings and to satisfy and engage demanding constituents. Once an electronic service delivery has been developed and the infrastructure is in place, they are almost infinitely scalable with minimal effort, and will reduce variable costs of electronic service provisioning and service use. As this trend continues, academics, IT professionals and decision makers need a deeper understanding of electronic service initiatives sustainability. Yet, analysis of IS academic literature reveals that electronic service initiatives sustainability, has received little in depth attention. This paper investigates the current state of electronic service initiatives sustainability research in IS literature. The article detailed out a review of literature from main IS journals. The study concludes with a tentative operational definition, a list of source references, and an agenda for related future research.

Keywords: *E-service Sustainability, Information Systems, Systematic Literature Review, Atlas.ti*

1. INTRODUCTION

Government computerization programmes have been ongoing for more than three decades and have achieved significant improvements. ICT sector has transformed the way government agencies work; increased productivity; and droved economic output and trade across the globe. Along with this, e-government is actively being deployed throughout the world, as evidenced by the fact that nearly all countries have improved their online service delivery to cater to citizens' need [1]. Citizen utilization of electronic service delivery initiatives is increasing in diverse way. Many citizen use the Internet to search for government information, and access government services. Regarding the search for information, many citizens and agencies recognize the value of electronic services. E-government programmes can be catalyst in boosting productivity, thereby speeding up the benefits of newer technologies to the people. Dato' Sri Najib Tun Razak, Prime Minister of Malaysia said:

e-Government project made it possible for the public to conduct business with the government over the Internet any time of the day or week and was one of the ways that had made great strides in improving the public service delivery.

Associated to his views, it seems that ICT can improve public sector service delivery where in the last few years many countries have employ ICT in areas such as entrepreneurship, innovation, research and development, promoting distance learning, e-health, e-agriculture, e-trade and other fields. The e-services initiative aims to create such a single window of access for citizens to deal with the government. Aggregating all services and creating a common link to all participating agencies is easier said than done. There is high cost implications involved in maintaining and operating the systems and services offered. Moreover, integrating all services into one portal is a complex and time-consuming task. It requires integration and interoperability between multiple parties. In order to ensure the e-services to be there in long term, it is utmost important for researchers to study on the sustainability aspects.

Hart defined the literature review as "the use of ideas in the literature to justify the particular approach to the topic, the selection of methods, and demonstration that this research contributes something new" [2]. The need to uncover what is

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already known in the body of knowledge prior to initiating any research study should not be underestimated [2]. According to Levy and Ellis, the quality of the literature used plays a significant role in advancing the knowledge of the researcher and the overall body of knowledge [3].

When most governments in the world have made their move towards e-government, public e-service projects that support government service delivery among public agencies have becoming a current trend. E-government has changed the government agencies services' landscape and currently the e-services are very critical to ensure the successful of e-government implementation. If these public e-services projects fail to be sustained, it will cause loss in the investment and could paralyze the government services delivery. We believe that it is necessary to have a strong foundation on sustainability when deriving to the initial concept of electronic service initiatives sustainability. The main idea for the research is to answer the question of how to sustain public e-service in order to enhance government service delivery. Therefore, a structured approached was devised and applied to systematically review the sustainability research state as reported in the IS domain. Credible IS journals are accessed to understand the current research status for public e-service sustainability.

With that in mind, two objectives will be answered in this paper: the first objective is to synthesize review of sustainability literature within IS academe; and the second objective is to discover whether the e-service sustainability studies have been done in the public sector. This paper will help academics, IT professionals and decision makers understand the sustainability towards electronic service initiatives and will demonstrate the lack of academic IS literature on electronic service sustainability.

2. RESEARCH METHOD

This study is committed to searching and reviewing the literature on the sustainability concept. Following [3-5], this research followed a three staged method to extract, analyze and report the literature based findings by Levy and Ellis. The first stage involved identifying the articles to be included in this review. The second stage comprised of designing and implementing an appropriate classification scheme to match with the study objectives. Finally, the third stage consists of synthesizing the coded details and analyzing the literature to respond to the research objective of this study.

As depicted in Figure 1, before the systematic literature review start, there are two main components need to be identified and clarified. First is the source and second is the search strategy. Source refers to the targeted journals or conferences for the search and search strategy refer to what keywords used during the extraction process. The aim was to describe sustainability from an Information Systems (IS) perspective and to review the nature of sustainability publications in IS. Therefore, the primary search limited to the IS domain.

