Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 2011 Proceedings - All Submissions

8-6-2011

Sustainable IS Initialization Through Outsourcing: A Theory-Based Approach

Dietmar Nedbal
Upper Austria University of Applied Sciences, dietmar.nedbal@fh-steyr.at

Werner Wetzlinger
Upper Austria University of Applied Sciences, werner.wetzlinger@fh-steyr.at

Andreas Auinger
Upper Austria University of Applied Sciences, andreas.auinger@fh-steyr.at

Gerold Wagner
Upper Austria University of Applied Sciences, gerold.wagner@fh-steyr.at

Follow this and additional works at: http://aisel.aisnet.org/amcis2011_submissions

Sustainable IS Initialization Through Outsourcing:
A Theory-Based Approach

Dietmar Nedbal
Upper Austria University of Applied Sciences
dietmar.nedbal@fh-steyr.at

Werner Wetzlinger
Upper Austria University of Applied Sciences
werner.wetzlinger@fh-steyr.at

Andreas Auinger
Upper Austria University of Applied Sciences
andreas.auinger@fh-steyr.at

Gerold Wagner
Upper Austria University of Applied Sciences
gerold.wagner@fh-steyr.at

ABSTRACT

Environmentally friendly and sustainable initiatives have emerged as important topics in IS research over the last few years. However the existing discussions and scientific contributions in this field are mainly based on case studies and empirical surveys. Less research is firmly based on existing IS theories. Furthermore, little research has been undertaken to analyze the contribution of outsourcing to environmental sustainability. This paper takes a theory-based approach to link outsourcing with sustainable IS to examine the possibilities of organizations engaging in green and sustainable initiatives. To ensure a broad scope the model is built on the technology-organization-environment (TOE) framework. This framework is extended with the diffusion of innovation (DoI) theory to incorporate implementation success, technology acceptance and the transaction cost theory (TCT) to integrate outsourcing success into the model.

Keywords

Green IT, Green IS, Sustainable IS, Outsourcing, B2B Integration, Sustainability.

INTRODUCTION

Information digitalization and automation of the flow of goods offer organizations the chance to become part of global acting supply networks. Besides the primary goal increasing efficiency to ensure economic success, modern and ecologically thinking organizations have realized the potential arising from sustainable initiatives (Molla, Pittayachawan, Corbitt and Deng, 2009). The information infrastructure, which has grown over decades, and the associated heterogeneity of information and communication technologies provide a very high potential to improve environmental sustainability (Huang, 2008). In addition, organizational measures to improve business processes and related flows of information and goods, both internally and across organizations help to reduce emissions along the supply network (Testa and Iraldo, 2010). Therefore, the consideration of sustainability requirements offers a lot of opportunities but also carries technical and organizational challenges for the entire organization.

So far, academic literature has primarily focused on large organizations in the technology industry like Dell, HP, ISM, Sun, Hitachi, and Fujitsu (Pollack, 2008) or Nokia, Samsung, Sony, and Sony Ericsson (Wati and Chulmo, 2010) to analyze their green and sustainable initiatives. Although these leading, large companies are quite concerned about environmental issues, many organizations do not take environmental sustainability into consideration, which leaves room for improvement, especially in energy consumption and waste generation (Huang, 2008). On the other hand, small and medium-sized enterprises (SMEs) often lack the necessary human and financial resources to cope with the facets involved in environmentally friendly initiatives (Schlieter, Juhrisch and Niggemann, 2010). Due to the rising cost pressure, this important issue usually is not a top priority in SMEs and therefore their internal motivation for improvements is low. However SMEs involved in supply networks are often forced to respond in a timely manner to environment-targeted strategies by larger partners (Testa and Iraldo, 2010). This external pressure is even stronger when an organization in the supply network is using an Environmental Management System (EMS) to assess their suppliers' environmental harm (Darnall, Jolley and Handfield, 2008) So, what can an SME that lacks the necessary resources to cope with environmental issues do in a highly competitive sector to fulfill these requirements?

This paper focuses on outsourcing of IT and business processes as a possibility to face the problems when coping with the organizational and technical tasks involved in environmentally friendly initiatives. Consistent with this goal, the main research question was: Which factors influence the organizations' decision to engage in sustainability through outsourcing?

The first step in answering this question is to examine the contributions of current literature to environmental sustainability. This includes a comparison of definitions of the underlying terms "Green IT", "Green IS" and "Sustainable IT/IS" in academic and practitioner's literature. Subsequently, existing frameworks and theories are used to assess the readiness of organizations to undertake sustainable initiatives and to discuss their applicability for SMEs in outsourcing initiatives. Existing theoretical models are expanded with an outsourcing dimension and it is shown which propositions are valid for business process outsourcing initiatives. As a result, factors that contribute to the assessment of the initialization of sustainable initiatives and factors that lead to competitiveness through outsourcing are identified and combined. Furthermore, the practical use of the model is shown by a case study dealing with business process outsourcing in a highly competitive market.

