EXPLAINING SUSTAINABILITY IN HEALTHCARE – A PRELIMINARY STUDY OF AN AGED CARE ORGANISATION IN AUSTRALIA

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Abstract

IT initiatives in healthcare often promise much but fail to deliver. As with IT projects in any other industry, healthcare projects may be abandoned before delivery, or if delivered, they may lack adoption or fail to deliver continuous use over a sustained period of time. Failure factors typically discussed in the IS literature fail to fully explain why sustainability is such an issue in the healthcare industry. Healthcare systems are technically complex to begin with. They involve a large number of stakeholders. Therefore their implementation process involves more planning and forethoughts. This paper focuses on the sustainability issues of healthcare information systems (HIS) implementation. We reviewed a broad array of literature to try to clarify the concept of “sustainability” within the defined context. We arrived at a broad framework for defining different types of sustainability for HIS. We propose they must all be considered for every sustainable healthcare IS implementation. Then using a successful aged care organisation in Australia, we explain the relevance of each type of sustainability defined. We conclude with some discussions of future work.

Keywords: Healthcare information systems, sustainability, aged care.
1 INTRODUCTION

“What is not sustainable cannot be called development.”

(John & Abel, 2002), p. 638)

Sustainability is often seen as one of the key criteria for ensuring ICT (Information and Communications Technologies) implementation success in development projects (Knippenberg et al., 1997). In this paper, we first define sustainability; we then draw from the literature to develop a sustainability ICT framework for assessment in the healthcare industry; and finally, we use this framework to assess an aged care home in our preliminary study.

There is no universal definition of sustainability. For instance, (Kimaro & Nhampossa, 2005) (p. 275-276) define sustainability as “the ability of the user organization to identify and manage risks that threaten the long-term viability of the Healthcare Information Systems (HIS)”. However, in this paper, we define sustainability in a more general form: “a concept that is used to describe community and economic development in terms of meeting the needs of the present without compromising the ability of future generations to meet their needs” (Oxford Online Dictionary 2008).

The importance of sustainability in ICT, more specifically in the healthcare industry, has been underestimated. Increasing attention to sustainable issues in healthcare (Shediac-Rizkallah & Bone, 1998) necessitates a much clearer understanding of what sustainability means. Sustainability in ICT is more than issues in project failures such as ‘not meeting user requirements’. Even when a project is successfully implemented, users still might not use the systems for other reasons. One such good example is HealthConnect project in Australia. The purpose of HealthConnect is to improve the information flow across the healthcare industry but, issues, such as patient’s privacy and lack of commitment from the doctors, have inhibited the smooth adoption of ICT. In terms of sustainability, even after the initial implementation of HealthConnect, it still does not meet both the needs of the present and needs of the future (Dearne, 2005). Therefore, there is a need for researchers and practitioners to understand the assessment of sustainability in ICT. Better understanding sustainability will help us to better assess and explain the success (or failure) of ICT implementation in the healthcare industry.

There are a number of reasons for selecting the healthcare industry to illustrate sustainability issues in its implementation of ICT. Healthcare is a critical component of modern economies (Chiasson & Davidson, 2004). Healthcare issues are complex as they involve stakeholders at multiple levels, and end users of different types. The implementation of healthcare programmes (with or without technology) therefore requires careful planning.

Healthcare information systems (HIS) is defined as a combination of hardware, software, and telecommunications networks that people build and use to collect, create, and distribute useful data, in a healthcare setting (modified from (Jessup & Valacich, 2008)). In this paper, we view sustainable HIS as one having the following characteristics:

(a) Bring benefits to healthcare (i.e. facilitate, contribute and strengthen healthcare) (Braa, Monteiro, & Sahay, 2004);
(b) Maintain at the proper level/standard of users’ needs;
(c) Being employed by staff (such as doctor, nurse or general staff) in their normal daily routine; and
(d) Persist over time (Braa et al., 2004).