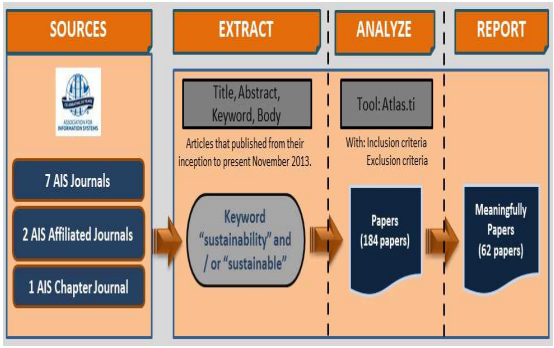

Figure 1: Steps Involved In Exploration of IS Literature

Hence, journals listed in the Association for Information Systems (AIS) web site were considered. Thus, the following IS Journals were included within the scope; AIS Transactions on Human-Computer Interactions (THCI), Journal of the Association for Information Systems (JAIS), Management Information Systems Quarterly (MISQ), Communications of the Association for Information Systems (CAIS), Pacific Asia Journal of the Association for Information Systems (PAJAIS), Journal of Information Technology Theory and Application (JITTA), Scandinavian Journal of Information Systems (SJIS), Business & Information Systems Engineering (BISE), Information Systems Journal (ISJ), and Australasian Journal of Information Systems (AJIS). Articles published from their inception to present (November 2013) were accessed. Articles available in print version (and not already digitized) were excluded from this analysis.

The search strategy used was 1) the key word 'sustainability' and 'sustainable' were searched for, in the title, abstract, and key words of all articles in the target source list, 2) extended the search of key word 'sustainability' and 'sustainable' in the body text of all articles in the target source list. All

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articles were downloaded as full text pdf files. They were systematically indexed (by year and source) using the Adobe Acrobat professional tool. Furthermore, Adobe Acrobat professional's 'advance-search' facility was used to search the indexed articles to identify they had mentioned 'sustainability' and 'sustainable' meaningfully, somewhere in the text of the articles. What is meant by 'mentioned sustainability meaningfully' is that the ability to maintain or prolong or defend the ICT initiatives at a certain rate or level.

Table 1: Source and Frequency of Publication

Journals	Search: keyword 'sustainability' and / or 'sustainable'	Mentioned keywords meaningfully	Percentage of Meaningfull
AJIS	5	3	60%
BISE	10	6	60%
CAIS	52	20	38%
ISJ	24	4	17%
JAIS	27	15	56%
JITTA	8	1	13%
MISQ	39	10	26%
PAJAIS	5	0	0%
SJIS	10	2	20%
THCI	4	1	25%
Total	184	62	34%

The first extraction strategy resulted into a total of 184 articles from all ten journal titles. Evaluating the body text that mentioned the word 'sustainability' and 'sustainable' in meaningful way enabled us to reject approximately 122 of these. This resulted into a final list of 62 articles or 34% of published articles that mention 'sustainability' and 'sustainable' meaningfully. The results of the strategies involved in the selection process are shown in Table 1. As mentioned earlier, the goal of this paper is to derive a synthesized definition and identify the dimensions of sustainability, based on literature. In order to achieve that, Atlas.ti was used as a qualitative data management and analysis tool. This tool was used to systematically code and analyze the data within one single repository.

3. DATA ANALYSIS AND FINDINGS

This section presents the results of the literature-based analysis. It presents a synthesis to categorizing the publication into a specified domains of sustainability, as identified from the IS literature. By domain, we mean the disciplinary area(s) in which the research of the sustainability is applied. Information Systems is a multidisciplinary subject, hence, it often borrow from many other areas [6]. This section later concludes with a potential research agenda.

3.1 Defining Sustainability

A general understanding of sustainability is the ability to maintain a certain status or process in existing systems or the ability of an organism or an ecosystem to maintain its activity and productivity over time. Another broad definition on sustainability is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [7]. While Barney defines sustainability as a state that exists after efforts to create that advantage have ended [8].

In other discussion, most researches consider sustainability to be closely linked to the ability of a project to be financially sustainable, in that a project must be capable of cost recovery in order to be continuously operative and dynamic in the services they provide [9]. Sustainable ICT in organizations, focusing on the main sustainability issues that organizations face in using ICT products and services in their own organizations. In the perspective of ICT projects initiative, sustainability is a critical issue due to the increased rate of failure of these projects [10].

For the purpose of this research we limit our examination to the narrow view of sustainability. Thus we adopted the definition of sustainability as "technology that is capable of being maintained over a long span of time independent of shifts in both hardware and software" [11].

3.2 Sustainability: A Review of IS Literature

Based on analysis of 62 information systems journal articles this research found an interesting pattern of sustainability domain application. The identified domains had been categorized into 14 domain applications of sustainability. The domains are Business Strategy, Financial Services, Open Source Software, Technology, IT / IS Projects, ICTD, Green IT / IS, IT Outsourcing, Community of Practice, IT/IS Discipline, Cloud Computing, Infrastructure, Social Network and Enterprise System Software (ESS).

