# IS for Sustainability Reporting: A Multi-Stage Implementing Analysis

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**ABSTRACT**

Having decided to incorporate sustainability into their operations and report the results to their stakeholders in corporate social responsibility (CSR) reports, organizations must necessarily use information systems (IS) to compile, analyze and publish data related to their initiatives. In this study, we use a multi-stage IS implementation theory to examine four cases to understand how sustainability reporting systems may successfully be incorporated into organizations. Our study reveals key stakeholders, factors and outcomes critical at each implementation stage, including those specific to sustainability projects. For example, our findings show that among the key factors were stakeholder pressures demanding sustainability inclusion, at the initiation stage, and a refined IT governance framework that includes sustainability goals, at the adoption stage. Key outcomes include (new) sustainability metrics at the end of the adoption stage, and sustainable process and/or product innovations at the end of routinization stage. Successful implementation appears to hinge on the inclusion of the key stakeholders' inputs, factors and outcomes we observed at each stage of the process. Our study adds to the sparse body of empirical research at the intersection of IS and sustainability and provides guidance for implementors. We also provide guidance for organizations considering environmental sustainability initiatives, particularly those hindered by challenges related to formalizing their reporting process and implementing IS to support the process. Finally, we hope to guide policy makers, regulatory bodies and monitoring agencies who recommend and promote guidelines and reporting frameworks for implementing organizations.

Keywords: corporate social responsibility, sustainability, reporting, green IS, implementation, case study

## INTRODUCTION

Many organizations, aware of their contributions to global warming and other environmental threats, have sought to transform their operations (Dyllick & Hockerts, 2002) to become more sustainable. To do so, they develop initiatives that address these important issues (Høgevold, 2011) and then publish reports that disclose the outcomes of the initiatives (Fowler & Hope, 2007) to demonstrate their commitment to their stakeholders. For example, IBM reported that the company's sustainability efforts resulted in conservation of 9.8 million MWh of energy, saving $661 million and avoiding 4.6 million metric tons of CO2 emissions from 1990 through to 2020 (IBM, 2020).

Despite the stakeholder benefits, providing disclosures imposes a burden on organizations. These disclosures require that organizations engage in costly initiatives and capture copious and high-quality related data. These data must then be analyzed and made available to various stakeholders, often in varied formats.

For those organizations that do engage in such initiatives, information systems (IS) play a major role in reducing the burden of providing the disclosures. For example, one aspect of the disclosure challenge is data capture and analysis. Enterprise systems, e.g. ERP systems, are known to be successful with respect to gathering data across multiple processes (Simmonds et al., 2018). Additionally, process-specific IS such as logistics and facility management systems have been effective at supplementing ERP system data (Brown et al., 2005; Dillard et al., 2005; Høgevold, 2011; Simmonds & Bhattacherjee, 2015). Another challenging aspect of the disclosure process is communicating to stakeholders. For this, the Internet has served as an effective medium for publishing sustainability reports (ExxonMobil, 2023).

Although reporting is challenging and costly, there are clear benefits for reporting organizations. For example, stakeholder satisfaction with disclosures may result in increased legitimacy, competitiveness, and market share for reporting organizations (Bansal & Roth, 2000). Disclosures are also used by monitoring agencies such as Dow Jones and Morgan Stanley Capital International (MSCI) for provide sustainability scores which are used by global investors in defining investment portfolios for organizations (ESGNavigator) accessed Feb 24, 2024. And disclosures are also used to qualify organizations for inclusion in prestigious sustainability indices such as the Dow Jones Sustainability Index (Robinson et al., 2011).

In this study, we focus on IS used for capturing and analyzing sustainability data and developing corporate sustainability reports. We examine the implementation process of these systems with a goal to identify the key stakeholders, factors and outcomes involved as the systems are being deployed. Our search of the literature revealed that investigations of IS used for sustainability have focused on two types of systems. The first deliver IT services more sustainably – for example, virtualized servers (Ko et al., 2011; Seidel et al., 2013). The second monitor other (non-IT) processes to and control their environmental impact (Chen et al., 2020; Simmonds & Bhattacherjee, 2013). Among these studies, the focus has been on two stages -- either on factors at the adoption stage, or on outcomes at the end of the process (Kuo & Dick, 2010; Loeser et al., 2017; Molla, 2013). We found no studies that focus specifically on sustainability reporting systems or on multiple implementation stages.