Sustainability in the healthcare industry makes ever increasing resource demand, with corresponding concomitant marginal health gain (Thomas, Douglas, & Cohen, 2002). This difficulty is due in part to the lack of understanding of the scope of sustainability by the implementation team. Thus, in this paper, we shall develop a sustainability ICT framework as an aid to assess sustainability in HIS.
2 SUSTAINABILITY ICT FRAMEWORK

Some of the recent studies such as (Braa et al., 2004; Jacucci, Shaw, & Braa, 2006; Kimaro & Nhampossa, 2005) discuss sustainability in the healthcare industry (mostly in the developing countries) but no framework related to assessment of sustainability in ICT has been developed. We believe that developing a framework will help both researchers and practitioners to assess sustainability issues in ICT. This assessment can be carried out at various points of the implementation process:

- **Pre-implementation assessment** – to assist with planning, needs assessment, and gauging the readiness of the organization before beginning implementation.
- **Post-implementation assessment** – to assess the existing sustainability status and determine lessons learnt with a view to improving sustainability.

Sustainability can have both positive and negative impact. When sustainability has a negative impact as a result of the ICT implementation, we say that the technology is *unsustainable* for the aspect(s) being referred to. Sustainability is not limited to technical issues, social issues are also addressed. We draw from literature (research articles from Information Systems, Medicine and Health related journals) and commercial reports (such as international reports from UN and WHO) to develop a sustainability ICT framework. From the literature and reports, we group different types of sustainability into four categories: resource, culture, management control and physical environment as shown in *Figure 1*. We argue that in order to achieve sustainability of HIS, stakeholders and policy makers must address all four categories.

![Figure 1. Sustainability ICT framework](image)

The four categories are expected to define the aspects in which we would expect HIS to have impact on. All categories are interrelated and interdependent and therefore combining them highlights interrelationships between them, indicating the need to treat them holistically. For each category, we explain with the support of the existing literature, how each type of sustainability is relevant to information systems in the healthcare context. The sustainability issues related to the implementation of HIS are also addressed. In developing the framework, we take the stance that successful HIS implementation must embrace change management principles. In this respect, we can consider HIS as a type of innovation defined by ‘*the process of growing into practical use*’ (Tidd, Bessant, & Pavitt, 2001, p.37).

2.1 Resource

In order for HIS to be sustainable, resources have to be available. In this context, resources include financial and economic, and knowledge and skills. **Financial** sustainability is an important aspect of maintaining sustainability in healthcare ICT (Lettieri & Masella, 2006). **Economic** sustainability refers to the ability to use resources (usually in monetary terms) efficiently. Healthcare programmes often use cost-effectiveness and performance efficiencies as a way for evaluating its effectiveness. After all,
healthcare information is very complex so implementation would be resource (both human and material) intensive and thus financially successful programmes therefore expect high cost effectiveness and high performance efficiencies as a result of the programmes. Naturally, without funding for healthcare information systems, development, maintenance and continued support would be a huge issue, and therefore longevity and sustainability cannot be expected. Knowledge and skills sustainability refers to the need for knowledge and skills to innovate and maintain the sustainability of HIS. Technical knowledge and skills are needed if HIS is to be sustainable. Technical people such as IT developers, IT administrators and technical trainers require technical and domain knowledge to properly implement and maintain the systems. End users of HIS require the knowledge and skills through proper training in order to use the system effectively. Furthermore, healthcare policy makers also require the skills to assess the value of services provided by HIS and ultimately be able to convert those value assessments to business plans (Marchibroda, 2007).

2.2 Management Control

This addresses the leadership requirements for achieving sustainability in healthcare and it emphasises the importance of frontline managers in effecting positive changes in healthcare delivery (Block & Manning, 2007). At all levels of HIS implementation, management should be in control for planning, coordination, monitoring and management of the implementation process; experienced managers and champions are required to drive the process (Cash et al., 1994). Successful execution of a business’s organisational strategy comprises the best combination of organisational, control and cultural variables (managerial levers) (Cash, Eccles, Nohria, & Nolan, 1994). Change management is therefore important as a control in the organisation if sustainability of the ICT is to occur. As for control management, organisational sustainability addresses organisational structures and processes at the level of the organisation whereas institutional sustainability refers to the principles, norms, laws, rules and policies that govern the healthcare industry (Pluye, Potvin, & Denis, 2004). Examples of institutional sustainability concerns in healthcare are institutional accreditation guidelines and standards. Political sustainability occurs when there is development and maintenance of the political will necessary to sustain a major policy direction (CPHA, 1990). Moreover, the role information systems play in healthcare can create ethical conflict and tensions (e.g. between individual needs vs. public good) (Lolas, 2003). Political situations are embedded in the organisations and the industry.

