Sustainability in IS Projects: A Case Study

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ABSTRACT

Sustainability is without doubt one of the most important challenges of our time. How can we develop prosperity, without compromising the life of future generations? Information systems (IS) provide organizations with the ability to change and improve business processes to better support sustainable practices. Therefore, IS can make a contribution to the sustainable development of organizations. However, the organizational change aspects of Green IS are covered only marginally in the emerging literature. This paper aims to contribute the debate on Green IS, by highlighting the role of sustainability in the projects developing or implementing IS.

The paper therefore explores the impact of the concepts of sustainability on IS projects. Based on a literature review of the concepts of sustainability, and the relationship between sustainability and project, we will report a maturity assessment of a case study of a Green IS project. We will conclude the paper by addressing the most likely areas of impact for sustainability in IS projects.

Keywords: Projects, project management, sustainability, green IS

INTRODUCTION

The concept of sustainability and the need for its presence in our businesses has been discussed extensively in academic publications in the past decades (for example: Dyllick & Hockerts, 2002; Ghose, Hasan, & Spedding, 2009; Watson, Boudreau, & Chen, 2010; Silvius, van den brink, & Smit, 2009). Proactively or reactively, companies are looking for ways to integrate ideas of sustainability in their marketing, corporate communications, annual reports and in their actions (Hedstrom, Poltorzycki, & Stroh, 1998; Holliday, 2001). The growing concern about sustainability and the preservation of our planet is increasingly being recognized by the information technology (IT) and information systems (IS) disciplines. CIOs identified Green IT as an important strategic technology (Thibodeau, 2007) and it is expected that the Green IT service market will reach nearly $5 billion by 2013 (Mines, 2008). In the academic world, the sustainability aspects of IT or by IT, are an emerging field of study (Ghose et al., 2009). In the emerging literature, a distinction can be made between Green IT and Green IS (Kazlauskas & Hasan, 2009; Watson et al., 2010), whereas Green IT refers to the energy efficient utilization of

IT equipment and Green IS to "the design and implementation of information systems that contribute to sustainability of business processes" (Boudreau, Chen, & Huber, 2008).

Given IS's ability to understand, change, and reinvent business processes (Kazlauskas &Hasan, 2010), the greening by IT effect, it is expected to deliver an important contribution to sustainable business practices. This is the greening by IT effect. However, recently, Watson et al. (2010) still conclude that "the IS academic community seems largely ignorant of the challenge of sustainable development." One of the areas where the IS community fails to recognize the aspects of sustainability is the delivery of IS projects (Silvius et al., 2009). Given the nature of projects as temporary organizations, the sustainability aspects of the process of performing the project are greatly overlooked (Gareis, 2010), even if the project deliverable or intended result can be classified as Green IS.

This paper aims to contribute to the debate on Green IS, by highlighting sustainability aspects of the process of developing and implementing Green IS and organizational change resulting from IS. And, since this process is often organized as projects (Gareis, 2010), this paper discusses the impact of sustainability on IS projects. In this paper, we will provide a practical example by means of a case study. The case study is the development of an Open Remote application by the Finalist IT Group located in Beijing, China. Their project will be analyzed as a representation of their projects and project management. The main research question is as follows:

How can the concepts of sustainability be integrated in IS projects?

After a review of the concepts and principles of sustainability, the relationship between sustainability and projects will be discussed. After this, we will introduce the research methodology and the case. The paper is concluded by reporting a case study and drawing conclusions from that.

CONCEPTS OF SUSTAINABILITY

The balance between economic growth and social wellbeing has been around as a political and managerial challenge for over 150 years (Dyllick & Hockerts, 2002). Also the concern for the wise use of natural resources and our planet emerged already many decades ago, with Carson's book Silent Spring (Carson, 1962) as a launching hallmark. In 1972, the Club of Rome, an independent think tank, published its book The Limits to Growth. In the book, the authors concluded that if the world's population and economy would continue to grow at their current speeds, our planet's natural resources would approach depletion. The Limits to Growth fuelled a public debate, leading to installation of the UN World Commission on Development and Environment (1987), named the Brundtland Commission after its chair. In their report Our Common Future, the Brundtland commission defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." By stating that "In its broadest sense, sustainable development strategy aims at promoting harmony among human beings and between humanity and nature," the report implies that sustainability requires also a social and an environmental perspective, next to the economical perspective, on development and performance.