We draw on Zmud and Apple's (1989) implementation stage theory to delineate the IS implementation process as we examine four cases of IS implemented to provide sustainability reports. We also draw on the Technology, Organization, Environment (TOE) framework (Tornatzky et al., 1990). Both are used to guide us as we seek to answer the following questions:

1. Who are the key stakeholders influencing the implementation process at each stage?

2. What critical factors are influential at each phase during the process?
3. What outcomes are observed during the process at each phase?
4. What are the indicators of success at the end of the implementation process?

This research contributes to the sparse body of empirical research at the intersection of IS and sustainability. We provide guidance for implementors of IS for sustainability reporting as well as for those considering implementing environmental sustainability initiatives. We hope the study will encourage more organizations to implement sustainability initiatives as well as help to formalize the IS reporting processes. Finally, we hope that our study will aid policy makers, regulatory bodies and monitoring agencies that recommend and promote guidelines and reporting frameworks.

In the next four sections we describe the theories that influenced our research model and present the model, then present our research methods, our findings, and a discussion of the results and the study.

## THEORETICAL BACKGROUND

### Sustainability and IS

While an increasing number of organizations recognize sustainability as a corporate essential (Demastus & Landrum, 2024; Lubin & Esty, 2010), many continue to limit their focus on profitability. As a result, there continues to be depletion of natural resources by consuming more materials and energy than they produce and output of more waste than can be absorbed by the natural environment (Alareeni & Hamdan, 2020; Dyllick & Hockerts, 2002; Kabeyi & Olanrewaju, 2022). Apart from higher operational costs due to, for example, fines and penalties, organizations face other consequences imposed by concerned stakeholders. They may, for example, lose market share as customers demand products with reduced environmental impact. They may also miss opportunities to earn sustainability awards and be included in sustainability indices such as the MSCI index and Dow Jones Sustainability Index. Overall, their legitimacy in the marketplace and opportunities for positive engagements with varied and often powerful stakeholders are reduced (Bansal & Roth, 2000; Lee, 2019; Michelon et al., 2019).

Stakeholder theory (Freeman, 2004) proposes a rationale for organizations extending their responsibility to a wider group beyond owners and shareholders. Stakeholders, increasingly more aware of organizations' impact on sustainability, are willing to use their power to influence organizations' performances (Ofori & Hinson, 2007). Therefore, despite the challenges of reporting, organizations responded to these pressures.

Many of the reporting challenges can only be met by establishing "technology-enabled data, information, and knowledge repositories that are readily accessible by all stakeholders" (Steve Elliot, 2011). Therefore, IS has an important role in sustainability reporting. Melville (2010) proposes that IS may be used to enable and drive actions and inform beliefs and can also play a role in the assessment of sustainability outcomes, and Elliot (2011) described the primary roles of IS as facilitating environmental sensitivity, evaluating environmental impacts and mediating communications among stakeholders. More recently, intelligent IS have been shown to effectively monitor sustainability initiatives and capture associated data. For example, Kuusela (2020) reported the use of drones to capture data that help to sustain the natural environment in processes such as forest planning, forest production, forest ownership and environmental governance. And building automation systems (BAS) and logistics monitoring systems have also been shown to effective at capturing sustainability data related to those processes (Simmonds & Bhattacherjee, 2013; R. T. Watson et al., 2010). Finally, Simmonds et al. (2018) recommend the use of ERP systems

as a more comprehensive data management tool to organize, analyze and present enterprise-wide data for reporting. Therefore, it is useful to focus on the needs of IS implementations for organizations seeking to engage in sustainability reporting.

Despite early calls for research on IS in engaging sustainability stakeholders (S. Elliot, 2011; R. T. Watson et al., 2010), research on this important IS role continues to be sparse with most studies focusing on the IS role in "greening" (Hadi et al., 2015; Ko et al., 2011; Xu et al., 2020). In response, we aim to contribute with this study by examining IS implemented for sustainability reporting in an effort to guide implementing organizations to success.

**IS Implementation Stages**

IS implementation is defined as an organizational effort directed toward diffusing appropriate information technology systems within a user community (Cooper & Zmud, 1990). IS implementation is known to be a process that starts with a business need followed by investments in, and deployment of technologies and people that will be engaged in the system use. Because implementations are among the most significant capital expenditure components (Asgarkhani, 2022), organizations need proper guidance to so they can deploy the systems effectively in order to realize returns on their investments.