2.3 Culture

Social sustainability means maintaining social capital. “Social capital is investments and services that create the basic framework for society.” (Goodland, 2002, p. 2) ICT has both positive and negative impact on the social sustainability of HIS. The existence of technologies however does not guarantee social sustainability, as technologies have different impact on different stakeholders of healthcare, depending on the functionalities and purpose of the systems. Cultural competence (CC) is defined by “the ability of systems to provide care to patients with diverse values, beliefs and behaviours, including tailoring delivery to meet patient’s social, cultural and linguistic needs.” (Betancourt, Green, & Carrillo, 2002) (p.v). CC refers to system attributes/features/resources such as language interpretation/preference, sensitivity towards levels of health literacy, language proficiency (Anderson et al., 2003; Betancourt et al., 2002), cultural norms when providing health information (Betancourt et al., 2002), and special care to human-computer interface for consumers with special physical needs. Medical decision-making tools used by clinicians should consider capturing built in decision rules exhibiting cultural competence such as delay in seeking care for certain cultural groups, traditional family authority (Anderson et al., 2003), and traditional medical practices. Since cultural factors affect the final acceptance of the systems, this has implications on the implementation of HIS for specific cultural contexts and the generalisability of HIS both in terms of research and implementations.
2.4 Physical Environment

*Physical Environmental* sustainability refers to the environmental factors required to sustain healthcare information systems in all stages of development and use: “The reality is delivering patient care involves a lot of hazardous materials, produces a lot of waste and consumes a lot of energy, all of which can be detrimental to the environment” (Frank, 2008). Physical environment in terms of technology sustainability refers to the ability to meet the technological, technical requirements and infrastructure of sustainable healthcare information systems. It is expected the implementation of HIS require technical infrastructure (e.g. hardware, networks) (Bishop, 2007); location (e.g. rural area) (Baumann, Hunsberger, Blythe, & Crea, 2007); physical surroundings (e.g. electricity, cables); and technical know-how (IT administrators and support team, technical trainers).

3 RESEARCH METHODOLOGY

In this section, we describe a preliminary study to validate the proposed model. We briefly discuss our instrument followed by the case background, data collection and data analysis.

The research objective of this paper is to better understand sustainability in order to help us better assess and explain / predict the success (of failure) of ICT implementation in the healthcare industry. Based on Yin’s (Yin, 2003) argument of using case study as a methodology, we conducted a case study with the aid of our proposed framework to explore and investigate the issues related to sustainability in a specific healthcare context – an aged care institution in Sydney, Australia. Interview is highlighted as the best technique for gathering information for an exploratory study (Yin 2003). Conducting semi-structured interviews allowed for clarification, and allows appropriate follow-up questions (Yin 2003). The semi-structured interview questions were drawn from literature.

The Australian Nursing Home Foundation (ANHF) is the first and largest Chinese aged care non-profit organisation founded in 1980. ANHF provides professional, culturally and linguistically, appropriate aged care services catering for the various needs of the Chinese elderly population through nursing home, community housing for seniors, and aged care services. The Foundation is funded the Australian government, and occasionally by philanthropic donors. All aged care facilities have achieved full accreditation, and had received the Best Practice Award by the Commonwealth Department in 1996, and has been showcased by both Federal and State Government's to overseas visitors and local service operators for best practices.

We interviewed two members of senior management from ANHF. The two members have a combined 50 years of experience in the aged care industry. Their vast experience in aged care reflects deep insight to the sustainability issues specifically tailored to the Chinese Community in Sydney.

In-depth interviews were conducted. Notes were taken and a recording device was used for all the interviews. All interviews were then transcribed. We also collected other sources from reports and internet as evidence to further to strengthen the case study (Yin, 2003).