The rest of this paper is structured as follows. Section 2 discusses the theoretical background concerning the terms "green", "sustainability", "IT", "IS" and "outsourcing". Section 3 gives insight into the theoretical model. Section 4 briefly discusses a case study and section 5 shows the practical applicability of the theoretical model on the basis of the case study. The last section contains the conclusions and provides suggestions for further research in this field.

THEORETICAL BACKGROUND AND LITERATURE REVIEW

The environmental sustainability of information systems has been identified as an important topic in the mainstream of IS research (Elliot, 2007). According to (Elliot and Binney, 2008) and (Brooks, Wang and Sarker, 2010) the leading IS research journals (MIS Quarterly, Information Systems Research, Journal of MIS, Journal of the AIS, European Journal of Information Systems, and Information Systems Journal) did not publish a single paper focusing on "green/sustainable" "IS/IT" until the end of 2009. A recent MISQ article (Watson, Boudreau and Chen, 2010) has confirmed that this significant topic has not been adequately addressed in IS research, although now specific tracks exist in all top IS conferences (AMCIS, ECIS, ICIS, PACIS and HICSS). Within these scientific contributions, terms are used inconsistently both within scientific literature and practitioner literature (Brooks, Wang and Sarker, 2010). Different terms are "*used widely but lack common and consistent meaning. Many articles and papers focus on a particular aspect of the issue without acknowledgement of its multi-faceted nature*" (Elliot and Binney, 2008). Therefore it is necessary do clarify the meaning of the important terms regarding the focus of this paper.

Firstly, current literature does not clearly distinguish between the terms "sustainable" and "green". According to (Brooks, Wang and Sarker, 2010) and (Samson, 2007) "green" is usually understood to mean environmentally friendly and energy efficient. In contrast, sustainability refers to planning and investing in an infrastructure that helps to achieve an organization's short-term objectives while conserving natural resources and helping to preserve the environment (Huang, 2008). The Word Commission on Environment and Development (Brundtland, 1991) defines the term as *"development that meets the needs of the present without compromising the ability of a future generation to meet their needs"*. Since this definition is rather broad and many organizations just focus on its ecological aspects, the triple bottom line perspective of sustainability has been developed (Elkington, 1994, 2004). This approach claims that a more sustainable outcome can be reached by the combination of environmental performance, economic performance and social performance. Furthermore, Porter and Kramer (Porter and Kramer, 2006) argue that, to ensure long-term profitability, companies have to take social and environmental issues into consideration and incorporate them in the core frameworks that guide its business strategy.

Secondly, the term "information system" (IS) needs to be distinguished from "information technology" (IT). Most current practitioners' literature exclusively addresses "information technology", which is considered as too narrow and should be extended to "information systems" (Watson, Boudreau and Chen, 2010). Information systems always incorporates people and IT to support business processes in fulfilling an individual or organizational task (O'Brien, 2003; Beynon-Davies, 2009). Information systems and consequently information technology can play an important and direct role in sustainable initiatives by monitoring, reporting and tracking environmental efforts. Indirectly, IS contributes to the reduction of natural resource consumption by improving productivity, reducing commute time, and avoiding the materials such as papers and plastics (Huang, 2008). Accordingly, Sustainable IS encompasses a wider range of possible initiatives such as business process virtualization (Bose and Luo, 2011) and supply chain management (Darnall, Jolley and Handfield, 2008).

Consequently, a sustainable initiative must have a broad scope and needs to be planned with a strategic focus. It has to be targeted at information systems (IS) as an integrated and cooperating set of people, processes, software and information technologies (IT) to support individual or organizational goals that contribute to t he environmental, economic or social performance (TBL) of the company (Watson, Boudreau and Chen, 2010). Furthermore, sustainability has to be considered throughout the whole lifecycle of a product or service (Huang, 2008; Ijab, Molla, Kassahun and Teoh, 2010). Table 1 summarizes the different scopes of existing definitions by stating the defined terms, included technological aspects

(hardware, software, infrastructure, ICT, technology etc.), considered organizational aspects (business processes, human aspects, culture, stakeholder, society etc.) and lifecycle aspects.