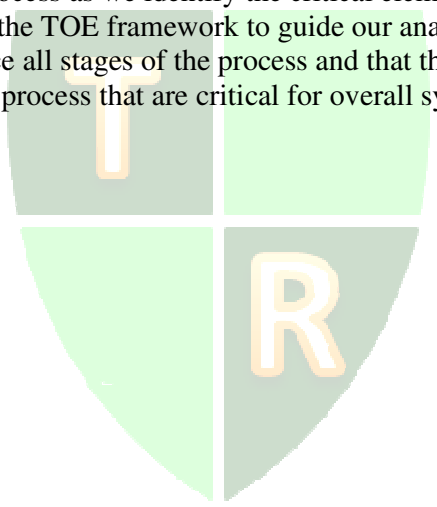
A number of researchers have identified the process nature of IS implementations and used various theories to guide their examinations of the process. Among these are the following theories. Lewin's (1947) change model that proposes three stages: unfreezing; change; and refreezing. Kwon and Zmud's (1987) theory built on Lewin's model to propose an IS-specific multi-stage implementation model. Zmud and Apple (1989) furthered the work with a model that proposes multiple implementation stages. Thus far, this remains the most comprehensive stage model developed for, and used to guide, IS implementations.
The Kwon and Zmud model (1987) proposes that implementation proceeds in six stages as follows. (1) *Initiation* involves active and/or passive scanning of organizational problems/opportunities and systems. Pressure to change evolves from pushes (organizational needs and/or pulls (technological innovations). At this stage, a system is aligned with the organization need(s). (2) *Adoption* involves rational and political negotiations to get internal support for deploying the system. At this stage, a decision is made to invest resources necessary implement. (3) *Adaptation* involves development, installation, and maintenance of the system and development and revision of related organizational procedures. employees are trained in both in the new procedures and the system -- the system is available for use. (4) *Acceptance* involves convincing organizational members to commit to using the system. At this stage, the system is employed in organizational work. (5) *Routinization* involves encouraging usage of the system as a normal (routine) activity. At this stage, the organization's governance systems are adjusted to account for the new system; the new system is now perceived as part of the organization. (6) *Infusion*, the final stage, involves obtaining increased organizational effectiveness by using the system in a more comprehensive and integrated manner to support higher level aspects of organizational work. At this stage, the system is exploited to its fullest.

Despite the existence of stage models, traditional, as well as, sustainable IS research have remined focused on adoption and diffusion (Kuo & Dick, 2010; Molla, 2013), thereby neglecting to elaborate on the other important stages of the implementation process. Fortunately, a few studies have examined IS multistage models to explore implementations (Bhattacherjee, 2001; Cooper & Zmud, 1990; Gwizdak, 2021; Yin et al., 2023) and therefore provided some insight into the process. However, none of these falls within the domain of sustainability and IS.

**IS Implementation Factors**

In proposing their multi-stage model, Kwon and Zmud (1987) identified five major sets of factors that would impact the implementation stages. These include the following, as well as interactions among them: (a) user-based factors including job tenure, education, resistance to change; (b) users' task-based factors including task uncertainty, autonomy and responsibility of person performing the task, and task variety; (c) organization-based factors including specialization, centralization, formalization; (d) technology-based factors, specifically, the complexity of the implemented system; and (e) environmental-based factors including uncertainty and interorganizational dependence. The Technology-Organization-Environment (TOE) framework (Tornatzky et al., 1990) organizes these factors in a framework that posits that the process by which a firm adopts and implements technological innovations is influenced by a combination of factors that may be categorized as either technological, organizational or external.

In this study, we expand the traditional view of "external" factors to consider those related to the natural environment -- a key stakeholder and expected influence of the process of implementing sustainable IS. We expect that the TOE framework will guide examination of the various stages of the process as we identify the critical elements of each. Therefore, we use both the stage model and the TOE framework to guide our analysis of the data. We posit that TOE factors will influence all stages of the process and that there will be observable key outcomes at each stage of the process that are critical for overall system success.



## RESEARCH METHODS

### Data Sources

We use four cases of successfully implemented sustainability reporting IS. Of the four organizations, three – Fujitsu Ltd, Intel Corporation and Digicel Group -- are technology providers, and the fourth, United Parcel Service, Inc (UPS), is a global shipping and logistics company that uses technology extensively in its business processes. The following describes each data site as well as their sustainability IS and reporting in some detail.