The visions that none of the development goals of economic growth, social wellbeing and a wise use of natural resources, can be reached without considering and effecting the other two, got widely accepted (Keating, 1993). Elkington's (1997), Cannibals with Forks: the Triple Bottom Line of 21st Century Business, identifies this as the Triple Bottom Line or Triple-P (People, Planet, Profit) concept, illustrated in Figure 1: Sustainability is about the balance or harmony between economic sustainability, social sustainability and environmental sustainability.

The Triple Bottom Line (TBL) concept probably is the best-known conceptualization of the principles of sustainability. However, other authors developed several key elements, or principles, of sustainability. For example, Dyllick and Hockerts (2002) identify three "key elements of corporate sustainability." Next to the TBL, these are integrating short-term and long-term aspects and consuming the income and not the capital. Gareis, Heumann, & Martinuzzi (2009) and Silvius, Schipper, Planko, van den Brink, and Köhler (2012) elaborate on these principles and conclude that sustainability principles also imply an ethical consideration, grounded in normative personal values.

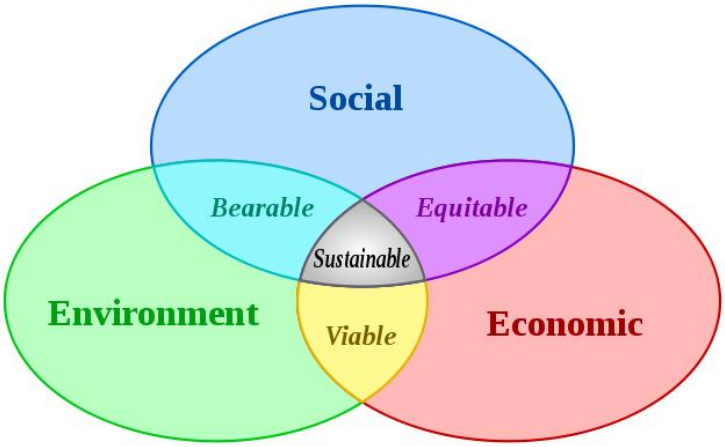

Figure 1. The Triple-P Concept of Sustainability.

(Source: California Academy of Sciences)

The concept, or principles, of sustainability may be understood intuitively, but are not easily expressed in concrete operational terms (Briassoulis, 2001). They need to be operationalized in order to be practically applicable. As a first step towards practical operationalization, a group of project management and sustainability experts jointly developed a Sustainability Checklist. This checklist was developed, following a focus group approach on an Expert Seminar of the International Project Management Association (Silvius as cited in Knoepfel, 2010). Table 1 provides this sustainability checklist.

SUSTAINABILITY IN IS PROJECTS

The relationship between sustainability and project management is still an emerging field of study and the integration of the principles of sustainability in project management has only just

begun (Gareis et al., 2009). The current state of research on sustainability in projects and project management is therefore mostly interpretive, giving meaning to how the concepts of sustainability could be interpreted in the context of projects, rather than prescriptive, prescribing how sustainability should be integrated into projects. The studies provide ingredients, but no clear recipe (Silvius et al., 2012).

Economic Sustainability	Return on Investment	- Direct financial benefits - Net Present Value
	Business Agility	- Flexibility / Optionality in the project - Increased business flexibility
Environmental Sustainability	Transport	- Local procurement - Digital communication - Traveling - Transport
	Energy	- Energy used - Emission / CO2 from energy used
	Waste	- Recycling - Disposal
	Materials and resources	- Reusability - Incorporated energy - Waste
Social Sustainability	Labor Practices and Decent Work	- Employment - Labor / Management relations - Health and Safety - Training and Education - Organizational learning - Diversity and Equal opportunity
	Human Rights	- Non-discrimination - Freedom of association - Child labor - Forced and compulsory labor
	Society and Customers	- Community support - Public policy / Compliance - Customer health and safety - Products and services labeling - Market communication and Advertising - Customer privacy
	Ethical behavior	- Investment and Procurement practices - Bribery and corruption - Anti-competition behavior

Table 1. Checklist for Integrating Sustainability in Projects (Silvius, 2010).