Reference	Defined Term	Technological Aspects	Organizational Aspects	Lifecycle Aspects
(Mingay, 2007) used in (Sarkar and Young, 2009)	Green IT	information and communication technology (ICT)	sustainable supply chain, resources	life cycle
(Elliot, 2007)	Environmentally sustainable ICT	ICT and ICT-enabled products and services	processes	design, production, operation, disposal
(Vykoukal, Wolf and Beck, 2009)	Green IT	IT equipment	processes	manufacturing , purchasing, operation, utilization, disposal
(Molla, 2009)	Green IT	IT technical infrastructure	processes, humans	design, production, sourcing, use, disposal
(Watson, Boudreau and Chen, 2010)	Green IS	software, and information technologies	people, processes, society	
(Brooks, Wang and Sarker, 2010)	Green IS	technology	processes, human aspect, organizational mindset, culture	
(Ijab, Molla, Kassahun and Teoh, 2010)	Green IS	information system	processes	design, development, acquisition, use
(Harmon, Demirkan, Auseklis and Reinoso, 2010)	Sustainable IT	IT technologies	customer, stakeholder, society	

Table 1. Comparison of terms

Table 1 shows that the technology-focused term "Green IT" has been extended with organizational and strategic aspects. Furthermore, the ecology-centric term "green" is being replaced more and more often with the term "sustainability" which, besides the environment, also takes the economic performance and the influences on the society into consideration. Hence, in this paper we use the term sustainability as a multi-faceted paradigm and therefore our model is based on a holistic notion. Accordingly, it is also necessary to take a broad view when referring to outsourcing. We refer to the "IS sourcing" definition of outsourcing as the *"organizational arrangement instituted for obtaining IS services and the management of resources and activities required for producing these services"* (Dibbern, Goles, Hirschheim and Jayatilaka, 2004). Through outsourcing of information infrastructure and/or business processes, organizations become part of global supply networks. Thus, outsourcing is a promising option for organizations that intend to focus on their core competencies to gain competitive advantage through cooperating in a business-to-business (b2b) environment (Lacity and Willcocks, 2001). B2b cooperation and integration is defined as the *"automated, electronic exchange of data and information of different formats between enterprises and their various, heterogeneous information systems, so that no manual intervention is required. This integration may include multiple levels (like data, application, business process, etc.) at the same time"* (Auinger, Nedbal and Wöß, 2009). Outsourcing in the broad definition may therefore encompass different technical and organizational levels including data, business information systems, middleware, services, processes and supply chain management. Consequently outsourcing may affect the business processes of the outsourcing organization as well as possible partners along the supply network. A Sustainable IS initiative through outsourcing can therefore contribute to the dimensions of the triple bottom line (TBL). Outsourcing can contribute to the economic performance, a b2b IS integration can contribute to the environmental and economic performance.

THEORETICAL MODEL

Having defined and characterized the underlying terms, this section introduces the theory-based approach to examine the possibilities of organizations to engage in green and sustainable initiatives via outsourcing. Bose and Luo (Bose and Luo, 2011) have recently developed a theoretical framework that aids organizations in assessing their potential for undertaking Green IT initiatives via modern technological means. Their framework is firmly based on three established IS theories: (i) technology organization environment (TOE) framework, (b) process virtualization theory (PVT), and (c) diffusion of innovation (DoI) theory. This incorporates a holistic view of Green IT and mainly addresses IT virtualization and process virtualization as the technological perspective. As outsourcing may also affect the virtualization of IT (e.g. by electronic transmission of business documents such as quotations, dispatch advices etc.) and processes (e.g. by conducting the whole process of invoicing electronically) we considered this framework as highly relevant for the focus of our model.

The Technology-Organization-Environment (TOE) framework (Tornatzky and Fleischer, 1990) characterizes the influence of organizational adoption and implementation of technological innovations by the *technological context*, the *organizational context*, and the *environmental context*. These three elements are seen as *"both constraints and opportunities for technological innovation"* (Tornatzky and Fleischer, 1990). We follow Bose and Luo (Bose and Luo, 2011) that employ TOE to take the broad context into account in which technological innovation takes place by clustering the framework into the three contexts.

The diffusion of innovation (DoI) theory describes factors that lead to a successful implementation or adoption of technology. Basically the 5 factors: relative advantage, compatibility, trialability, observability, and complexity were identified by Rogers (Rogers, 1995). Applications of the DoI theory to IS research (Cooper and Zmud, 1990; Agarwal and Prasad, 1998; Crum, Premkumar and Ramamurthy, 1996) have shown that in this context *technical compatibility*, *technical complexity*, and *relative advantage* (perceived need) are important factors for the adoption of innovations.