**Digicel Group** is a global telecommunication company with its headquarters located on the waterfront in Kingston, Jamaica. Digicel data were obtained from interviews with members of the IT and facilities management teams as well as the company's "Go Green" Team. Both are key stakeholders in the systems that captured sustainability data as and the reports. Digicel represents our only source of primary data.

Digicel's stated goal from the start of their operations in Jamaica in 2001 was to be the sustainability leader in the island. Their *Go Green* Team designed and were involved in tracking the company's various sustainability initiatives since inception. The team was also instrumental in the implementation of other IS and technologies for reducing the negative impact of the company's operations at their global headquarters. Despite engagements in various initiatives (Guardian, December 2013), the company first published their "Environmental, Social and Governance" (ESG) report in 2023 (DigicelGroup, 2023).

**UPS** is a global shipping and logistics company that has implemented IS widely across their services to achieve sustainability transformation of their services. Some of these systems have been used for routing/scheduling systems, artificial intelligence and in expert systems (Labiyi, 2018; Rubin & Carmichael, 2008; Richard T. Watson et al., 2010). UPS data was were taken from the reports of two case studies that offered a fair amount of insight into the implementation process for their reporting system (Rubin & Carmichael, 2017; Richard T. Watson et al., 2010).

UPS published their first sustainability report in 2003 and was therefore publishing sustainability reports at the time we obtained the data on the company. UPS's sustainability reporting was very sophisticated, based as it was on the more stringent Global Reporting Indices (GRIs) as opposed to mere compliance with U.S. regulations, as was the case at the time with other companies. Today the company continues to publish and recently released it twenty first sustainability report (UPS, 2022).

**Fujitsu Limited** is a Japanese technology company that specializes in consumer and industrial electronics products including servers, PCs, laptops, media centers, tablets, storage hardware, displays, air conditioning and heat pump units. The company published their first sustainability report -- "Environmental Report" -- in 1996 and was therefore creating these reports at the time we obtained the data on the company. According to the company, their aim was "increasing the responsibilities and transparency of companies to society. Since 2003, they have reported on three elements: the natural environment; economy; and society. Their reports are aimed at publishing the company's "thoughts, efforts, and results in social and environmental fields."

The company continues to improve on its reporting and today publishes their sustainability report, the "Sustainability Data Book" (FujitsuGroup, 2023).

**Intel** Corporation is best known for developing the microprocessors found in most of the world's personal computers. The multinational technology company is also the world's largest manufacturer by revenue of semiconductor chips, a product used in most of the world's electronic devices. Intel released their first sustainability report -- "Environmental, Health, and Safety Report" in 1994. Since then, they have increased their engagement in

sustainability activities, recently reporting increase of their reuse and recovery of their manufacturing waste by 275%. Intel continues to improve their reporting over the years and today publishes its "Corporate Responsibility Report" (Intel, 2023).
Details of the Fujitsu and Intel cases were obtained from a publication of green IT cases by the Australia-based consulting company Australian Information Industry Association (AIIA, 2009). Overall, the sources provided copious data for analysis of the implementation details.

## Analysis

For analysis of our data, we opted to use *analytic induction* – a grounded theoretic method. As per Bansal & Roth (2000), page 719, analytic induction "explicitly accommodated relevant existing theories as opposed to proceeding according to the traditional grounded theory method. Therefore, analysis does not start with a "blank slate" for which there are no theoretical preconceptions and construction (Glaser & Strauss, 1967). We deemed analytic induction to be more appropriate given prior knowledge of implementations to guide our analysis of the qualitative data. We also expected that the prior theoretical understanding of the implementation process would direct us to more easily and accurately identify the factors in our data as well as to delineate the process in each case.

We used NVivo 11 to maintain our data sets and to conduct open, axial and selective coding. We established nodes for coding concepts related to each of the six implementation stages and then sub-nodes within each for factors, stakeholders and outcomes. We delineated the data regarding the implementation processes into the six stages and identified our constructs with each. For example, a comment in one case, we coded "*becoming more aware of environmental issues,*" as "*environmental awareness.*" Each concept identified was categorized within the TOE framework.