In an interesting contribution to the debate on the inclusion of sustainability principles into project management, Silvius and Schipper (2010) developed a maturity model to assess, monitor, and improve the incorporation of the principles and concepts of sustainability in projects. Maturity models are a practical way to translate complex concepts into organizational capabilities and to raise awareness for potential development. They provide guidance for action

plans and allow organizations to monitor their progress (Dinsmore, 1998). The maturity model of Silvius and Schipper is based on two concepts.

The first is that of the depth of vision of the consideration of sustainability. This approach is based on the observation that sustainability can be considered on different levels (Silvius & Schipper, 2010).

- A first logical level is the level of the resources used in the project. For example, using resources that provide the same functionality, but are less harmful for the environment, like using hybrid cars instead of normal fueled cars. These actions can for example reduce the environmental impact of the project. They reduce the negative impact of the project, but do not take away the cause of non-sustainability.
- A second level of consideration is that of the business process of delivering or managing the project. A more sustainable project process takes away the cause of non-sustainable effects instead of just limiting or compensating them. For example, using teleconferencing for project meetings, instead of traveling to the meeting location.
- A third level of consideration is looking at the business model in which the project is delivered. For example, changing the contract for a project from just the construction phase to the full life cycle, may have favorable effects on the project delivery because of the emphasis on the full life cycle of the project and the project deliverable.
- A fourth and final level of consideration takes into account the result or deliverable of the project. This connects the consideration of sustainability in project management to the sustainability of the project itself. How does the project deliverable to contribute to a more sustainable society? For a project that delivers a course in high schools that teaches children to respect nature.

The different levels of consideration reflect the development in thinking about sustainability. In this thinking, the focus shifted from being less bad to being good, by making products, services and processes that make the customer or user of those products, services and processes more sustainable (Silvius et al., 2012).

The second concept that the maturity model builds upon are the principles of sustainability mentioned above, as operationalized in the sustainability checklist. The maturity model assesses the level (resources, business process, business model, products/services) on which the different aspects or criteria of sustainability are considered in the project. The sustainability criteria are derived from the sustainability checklist and are grouped in economic criteria, environmental criteria and social criteria.

The maturity assessment uses a questionnaire consisting of four sections and in total 31 questions. The first three sections cover descriptive questions regarding the respondent, the project that is assessed and the organizational context of the project. The fourth section consist of the actual assessment questions. Figure 2 shows the conceptual model of the assessment.

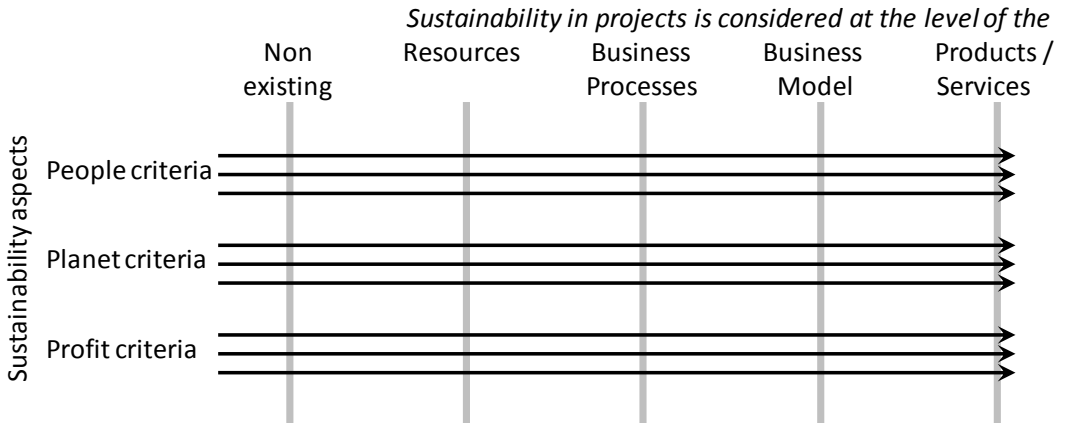

Figure 2. Conceptual Model of the Assessment (Silvius & Schipper, 2010).