Since process virtualization is not the main focus of this approach, we do not consider the process virtualization theory (PVT) in our theoretical research model. Instead, we include the outsourcing aspect by incorporating the Transaction Cost Theory (TCT). A comprehensive study Dibbern et al. (Dibbern, Goles, Hirschheim and Jayatilaka, 2004) found that TCT is the most used reference theory in outsourcing research. The theory states that a company's success depends on managing transactions efficiently. It will be successful as long as the company's activities can be performed cheaper within the company, than by the market. If that is not the case, these activities are likely to be outsourced. The main factors that influence the transaction costs are *asset specificity*, *uncertainty* and *frequency*.

IS theory	Dependent variables	Independent variables
Technology-Organization-Environment (TOE) Framework	Intention of technological innovation adoption	technological context, organizational context, environmental context
Diffusion of Innovation (DoI)	Adoption of technical innovation	technical compatibility, technical complexity, relative advantage (perceived need)
Transaction Cost Theory (TCT)	Outsourcing success	asset specificity, uncertainty, frequency

Table 2. Theoretical foundation of the research model

Table 2 summarizes the relevant IS theories and their dependent and independent variables that build the theoretical foundation of our research model. In our proposed model, the innovation decision - i.e. an organization initializes a *Sustainable IS Initiative* via outsourcing - is influenced by the aforementioned theories. Figure 1 graphically shows the theoretical model, the propositions derived from the model are explained in the following.
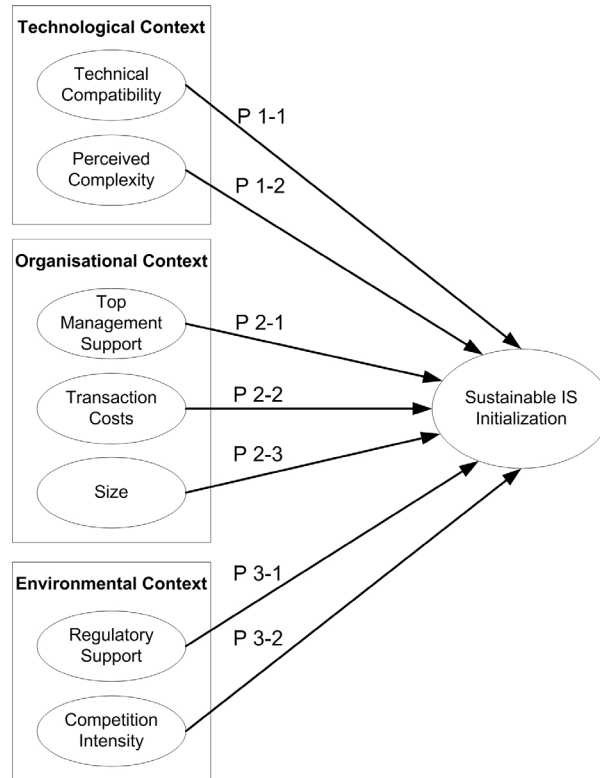
Figure 1. Theory-based research model

Technological Context

According to (Tornatzky and Fleischer, 1990), the technological context includes relevant internal and external technologies. In the context of this paper the technologies include both IT and business infrastructures. Sustainable IS initiatives in the technological context focus on acquiring and using more environmentally friendly and effective technologies. This includes measures like server consolidation and virtualization, or green applications, standards and buildings (Molla, Cooper, Corbitt, Deng, Peszynski, Pittayachawan and Teoh, 2008). Within this context, the first proposition we draw to affect the organizations' decision to initiate sustainable measures by outsourcing is the degree of *technical compatibility.* In accordance with the previous research of (Bradford and Florin, 2003), which is based on the DoI theory, we refer to the technical compatibility of *"an innovation's compatibility with existing systems [...], including hardware and software".* These systems need to support cross-organizational processes. If the specificity of the existing systems is high (cf. TCT in Table 2), the compatibility between them is harder to establish. Therefore, we propose that a higher level of compatibility across the organizations' IT infrastructure to support b2b processes will positively influence Sustainable IS initialization.

Proposition 1-1: A higher degree of technical compatibility will positively influence Sustainable IS initialization through outsourcing.

According to (Bradford and Florin, 2003) and the DoI theory, the second important issue within the technological context is the *perceived complexity.* If a certain innovation is difficult to understand and use, organizations will diffuse it more slowly and with limited resources (Bradford and Florin, 2003). Thus, an easy to use outsourcing solution will positively influence the decision.

Proposition 1-2: Higher degree of perceived complexity will negatively influence Sustainable IS initialization through outsourcing.