## FINDINGS

We present these results of the study in tables. In Table 1, we present key stakeholders.

| Stage | Stakeholders |
|---|---|
| **Initiation** | The natural environment, regulators, customers, managers, and line-employees |
| **Adoption** | Managers and line employees. |
| **Adaptation** | Training consultants, managers and line employees |
| **Acceptance** | Managers and line employees |
| **Routinization** | Community members, shareholders, managers, line-employees, customers and industry partners |
| **Incorporation** | Managers, line employees, industry partners, shareholders, and community members |

*Table 1: Key Outcomes - by Implementation Stage*

Table 2 presents implementation factors and in Table 3, the interim outcomes. We end with success indicators. In the appendices, we further provide examples of codes extracted from the data.

| Stage | Factor | Definition | TOE Category |
|---|---|---|---|
| **Initiation** | Stakeholders' pressures | Recognition of a need to invest in a system that engages stakeholder and communicates the environmental impact of operations. | Environmental |
| | Environmental footprint | Recognition of a need to invest in a system that would change the impact on the natural environment. | Organizational |
| **Adoption** | Existing IT infrastructure | Investment in a system that is compatible with, and enhances, the existing IT infrastructure. | Technological |
| | Aligned business, technology, and sustainability strategies | Investment in a system that aligns with (fits) the new sustainability, and existing or refined business, strategies. | Organizational |
| | Relative advantage | Investment in a system that tracks data related to the economic and ecological efficiency of the company operations. | Technological |
| **Adaptation** | IT Sophistication | Investment in human resource and technological capabilities for meeting the system use/needs. | Technological |
| | Management influence | Management support for sustainability goals and employee use of the system. | Organizational |
| **Acceptance** | Management commitment | Use of the IS at the management-level. | Organizational |
| | Line-employee commitment | Use of IS at the line-employee-level. | Organizational |
| **Routinization** | External stakeholders' engagement/ feedback | Engagement with, and information from external stakeholders to improve system use. | Environmental |
| **Infusion** | Firm visibility | System use was instrumental in establishing industry corporate sustainability leadership for the companies | Environmental |

*Table 2: Results: Implementation Factors – by Stage*

| Stage | Outcome | Definition |
|---|---|---|
| **Initiation** | Sustainability awareness | Awareness of implications of excluding sustainability. Recognition of IS role/impact. |
| **Adoption** | New KPIs | Sustainability strategy; revised IT and business strategy and alignment of all three. Investment in new capabilities and technologies. Development of new metrics. |
| **Adaptation** | Pilot corporate sustainability report | Pilot report developed from system data that capture and measure goals of the sustainability strategy. |
| **Acceptance** | Commitment | Increased support for the strategic goals for the IS displayed by dedicated system use for operational tasks. |
| **Routinization** | Refined KPIs | Revised metrics and strategies based on comprehensive IS use. |
| | Economic and ecological innovations | Opportunities for efficiencies through innovation informed by stakeholder feedback. |

*Table 3: Key Outcomes - by Implementation Stage*

## CONCLUSION

Sustainability reporting is challenging for organizations because, in addition to the challenges implicit in measuring the impact of sustainability initiatives, there are also the challenges implicit in deploying IS as evidenced by their known high rates of failure (Dennis, 2015; Doherty et al., 2012; Hughes et al., 2020; Hughes et al., 2017). Nevertheless, organizations must engage in this reporting because of its importance to stakeholders (Zhang et al., 2015).

Our study examines realistic, industry-based and evolving environments that captures the complex phenomena of IS implementation especially within the fairly new avenue of sustainability reporting. In doing so, we contribute to this important area of research and practice by elaborating on the process throughout its multiple stages, highlighting stakeholders, factors and milestones important for the implementation success of the reporting IS.

Guided by existing IS theories, our analysis results in a model -- Figure1 -- that tells a story of how successful implementations of IS for reporting sustainability initiatives are achieved.