Figure 2: Publication with Meaningful Keywords

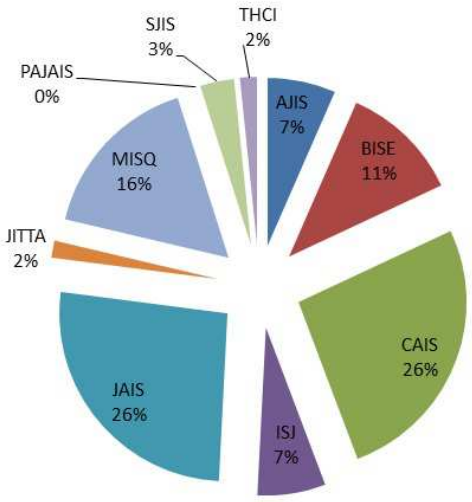

Figure 2 shows the breakdown of articles relevant to sustainability and their source of publication. Out of 184 journal articles, only 62 articles described sustainability meaningfully. This represents 26% of both JAIS and CAIS articles, 16% of MISQ articles, 11% of BISE, 7% each from AJIS and ISJ, 3% of SJIS, and the remaining of 2% each from JITTA and THCI. One other journal (PAJAIS) did not contain any articles that match the meaningful sustainability. We expect that the significantly higher number of matches in the JAIS and CAIS journals may be influenced by the nature of the journal itself, which caters to exploratory type articles. At the early stage of the sustainability research in Information Systems, one would expect that there would be an increased focus on exploratory articles first, so as to understand the problems at hand, before a surge in articles presenting sustainability solutions. Although the relatively low number of publications may be seen as not encouraging, the IS research community should not take it as an indicator of insignificance. Indeed, the roles of IS or IT as enablers of sustainability have increased year by year.

The next step is the classification of the articles according to the sustainability domain of application as identified earlier. This step shows the distribution of the articles against the domain applications and journal titles. It also uncovers the publications frequency for the last 19 years (from their first inception in year of 1994 until November 2013).

As expected in an emerging research domain, the majority of the articles were found to be in the business strategy, 23% (14/62). The second one is green IT/IS 18%(11/62), followed by IT/IS projects 13% (8/62), technology and IT/IS discipline each of 8% (5/62), both social network and ESS having 6% (4/62), community of practice 5% (3/62) and infrastructure and open source system with 3% (2/62) and the remaining domain contributed one paper for each domain (2%).

The results as shown in Table 2 suggest that research on sustainability in IT projects domain ranked at number three after the business strategy and green IT/IS domain applications. It shows that IT project addressed the sustainability through publications of CAIS, JAIS, MISQ and SJIS. With each publication publishing only two articles, this domain application placed itself at number three with a total of eight articles. However, the result shows that there is no e-services sustainability research under IT projects found in the studied journal. As this study found lack of research of e-services sustainability, more research on e-services sustainability domain need to be explored as it has growing its importance.

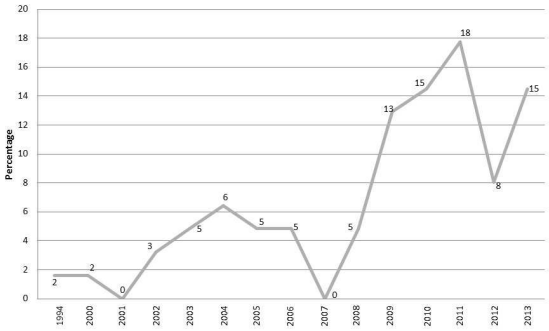

Figure 3: Distribution of Sustainability Research by Year

Furthermore, we were interested to determine the emergence of sustainability research in Information Systems publication outlets. The breakdown of sustainability per year of articles is shown in Figure 3. The figure clearly shows that the earliest publication of sustainability in Information Systems is in the early 1994. However it did not get much attention from the Information Systems community as no publication was recorded from 1995 until 1999. It was again discussed by Information Systems scholars in the year 2000 up until present. The figure also shows that a spike in publications was recorded in 2011. We posit that this finding is in line with the increased of sustainability importance awareness. A characteristic of publishing in the Information Systems discipline is a lag of generally one to two years from time of writing to time of actual

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publication. Accordingly, this situation would imply that increasing focus began around 2008. Prior to this event, little literature on sustainability exists, with zero publication in 2007. The decreasing amount of articles published in 2008 is due to the fact that there is a lag in the publication as described earlier. We expect the increasing trend to continue in 2014 for their research to reach maturity, despite the perceived drop in sustainability publications.