Organizational Context

The organizational context of the TOE framework includes characteristics and resources of the organization itself. We incorporate this view by including the organization's managerial structure, financial situation, and size. The first important factor in this context is the commitment of the top management. In general, *top management support* is seen as a critical factor for project success. Lacity et al. (Lacity, Khan and Willcocks, 2009) found, that all of the relationships in empirical literature suggest that top management's commitment and support are critical for the overall outsourcing success. The strategic focus of Sustainable IS also implies that such projects need the support of the top-management, which Bose and Luo (Bose and Luo, 2011) call champion support. Therefore, we propose:

Proposition 2-1: Organizations with greater top management support are more likely to initiate Sustainable IS through outsourcing.

According to (Bose and Luo, 2011) and the Transaction Cost Theory (Williamson, 2007), organizations weigh the internal transaction costs against the external transaction costs before they decide whether or not to keep certain business processes in-house, or to outsource the processes. The main factors influencing costs according to the TCT are the frequency of transactions and the uncertainty caused by opportunism and bounded rationality. Consequently the financial aspect in general is relevant for the initialization of a sustainability initiative as it affects the *transaction costs* and may require additional and uncertain financial investments.

Proposition 2-2: Higher internal than external transaction costs will positively influence Sustainable IS initialization through outsourcing.

The third proposition in the organizational context refers to the organizational *size*, i.e. the number of employees. Bose and Luo (Bose and Luo, 2011) argue that large organizations are more likely to initiate Green Is as they have sufficient technical, managerial, and financial resources. But according to Lacity et al. (Lacity, Khan and Willcocks, 2009) findings concerning the organization size as well as the size of the IT department are mixed. Six out of 11 relationships found in empirical outsourcing literature did not find correlation between size and outsourcing, two found that larger companies are more likely to outsource, and three found that smaller firms are more likely to outsource. The Transaction Cost Theory can be used to describe the fact that outsourcing may save money if the internal costs are higher than the external costs for the same service or product. Additionally, outsourcing can be a chance for SMEs to reduce their carbon footprint by reducing the energy consumption of e.g. their IT infrastructure or their vehicle fleet, without high external costs. Therefore, we propose that the organization's size does not affect the initiation of Sustainable IS in the context of outsourcing.

Proposition 2-3: **Organization's size does not affect the initialization of Sustainable IS through outsourcing.**

Environmental Context

The environmental context (Tornatzky and Fleischer, 1990) is the third important element in the TOE framework. It includes industry characteristics and market structure, the organization's competitors, and the regulatory environment. *Regulatory support* comprises supportive policies, legislation as well as incentives from government or state (e.g. law, funding, and tax relief). The proposition that regulatory support is positively correlated with the initiation of Green IS projects was also argued by Bose and Luo (Bose and Luo, 2011), as it has been recognized as a crucial component affecting innovation diffusion.

Proposition 3-1: Organizations with greater regulatory support are more likely to initiate Sustainable IS initiatives.

Another important factor that needs attention according to the TOE framework and the DoI theory is *competition intensity*. According to the DoI theory, competition drives organizations to adopt innovations to stay on the competitive edge. According to (Bose and Luo, 2011) we propose that the degree that the organization is affected by competitors in the market and the pressure the organization feels from competitors positively affects the initiation of Sustainable IS initiatives.

Proposition 3-2: Organizations facing higher competition intensity are more likely to initiate Sustainable IS initiatives.

CASE STUDY PBS

To show how the propositions made in the previous section can be applied to practice we present the following case study. The facts were collected by document analysis and semi-structured interviews with experts based on the method "PROMET Business Engineering Case Studies" (Senger and Österle, 2004), a well established method of IS research (Wilde and Hess, 2007).

The case study centers on a small enterprise with 15 employees doing business in the area of office supplies, who outsourced mayor key processes to an intermediary (in the following "PBS"), specialized in b2b integration in this business area. The SME deeply reflected its position on the market as a full-range supplier of office equipment, divided into the business areas of office furniture (ranging from planning of the workplace to installation of furniture including accessories) and office supplies. Due to the highly competitive and stagnating market concerning office supplies, this business area could not be operated cost-effectively any longer. In an initial step the SME identified the following goals in order to antagonize a sales collapse in the office supplies sector: (i) shortening delivery times to within 24 hours; (ii) reducing fixed costs through savings in its own stock and the associated resources by at least 50%; (iii) reducing returns of goods by at least 50% by improving the process quality in deliveries; (iv) improving the marketing activities by a mix of offline and online activities; (v) conducting intense personal sales activities in conjunction with the aforementioned quality improvement measures. Based on the decision by the top management not to close down the business area, as this could harm the SME's image and cause an unpredictable loss of customers of business furniture as well, the SME balanced the remaining alternatives. In addition to the profound strategic decisions, an As-Is Analysis of the current process showed great improvement potentials in terms of cost, time and quality by integrating an intermediary specialization in office supplies on the market.