For each of the sustainability criteria, an assessment of the current level of consideration and the desired level of consideration is asked, which allows for an analysis of the difference between current state and ambition.

THE CASE STUDY

The maturity model assesses how sustainability is considered in a specific project. The fact that the unit of analysis of the maturity model distinguishes it from other project management maturity models that most often assess the maturity of process performance and control on the level of the organization. Since projects are performed within, or between, organizations, and are therefore existing within a certain organizational context, a case study approach appears to be a suitable research methodology (Yin, 2009).

The case study concerns the project Open Remote of the Finalist IT group in Beijing. This case was selected because both the result of the project, open source software for a universal remote control on a Smartphone, and the process of the project, with a Western IT company using its Chinese subsidiary to deliver the project, offer many opportunities for considering sustainability aspects. The data collection for this study was done by semi-structured interviews with the general manager of Finalist Beijing and the project manager of the project Open Remote. The general manager provided more general information about the company, and the project manager filled in a maturity assessment questionnaire.

Finalist IT Group is a Dutch IT service provider with branches in New York and Beijing. It specializes in consultancy, project and application maintenance. The Beijing office employs approximately 30 people and is engaged in local Chinese business and in projects that are acquired by the other Finalist branches. As mentioned on their corporate website (www.finalist.com), the company's mission statement is: "We help our customers achieve long lasting competitive benefits by successfully implementing best of breed IT-solutions."

The Project OpenRemote is an open source software development project where Finalist Beijing, with a core development team of ten people, designs and implements a software application for iPhone, iPad, and other Mac-products. The project is destined for the US and has a budget of

over one million dollars. The goal of the project is to design and program an open source software application for controlling the lighting, air condition, entertainment equipment, and other electrical devices in the average home that normally require many separate remotes (and batteries). The purpose of the project is to create an application (a service) that replaces the numerous remote controls that are often required to operate the many electrical appliances of the average home. So in this case the product (remote control and batteries) is redesigned into a service (the application). The application typically qualifies as Green IS because it replaces battery-consuming devices by an app on an existing device.

CASE STUDY FINDINGS

The case study includes the application of the Silvius and Schipper (2010) maturity model in order to analyze how sustainability is considered in the Green IS project Open Remote. Results of the maturity assessment are portrayed in Figures 3, 4 and 5. The data are separated by three categories: profit, people, and planet. Figures present both actual and desired level of consideration of sustainability in the project. From low to high maturity, the levels of consideration are:

- Sustainability aspects are not considered in the project;
- Sustainability aspects are considered at the level of the resources of the project;
- Sustainability aspects are considered at the level of the business processes of the project;
- Sustainability aspects are considered at the level of the business model of the project;
- Sustainability aspects are considered at the level of the products/services the project delivers.

Given the Green IS nature of the Open Remote application, this last level of consideration is expected to be quite high, especially regarding the Planet aspects of sustainability.

For each category, the weight per answer is calculated and labeled as "possible percentage per answer." The percentage is based on the number of questions per category converted to a percentile weight. Simply put: the higher the presence of sustainability in a certain level, the higher the bar in the graphs is.

Profit Perspective

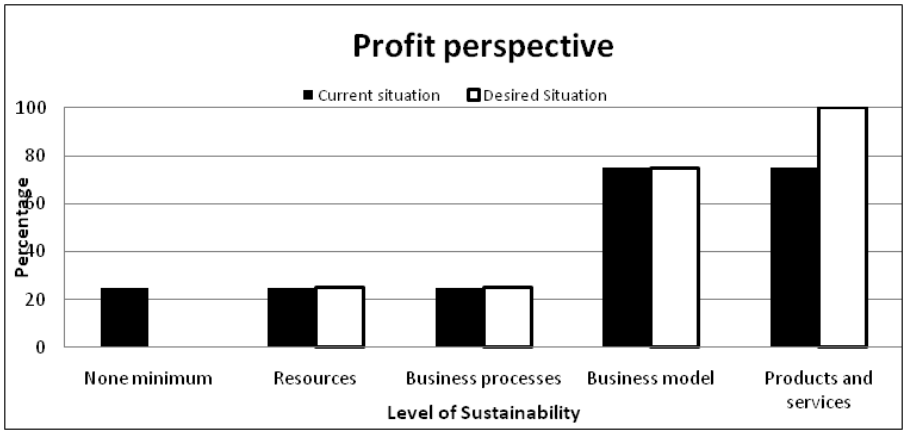

Figure 3. Data for the Profit Perspective.
(Four questions; Possible percentage per answer is 25%)