Table 2: Distribution of article references per domain application by journal

Domain	AJIS	BISE	CAIS	ISJ	JAIS	JITTA	MISQ	SJIS	THCI	Total
Business Strategy		[12]	[13-18]		[19, 20]	[21]	[22-25]			14
Financial Services			[26]							1
Open Source Software			[27, 28]							2
Technology			[29-31]		[32]		[33]			5
IT / IS Projects			[34, 35]		[36, 37]		[38, 39]	[40, 41]		8
ICTD				[42]						1
Green IT / IS	[43-45]	[46, 47]	[48-50]		[51]		[52, 53]			11
IT Outsourcing				[54]						1
Community of Practice					[55, 56]				[57]	3
IT/IS Discipline			[58]		[59-61]		[62]			5
Cloud Computing		[63]								1
Infrastructure					[64, 65]					2
Social Network		[66]	[67]		[68, 69]					4
Enterprise System Software (ESS)		[70]	[71]	[72, 73]						4
Total	3	6	20	4	15	1	10	2	1	62

3.3 A Potential Research Agenda for Sustainability Identified From a Critical Review of IS Literature

As depicted in Table 3, business strategy, Green IT/IS and IT/IS projects are the domains that attracted most concern in the articles. There is other sustainability research in other domains; however, the number of research is small. This show there are gaps of sustainability research in several domains especially IS/IT discipline, community of practice, Financial Services, Open Source Software, Technology, ICTD, IT Outsourcing, Community of Practice, IT/IS Discipline, Cloud Computing, Infrastructure, Social Network and Enterprise System Software (ESS).

Further investigation on the IT/IS projects shows that most IT / IS projects sustainability only focus in healthcare domain, transportation domain and open source domain (as shown in Figure 4). This reveals that there are gaps of IT / IS projects sustainability in other services domain such as finance and insurance, communication, business & private services, construction, electricity, gas & water, real estate & ownership of dwellings, agriculture, fishery & forestry, hotel & restaurants, mining & quarrying, government services, manufacturing, wholesale & retail trade. Furthermore, this paper confirmed that we have not found any other studies on public e-service sustainability prior to this in credential IS journals.

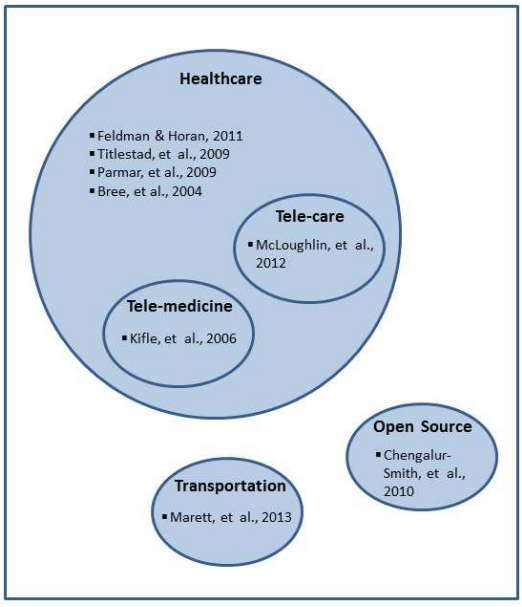

Figure 4: IT / IS projects sustainability literature according to the domain

4. CONCLUSION AND OUTLOOK

E-service sustainability becomes a critical issue due to the increased rate of failure in sustaining these initiatives among public sector agencies [74].

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Therefore, it is important to analyze and understand the different elements behind the failure of sustainability in these initiatives. However, the research revealed that there is no publication reported on e-service sustainability in IS literature as this paper was reported. However most articles on sustainability could be found both in the JAIS and CAIS, this is due to the exploratory type of the journals.

Table 3: Distribution of Publication per Domain Application by Year

Domain Application	1994	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total	%
Business Strategy	1	1			1	1	2	1		1		2	4			14	23%
Financial Services															1	1	2%
Open Source Software							1	1								2	3%
Technology					1						1		2	1		5	8%
IT / IS Projects						1		1			2	1	1	1	1	8	13%
ICTD															1	1	2%
Green IT/IS											1	4	2	1	3	11	18%
IT Outsourcing															1	1	2%
Community of Practice					1						1				1	3	5%
IT/IS Discipline				1						1	1	1		1		5	8%
Cloud Computing													1			1	2%
Infrastructure											2					2	3%
Social Network						1						1		1	1	4	6%
Enterprise System Software				1		1				1			1			4	6%
Total	1	1	0	2	3	4	3	3	0	3	8	9	11	5	9	62	100%

However, this paper only presents and focuses on the search results based on the keyword search of sustainability and sustainable. As mentioned earlier in the methodology section, only meaningful journal articles were then selected. In-depth analysis of the papers found based on the keyword search was done but are not presented in this paper.

Future work in this area involves two main steps. First is an extension of the IS journals to IS conference venues, which have a shorter time to publication and would provide more detail on e-service sustainability research area. Second, a series of interviews and focus groups has been initiated in order to collect the e-service sustainability problems, as experienced by public sector agencies who implemented the e-service project, and as observed by IT professionals and project consultants. The ultimate goal is to perform a gap-analysis between their needs and the focus of the research community, resulting in a relevant research agenda for the coming years.

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