For economic and process oriented reasons, the b2b integration with PBS foresees an elimination of duplications in the supply network (e.g. in terms of logistics, stock, marketing, etc.) by outsourcing key processes and IT infrastructure and focusing on core competencies. The basis for outsourcing is the IT integration. Therefore, the ERP system, a custom software for the office equipment sector developed by PBS, is available as in-house solution or as application service provider (ASP) solution hosted at PBS. The SME chose an in-house solution that uses WebEDI to communicate with the central system at PBS and requires a dedicated server PC together with a broadband internet connection. Together with the technical integration the SME received a personal web shop. Further marketing activities include newsletter activities, annual catalogs, monthly mailings and invoice inlays, being created and dispatched by PBS. As a result of massive cost savings, the SME decided to close down its own stock in favor of directly dispatching goods from the central stock at PBS.

The overall process and IT outsourcing project resulted in an integrated electronic process from order to delivery. The consumer places an order via a web shop or classic channels (phone, email, or fax). An online order is automatically transferred to the central ERP system at PBS and the SME is informed by email. Orders via classic channels have to be entered manually. After the SME releases the order, it automatically generates a job in the central IT system of PBS. The "Trader" is used for centralized management of master data, purchasing and product range selection. The second core component at PBS handles all the logistics and the picking of the dealership network. Its main tasks include the creation of the electronic freight list for the carriers, the acceptance of electronic billings from vendors and carriers as well as "track & trace" package tracking. To optimize the shipment of the ordered goods, a total of 10 employees of various distributors are employed at PBS. Additionally, orders from only one manufacturer can be delivered directly from the manufacturer to the final consumer, saving additional money in shipment and logistics. The b2b integration of all the partners of the supply network enables 24 hour delivery of more than 15,000 office products in the standard selection. The solution provided by PBS also significantly increased quality by the use of a standardized numbering system for items, vendors and customers (along with plausibility checks at processes such as picking, using common e-business standards and eliminating incorrect manual inputs by integrated electronic processes.

FINDINGS FROM THE CASE STUDY

The case study corresponds to the propositions (P) of the research model. The *technical compatibility* (P 1-1) to support cross-organizational processes was given by using a custom software ERP system. It was developed by the outsourcing partner PBS and provided as in-house solution for the SME. The system had a low *perceived complexity* (P 1-2) for the SME, as it was very easy to adopt and use. Concerning the organizational context, the *top management* (P 2-1) decided on the outsourcing project and supported the project. The *transaction costs* (P 2-2) also played an important role. The goal to cut costs was achieved due to the lower implementation, service and support costs of the outsourcing solution. In the case study, it was a small enterprise (P 2-3) without an IT department that adopted the outsourcing solution. From the environmental context it can be stated that the SME did not receive any *regulatory support* (P 3-1), but the SME was facing intense market

pressure that needed action. Due to the *highly competitive* and stagnating business area, the SME adopted the outsourcing solution to remain competitive (P 3-2).

The case also describes the direct and indirect contribution to sustainability and competitiveness by the following means. Firstly, we saw that the SME outsourced parts of their IT infrastructure by using an in-house hosted standardized product of the supplier. Using the central ASP solution would have further contributed to Green IT in the narrow definition by eliminating considerable parts of the in-house IT. ASP solutions on a central platform are seen as energy saving technology and greatly in line with the objectives of Green IT (Sarkar and Young, 2009), as virtualization technologies, such as ASP, and centralization reduce the physical server count and improves the efficiency. IT outsourcing therefore contributes to Green IT. Secondly, the optimized purchasing process contributes to the environment by direct deliveries from the manufacturer to the end customer. Thirdly, the SME significantly reduced the return rate of warranted and/or defective products due to quality improvements in the process. However, returns can never be completely avoided. Therefore, the first step in greening the lifecycle of a product can be seen in quality improvements of the process by the aforementioned means. The second step would be to apply sustainable measures to the reverse logistics structure, including and involving materials suppliers, service contractors, vendors, distributors and end users working together to reduce or eliminate adverse environmental impacts of their activities (Rao and Holt, 2005). Efficient and sustainable reverse logistics will therefore lead to a significant return on investment as well as significantly increased competitiveness in the market (Efendigil, Önüt and Kongar, 2008).