4 PRELIMINARY RESULTS, DISCUSSION AND CONCLUSION

We use the framework as a guide when presenting our results and discussions. A sample of the results and discussions are shown in the Table 1 (see next page). Sustainability in healthcare has often been considered very broadly, mainly from development and policy makers’ limited perspectives. The capability of IT in helping to fulfil these objectives is undeniable. In this paper, our contributions can be summarised below:

1. We argue the importance of the sustainability concept in healthcare and summarise the definitions related to “sustainability”. 
2. We propose a broad framework for classifying different types of sustainability - consisting of resource, culture, management control and physical environment. We explain the relevance of each type in the context of the HIS implementation.

3. Using a successful aged care organisation for the Chinese community in Australia (ANHF), we explain the importance of each type of sustainability within that context, and in that process, also pointed out possible areas of improvement ANHF may consider when considering implementing healthcare IS.

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<tr>
<th>Category</th>
<th>Result and Discussion of ANHF Case</th>
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<tr>
<td>Resource</td>
<td>Being a non-profit organisation, ANHF received its financial support from the government and generous donations but with no IT department. However, the senior managers said they prepare to invest in the technology as long as there are justifications for it, they argued that there must be an economic sustainability if HIS are to maintain in long term. Even when ANHF has the financial sustainability to implement and maintain HIS, the senior managers agreed that they must promote IT knowledge and skills to their staffs if they want to maintain IS skills sustainability. The current IS knowledge and skills are limited in ANHF. We argue that ANHF has the financial to implement HIS but they lack of the resources with IS skills and knowledge. Thus, the sustainability of implementing ANHF depends on the control of the management of ANHF.</td>
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<td>Management Control</td>
<td>ANHF has a mission statement which reads: “We are committed to the pursuit of excellence in the provision of quality and culturally competent care for the Aged.” The two managers know the advantages of using technologies in business, and the management of ANHF are open to technological innovations. They continuous to seek improvement and are very keen to exploit IT innovation to improve their services. Moreover, they know they must address issues in sustainability when implementing HIS: planning, design, implementation, testing, delivery, maintenance, training and beyond. The managers admitted that the major barrier to technological solutions is the lack of IT resources, skills and know-how. They realise that they have to develop new IS/IT skills and require help to develop strategic solutions that exploit IT capabilities The two managers said they aware of possible political barriers that might affect its sustainability, for example unwillingness of government to invest in aged citizens if this group is seen as not being able to contribute to the society. However, it has addressed political sustainability by striving for excellence, professionalism and continuous improvement in its decades of outstanding operation, and has received outstanding recognition, awards and accreditation by the Australian government and the community.</td>
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<tr>
<td>Culture</td>
<td>The two managers want the employees to accept changes to their normal practice if HIS were to implement at ANHF. However, this is an untested ground and they hope training and support will help their objective. Moreover, there is a culture developed in ANHF which is different from other aged care in Australia because nearly all the residents are Chinese. Thus, ANHF is committed to provide socially, culturally and linguistically appropriate aged care services for the Chinese community. For example, the residents currently enjoy Chinese TV channels, and celebrations of 3 major events a year (Chinese New Year, Moon Festival and Christmas). The two managers agreed the implementation of HIS should equally meet cultural sustainability needs by incorporating them in the system specifications, design and the final implementations.</td>
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<td>Physical Environment</td>
<td>The extent of environmental sustainability pertaining to healthcare information systems depends on the functionalities of the system – how correlated these functions are to environmental inputs and outputs. The two managers know that they have to set up the physical environment for the implementation of HIS if implementation of HIS is to be sustainable.</td>
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**Table 1. Results**

Future work includes developing a more formal framework for assessing sustainability, and also operationalising each type of sustainability. We propose that the framework may be two dimensional: (1) sustainability types as defined and (2) different implementation levels within each type (such as planning, design, implementation, execution, maintenance). A two-dimensional framework will have more practical implications in terms of evaluation outcomes. Researchers can look at applying such a framework in different healthcare sectors in a number of ways:
for assessing the sustainability of existing healthcare information systems with objectives of improving existing operations and establishing strategic plans (post-implementation assessment).

for planning new healthcare IT innovations and aligning HIS to strategic objectives so as to maximise sustainability of the new system.

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