The results of the questionnaire's category Profit show a rather high presence of sustainability within this particular project. The highest level of sustainability, namely sustainability in products and services, is firmly present with a score of 75%. Although all the four preceding levels are at a desired height, the project manager does still see room for improvement on the level of products and services. The desired level here is 100% instead of the current 75%. The highest presence of sustainability can be found in the business model and in products and services. The other three levels have an equal score of 25%. However, since the highest levels of sustainability have the highest sustainability presence (75% each), the level of sustainability can be seen as very high. The answers given by the project manager of the project in the case show that thinking about the long term, being flexible and improving the company are very important aspects. These aspects contribute to a higher level of sustainability as the future is being kept in mind and the company functions to improve constantly.

Planet Perspective

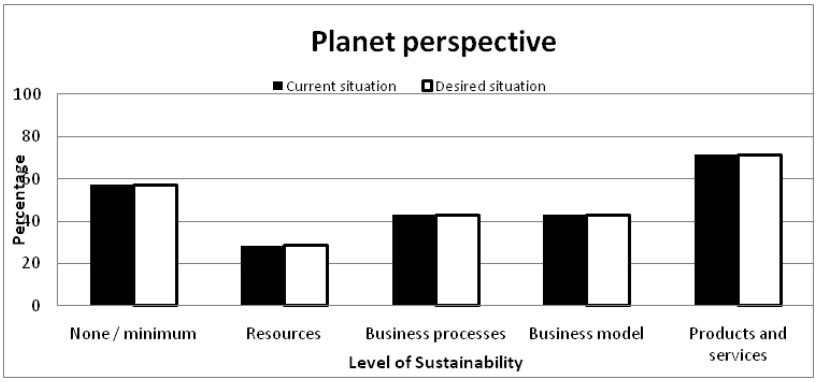

Figure 4. Data for the Planet Perspective.
(Seven questions; Possible percentage per answer is 14.3%)

Figure 4 clearly shows that Finalist is completely satisfied with their level of sustainability within the planet perspective. The graph shows that the current situation is the same as the desired situation.

The highest presence of sustainability is, once again, on the level of products and services. Contrary to the profit perspective, however, the score for the none/minimum category is 57.14%. This percentage is decidedly higher than in the profit perspective. From this, we can conclude that there is a higher overall presence of sustainability in the profit perspective of the project than in the planet perspective.

People Perspective

Finally, the products and services category of the people perspective scores a neat 100%, as can be seen in Figure 5. Finalist tries to maximize their sustainability when it comes to people. This means fair work, wages, and futures for the company's employees. The company has many standards for, for example, labor practices, health and safety, and equal opportunity. Besides this, the respondents also mention that they constantly try to improve upon this with every project and make sure that everyone is still satisfied.

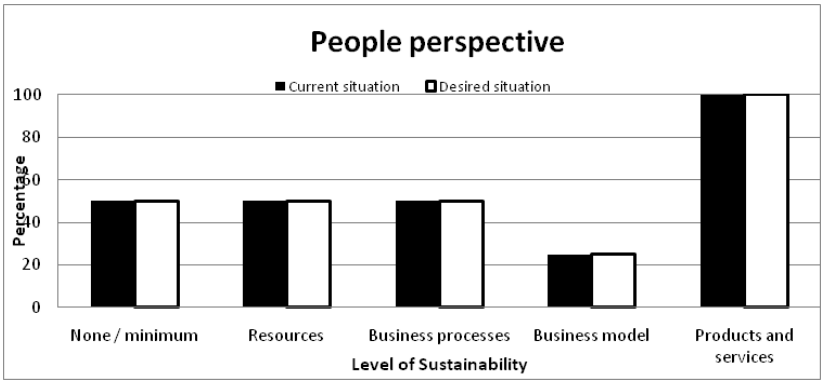

Figure 5. Data for the People Perspective.
(Eight questions; Possible percentage per answer is 12.5%)