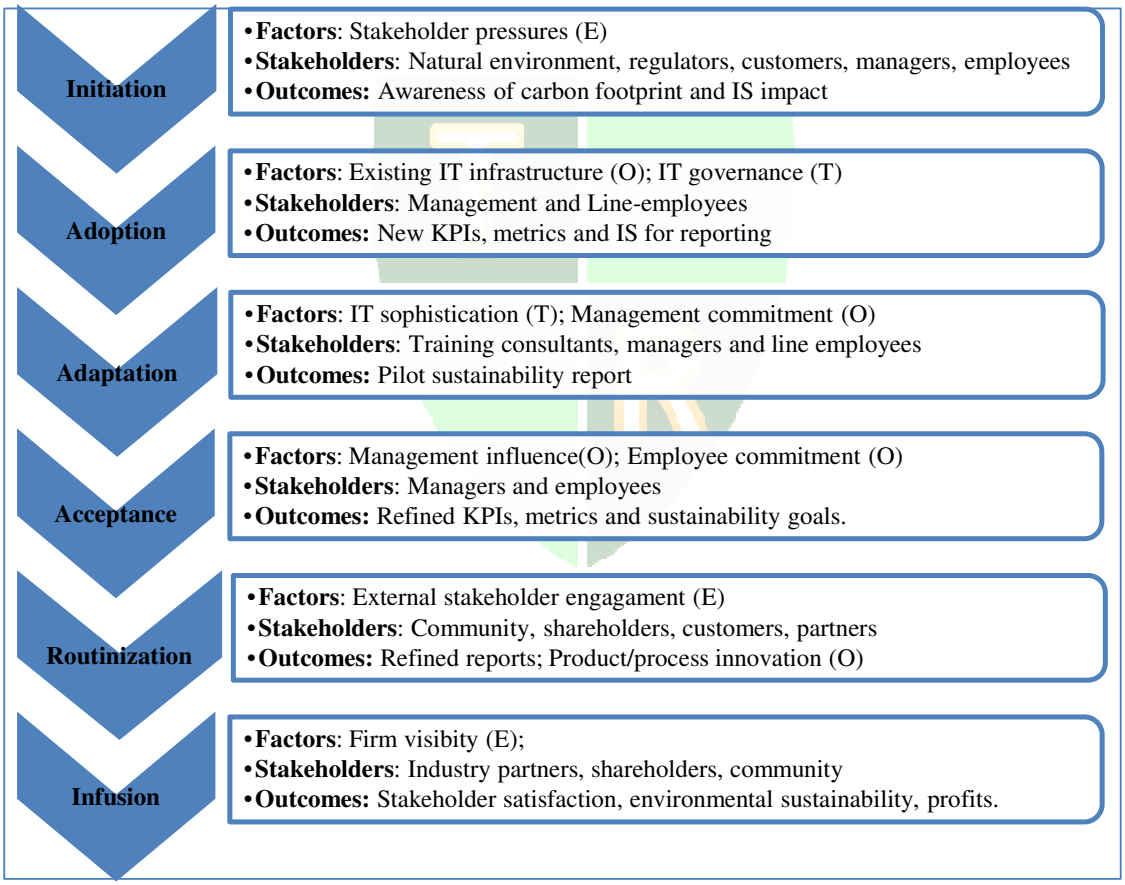



*Figure 1: Synthesized Model of IS Implementation for Sustainability Reporting*

At each stage, stakeholders, factors and outcomes were identified. The factors could be interpreted as the key inputs to each stage that motivated the of activities necessary for completing, and realizing the critical outcomes of, the stage. The stakeholders represent the key participants that either ensured availability of those inputs, or influenced actions that completed the process stages. The outcomes may be seen as the observable milestones achieved throughout the process that mark the completion of one stage and readiness for the next.

At the initiation stage, the advocacy of stakeholders for the sustainability of the natural environment aligns with the early management literature on sustainability (Bansal & Roth, 2000; Dyllick & Hockerts, 2002; Starik & Rands, 1995). These found the emergence and proliferation of legislators, monitoring agencies, regulatory bodies, customers, and employees within the organizations demanding for greater attention to the organizations' role in the destruction of the natural environment. An outcome of this stage, the heightened awareness of the organizations' carbon footprints – would propel the implementing organization on to the next stage -- the decision to adopt an IS that would capture the organizations' footprint and to track the progress of its sustainability efforts so these stakeholders could be engaged.

At the adoption stage, organizations' member moved to develop a sustainability strategy and new metrics for it measurement. Researchers have found that having a sustainability strategy does not only directly influences IS implementation success, but also positively mediates the relationship between technology and environmental sustainability (Hanelt et al., 2016; Saunila et al., 2019). This stage also involves revision of the organizations' IT governance program to ensure alignment of their existing IT and business strategies with the new sustainability strategy – also essential for implementation success (Haseeb et al., 2019; Puspitasari & Jie, 2020; Saunila et al., 2019).

The adaptation and acceptance stages were also largely driven internally by managers and employees. At these stages, IT sophistication, management and employee commitment were critical factors and out of these some key outcomes were early reports (pilots) from the system, refined sustainability goals and metrics and greater familiarity with the system leading to routinized system use.