CONCLUSIONS

The case study showed that through error reduction, logistics improvements and IT optimization a mature b2b integration solution can contribute to the triple bottom line perspective of sustainability (environmental, economic and social performance) by reducing costs, therefore improving competitiveness and providing significant environmental benefits. By outsourcing IT infrastructure and processes the SME improved its own carbon footprint. Using an ASP solution, the result could have been even better due to the more efficient hosting of the data in a data center. This is seen as the first step in a sustainable strategy that needs to be viewed from a holistic point of view, including all actors along the supply network. According to previous research (e.g. Rao and Holt, 2005) and conclusions we can draw from the case, this also has the same potential to lead to competitiveness and economic performance.

Descriptive studies, like the presented case study, often serve as a source for subsequent research. From the practical view of the SME, outsourcing improved its economic and environmental performance. However, much more is needed to build a sustainable supply network. In the near future, the pressure will be on the intermediaries - coming from their customers, the SMEs - to introduce and maintain Sustainable IS initiatives. They need to react now to this emerging topic to remain competitive and on the leading edge.

Despite its practical insights, this paper adds theoretical knowledge for the community. By investigating the topic of green and sustainable possibilities for SMEs through outsourcing to stay competitive, this paper contributes to the ongoing debate. The proposed theoretical model is grounded on the work of Bose and Luo (Bose and Luo, 2011) and extends it with aspects from outsourcing literature. With the resulting theoretical model, we provide a ready to use framework to assess the initiation of Sustainable IS initiatives through outsourcing. The case study showed single evidence that the propositions are supported.

ACKNOWLEDGMENTS

REFERENCES

1. Agarwal, R. and Prasad, J. (1998) A conceptual and operational definition of personal innovativeness in the domain of information technology, *Information Systems Research*, 9, 2, 204–215.

2. Auinger, A., Nedbal, D. and Wöß, W. (2009) A Holistic Approach for B2B Integration at Different Conceptual Levels,. *Proceedings of the 2009 International Conference on e-Learning, e-Business Enterprise Information Systems, and e-Government (EEE'09)*, 179–185.

3. Beynon-Davies, P. (2009) The 'language' of informatics: The nature of information systems,. *International Journal of Information Management*, 29, 2, 92–103.

4. Bose, R. and Luo, X. (2011) Integrative framework for assessing firms' potential to undertake Green IT initiatives via virtualization - A theoretical perspective, *The Journal of Strategic Information Systems*, In Press, Corrected Proof, 1–17.

5. Bradford, M. and Florin, J. (2003) Examining the role of innovation diffusion factors on the implementation success of enterprise resource planning systems, *International Journal of Accounting Information Systems*, 4, 3, 205–225.

6. Brooks, S., Wang, X. and Sarker, S. (2010) Unpacking Green IT: A Review of the Existing Literature, *AMCIS 2010 Proceedings*, 1–10.

7. Brundtland, G. H. (1991) Our common future, Univ. Press, Oxford.

8. Cooper, R. B. and Zmud, R. W. (1990) Information technology implementation research: A technological diffusion approach, *Management Science*, 36, 2, 123–139.

9. Crum, M. R., Premkumar, G. and Ramamurthy, K. (1996) An assessment of motor carrier adoption, use, and satisfaction with EDI,. *Transportation Journal*, 35, 4, 44–57.

10. Darnall, N., Jolley, G. J. and Handfield, R. (2008) Environmental Management Systems and Green Supply Chain Management: Complements for Sustainability?, *Business Strategy and the Environment*, 17, 1, 30–45.

11. Dibbern, J., Goles, T., Hirschheim, R. and Jayatilaka, B. (2004) Information systems outsourcing: a survey and analysis of the literature, *SIGMIS Database*, 35, 6-102.

12. Efendigil, T., Önüt, S. and Kongar, E. (2008) A holistic approach for selecting a third-party reverse logistics provider in the presence of vagueness, *Computers & Industrial Engineering*, 54, 2, 269–287.

13. Elkington, J. (1994) Towards a sustainable corporation: Win-win-win business strategies for sustainable development, *California Management Review*, 36, 2, 90–100.

14. Elkington, J. (2004) Enter the Triple Bottom Line, in A. Henriques and J. Richardson (Eds.) *The triple bottom line, does it all add up?*, , London: Earthscan, 1–16.

15. Elliot, S. (2007) Environmentally Sustainable ICT: A Critical Topic for IS Research?, *PACIS 2007 Proceedings*, 100–112.

16. Elliot, S. and Binney, D. (2008) Environmentally Sustainable ICT: Developing Corporate Capabilities and an Industry-relevant IS Research Agenda, *PACIS 2008 Proceedings*.