Overall, the Open Remote project shows a relatively high presence of sustainability, particularly on the level of products and services. This is not unexpected for a Green IS project. Given the almost completely lacking difference between current situation and actual situation, it can also be concluded that there Finalist is satisfied regarding the level on which sustainability is considered in the project. What these first conclusions mean with regards to the main research question of this paper, will be explored in the next section.

ANALYSIS

As can be concluded from the data analysis, the Open Remote project contributes to establishing a more sustainable company. The project's goal is to replace physical products (remote controls and batteries) with a service (in this case a software application). It does not produce waste in usage. As a matter of fact, using it would reduce waste simply because of all the remotes and batteries you don't have to purchase, use, and dispose of any more.

Noticeable about the data analysis is that the highest presence of sustainability occurred on the level of products and services. In this case, where the project is turning a product into a service, it's not that peculiar. In fact, turning products into services is one of the renowned strategies to create more sustainable businesses (Girshick, Shah, & Waage, 2003). However, the significantly lower scores on the consideration levels resources, business processes, and business model indicate that considering sustainability aspects in the project of developing a Green IS application is a less developed area. Thereby confirming the earlier findings of Gareis et al. (2009).

Another noticeable fact resulting from the data is that although in the case there seems to be a solid presence of sustainability, there also seems to be no desire to improve upon this, even where it can still be improved. Finalist indicated that there is no desire to change their current situation. From this, we can hypothesize that Finalist saw a business opportunity, something that would make for a good service, but never tied it specifically to sustainability or a sustainable strategy. The company seemed unaware of the concept of sustainability in general, and never specifically implemented it into its business plan. Finalist has a long-term vision, wants to grow, wants to earn a healthy profit and also wants to treat their employees fairly, but all of this not

specifically because of an explicit sustainability ambition. This lack of motivation, or lack of awareness, does not change the findings of the case, but it does influence the potential for a more complete consideration of sustainability aspects of the project.

CONCLUSION

IS can make a contribution to the sustainable development of organizations. However, the sustainability effects from IS require development, implementation and change. This development and implementation perspective is covered only marginally in the emerging literature on Green IS. This paper explored the integration of the concepts of sustainability in IS projects.

We performed a case study into a Green IS project, Open Remote, of the Finalist IT Group in Beijing, China. The research question of the study was: In what way does Finalist implement the concepts of sustainability in its IS projects? Based on our analysis of the case Open Remote, we can conclude that one way that Finalist implements the concepts of sustainability is by turning products into services. By re-designing a product, in this case a remote control, into a software service, Finalist creates a sustainable service and makes a wasteful product obsolete. The Open Remote project therefore qualifies as a Green IS project.

The Green quality of the Open Remote project, however, is only partly applied to the process of performing the project. The maturity assessment we performed showed that on the level of the resources used in the project, the business processes of the project and the business model of the project, sustainability aspects are only partly considered. Finalist considers the future to be important to them, by striving for continuous improvement and taking care of their employees fairly. However, the organization lacks guidance on how to integrate these values and other aspects of sustainability fully into the way IS projects are delivered.

As was mentioned earlier, Finalist also seems not fully aware of the concepts and principles of sustainability in general. Given the key-role that IS and companies like Finalist can play in creating a more sustainable society, there still seems to be a huge opportunity for the IS sector to improve in this aspect. Based upon the comments of the respondents of the case study, however, it can be concluded that this requires an increased awareness and understanding of sustainability.

Although there was an implementation of the concept of sustainability within Finalist, and surely within many other companies, there was no standard for the practice of sustainability. There also was not a real realization of what could potentially be done and, more importantly, what should be done because they (the IT/IS sector) are able to do it. One of the major challenges in the development and implementation of sustainability is the operationalization of the concepts of sustainability. Like there are project management methods, there should be methods for sustainability. And, they should be integrated into the IS project management methods and practices.

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