Routinization saw the influence of engaging external stakeholders -- a finding consistent with Ahmed et al.'s (2021) findings that stakeholder engagement is" an *essential aspect for ISD project's survival and long-term success."* At this stage, the findings show refined reports as well as product and process innovations were major outcomes.

Finally, at the infusion stage, firm visibility was influential factor. This factor has is also supported in the literature as being critical for the success of sustainability initiatives as well as for IS implemented for sustainability benefits (Babiak & Trendafilova, 2011; S. Elliot, 2011; Rivera-Camino, 2007).

**Limitations and Future Research**

One major limitation of this study is the use of a single primary data source. Although our primary data are complemented by written case studies, we acknowledge that, unlike the primary data, these studies were not conducted specifically to capture implementation details. However, as Eisenhart (1989) points out, "The concern is not whether two cases are better than one or four better than three. Rather, the appropriate number of cases depends upon how much is known and how much new information is likely to be learned from incremental cases".

A second limitation is the use of only cases of successful implementations in our investigations. To overcome this, we recommend that future studies include failed IS implementations of reporting systems to get a comparative analysis; however, these are difficult to find and if found, our experience shows that implementors are unwilling to discuss the details.

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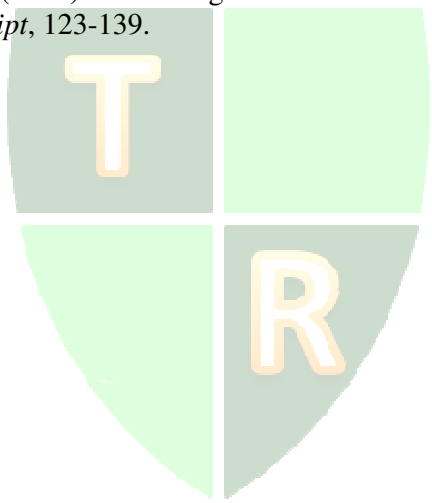

## APPENDICES

Below, we present exemplar codes from the data that show evidence of our results.

### Appendix 1: Case Data -- Factors

| |
|---|
| • **Initiation**: Stakeholders' pressures |
| **Digicel** *We got a directive from the head honcho – the CEO. He sent out a mandate to measure consumption.* |
| **UPS** *Companies have become subject to close scrutiny.* |
| **Fujitsu** *Environmental laws are becoming stricter around the world.* |
| **Intel** *The environmental impact of conducting business ... continues to receive attention on all fronts – from customers and employees to regulators and local communities* |
| • **Adoption**: Aligned business, IT and sustainability strategies |
| **Digicel** *The system is part of a green mandate. Every communication has a green message in it. Whatever the Go-Green committee puts out must have a green stamp, so persons are aware that we are green champions.* |
| **UPS** *There's no IT strategy; just a business strategy.* |
| **Fujitsu** *It needs to be an IT and a business strategy from the start – a whole-of-business strategy.* |
| **Intel** *We need to align Eco-Technology and corporate affairs.* |
| • **Adaptation:** IT sophistication |
| **Digicel** *Our system server is blocked to IT -- they have no access privileges, they have no passwords, nor training on the system; only we do.* |
| **UPS** *We were not just looking at the reporting system but at all the other systems that fed into and got data from it. So, our staff are COMPETENT!. They make decisions. Success is attributed to the sophistication of our network.* |
| ***Fujitsu's*** *technological expertise in the IT industry.* |
| **Intel** *In the case of this company, there was no particular reference in the data; however, the entire case as well as their reputation in industry alludes to their technological capabilities.* |
| • **Acceptance:** Management influence |
| **Digicel** *We even went further and said, if you have plastics at home, put it in your trunk and take it here. So, now we are beyond just operational efficiencies, and this increases their commitment to the system.* |
| **UPS** *A supervisor can replay a drivers' complete route for the day and use this visual display and other reports to work with drivers to reduce the distance they drive.* |
| **Intel** *Management knew they would have to influence corporate culture, including system processes and employee involvement.* |
| **Fujitsu** *Managers were responsible for building a sustainability mindset and so they went and got buy-in and ownership [from the employees].* |
| • **Routinization:** Stakeholder engagement and feedback |
| **Digicel** *We have monitoring so there is feedback. We see where we can increase your efficiencies. Where we have reports of issues in processes that can be adjusted, we make those adjustments.* |
| **UPS** *Going public drove change from modest culture to high profile. Through stakeholder relationships, UPS moved beyond compliance, through employee engagement with community stakeholders, feeding from the experience of the people.* |
| **Fujitsu** *A key goal was product innovations aimed to reduce CO2 emissions … through environmental innovation in collaboration with customers and partners.* |
| **Intel** *Emphasis was also placed on technology innovations that reduced energy consumption and increased efficiency of the data centre. IT engagements also facilitate exchange of techniques and strategies* |
| • **Infusion:** Visible sustainability image |
| **Digicel** *We are always at events and every communication that we put out must have a green message in it -- a stamp so persons are aware that we are green champions.* |
| **UPS** *We appeared in the Dow Jones Sustainability Index. UPS metrics were shared at industry meetings, and some, were adopted by competitors.* |
| ***Fujitsu*** *became the first company in the industry to establish a recycling system in Japan.* |
| ***Intel*** *joins Chicago Climate Exchange, the only CO2 emissions trading market in the U.S.* |