17. Harmon, R., Demirkan, H., Auseklis, N. and Reinoso, M. (2010) From Green Computing to Sustainable IT: Developing a Sustainable Service Orientation, *Hawaii International Conference on System Sciences*, 1–10.

18. Huang, A. (2008) A Sustainable Systems Development Lifecycle, *PACIS 2008 Proceedings*.

19. Ijab, M. T., Molla, A., Kassahun, A. E. and Teoh, S. Y. (2010) Seeking the Green in Green IS: A Spirit, Practice and Impact Perspective, *PACIS 2010 Proceedings*, 433–443.

20. Lacity, M. C., Khan, S. A. and Willcocks, L. P. (2009) A review of the IT outsourcing literature: Insights for practice,. *The Journal of Strategic Information Systems*, 18, 3, 130–146.

21. Lacity, M. C. and Willcocks, L. P. (2001) Global information technology outsourcing: In search of business advantage, Wiley, Chichester.

22. Mingay, S. (2007. *Green IT: The New Industry Shock Wave*.

23. Molla, A. (2009) Organizational Motivations for Green IT: Exploring Green IT Matrix and Motivation Models, *PACIS 2009 Proceedings*, 1–13.

24. Molla, A., Cooper, V., Corbitt, B., Deng, H., Peszynski, K., Pittayachawan, S. and Teoh, S. Y. (2008) E-Readiness to G-Readiness: Developing a Green Information Technology Readiness Framework, *19th Australasian Conference on Information Systems*, 669–678.

25. Molla, A., Pittayachawan, S., Corbitt, B. and Deng, H. (2009) An International Comparison of Green IT Diffusion,. *International Journal of e-Business Management*, 3, 3, 1–23.

26. O'Brien, J. A. (2003) Introduction to information systems: Essentials for the E-business enterprise, McGraw-Hill/Irwin, Boston, Mass.

27. Pollack, T. A. (2008) Green and Sustainable Information Technology: A Foundation for Students, *Proceedings of the ASCUE Summer Conference*, 63–72.

28. Porter, M. E. and Kramer, M. R. (2006) Strategy and society: the link between competitive advantage and corporate social responsibility, *Harvard Business Review*, 84, 12, 76–92.

29. Rao, P. and Holt, D. (2005) Do green supply chains lead to competitiveness and economic performance?, *International Journal of Operations & Production Management*, 25, 9, 898–916.

30. Rogers, E. M. (1995) Diffusion of innovations, Free Press, New York, NY u. a.

31. Samson, T. (2007). *Green tech vs. sustainable tech*. http://www.infoworld.com/d/green-it/green-tech-vs-sustainable-tech-691. Accessed 2 February 2011.

32. Sarkar, P. and Young, L. (2009) Managerial Attitudes Towards Green IT: An Explorative Study of Policy Drivers,. *PACIS 2009 Proceedings*.

33. Schlieter, H., Juhrisch, M. and Niggemann, S. (2010) The Challenge of Energy Management – Status-Quo and Perspectives for Reference Models, *PACIS 2010 Proceedings*.

34. Senger, E. and Österle, H. (2004) PROMET Business Engineering Case Studies (BECS) Version 2.0,. *Bericht BE HSG / BECS / 1*.

35. Testa, F. and Iraldo, F. (2010) Shadows and lights of GSCM (Green Supply Chain Management): determinants and effects of these practices based on a multi-national study, *Management Research Review*, 18, 10-11, 953–962.

36. Tornatzky, L. G. and Fleischer, M. (1990) The Processes of Technological Innovation, Lexington Books, Massachusetts, USA.

37. Vykoukal, J., Wolf, M. and Beck, R. (2009) Does Green IT Matter? Analysis of the Relationship between Green IT and Grid Technology from a Resource-Based View Perspective, *PACIS 2009 Proceedings*.

38. Wati, Y. and Chulmo, K. (2010) The Green IT Practices of Nokia, Samsung, Sony, and Sony Ericsson: Content Analysis Approach, *Hawaii International Conference on System Sciences*, 1–10.

39. Watson, R. T., Boudreau, M.-C. and Chen, A. J. (2010) Information Systems and Environmentally Sustainable Development: Energy Informatics and New Directions for the IS Community, *MIS Quarterly*, 34, 1, 23–38.

40. Wilde, T. and Hess, T. (2007) Forschungsmethoden der Wirtschaftsinformatik, *Wirtschaftsinformatik*, 49, 4, 280–287.

41. Williamson, O. E. (2007) Transaction Cost Economics: An Introduction, *Economics: The Open-Access, Open Assessment E-Journal*, 1, 2007-3.