### Appendix 2: Case Data -- Outcomes

| |
|---|
| • **Initiation:** Sustainability awareness |
| **Digicel** *Our team and the IT consultants were providing input. I provided a matrix of all the systems that I want monitored so they could tell me what system would work.* |
| **UPS** *We started to realize that we burned a lot of fossil fuel, used tons of paper.* |

| |
|---|
| **Fujitsu** *We are becoming more aware of environmental issues and identifying the most suitable approaches to implement ...* |
| **Intel** *What started as a grass roots initiative when Executives asked, "What is sustainable IT?" has become ...* |
| • **Adoption:** New KPIs |
| **Digicel** *When the mandate came forward, we jumped on it. We started to put together ideas. We got motion sensors and a programmable AC system that shut down at 7pm. We had to reprogram for operation after 7pm.* |
| **UPS** *Provide stakeholders with environmental data* |
| **Fujitsu** *The implementation of an environmental management evaluation system enabled a more methodological approach throughout the organization.* |
| **Intel** *Develop an IT sustainability strategy and roadmap to educate on the principles/importance of sustainable business practices.* |
| • **Adaptation:** CSR report pilot |
| **Digicel** *We have some changes to make – the design has to be tweaked. Now we've implemented it we're beginning to see the shortcomings. We are just beginning to understand.* |
| **UPS** *We painstakingly went through the GRI ... what we could use as transportation metrics.* |
| **Fujitsu** *A reduction of 28%/ unit relative to 1990 for the whole group.* |
| **Intel** *We identified the bottom-line benefits and defined the metrics that enabled us to effectively reduce our footprint.* |
| • **Acceptance:** Commitment |
| **Digicel** *For me the benefits are to the environment itself. That is very critical.* |
| **UPS** *40,000 employees with management positions took a business ethics questionnaire.* |
| **Fujitsu** *Transition from environmental management to management for sustainable environment.* |
| **Intel** *Share IT key results, ideas and needs relating to sustainability and value-add opportunities with platform design teams.* |
| • **Routinization:** Refined KPIs |
| **Digicel** *The reporting aspect of the system gives feedback that better positions us to trust the system and the systems that feed into it so can adjust the metrics based on the historical data.* |
| **UPS** *The key was to have mechanisms in place to review and see where the gaps are.* |
| **Fujitsu** *We disclose environment-related results and critique for continuous improvement.* |

## Appendix 3: Case Data Supporting Success Outcomes

| | |
|---|---|
| Developed the "*UPS's proprietary Automotive* Information *System (AIS), which tracked vehicle maintenance and need for upgrades.*" | UPS |
| *The operational side of the company developed procedures to identify hazmats (hazardous materials).* | UPS |
| Developed the "*sustainable data* center *in Perth.*" | Fujitsu |
| *Fujitsu helps customers achieve a 7-million-ton reduction in Carbon (2010).* | Fujitsu |
| *Fujitsu also provides professional consulting services to customers to share the knowledge and expertise it has acquired.* | Fujitsu |
| *Intel sets new 2012 climate change and energy conservation goals to drive continuous improvement.* | Intel |
| *Share best-known methods. Intel IT ... improves results beyond the enterprise. Intel shares its data centre experience.* | Intel |
| Developed "*energy efficient equipment*" (e.g. Intel® Xeon® processor 5500 series-based platforms). | Intel |
| *Use new technologies to improve Intel® platforms and increase sustainability.* | Intel |