Digital sustainability projects: Organizational convergence of digitalization and sustainability outcomes

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***Abstract*—Contemporary organizations are experiencing an internal and external push towards a digitalization and sustainability convergence. This requires internal information technology (IT) departments to transition from IT projects to digital sustainability projects and develop practices for sustainable value creation. By exploring the sustainability outcomes and ramifications of a digital sustainability project we show how organizations can leverage internal IT-projects with external sustainability demands by developing managerial-, project target prioritization-, and negotiation practices that support digital and sustainability convergence. We thereby highlight the complexity of attaining digital- and sustainability convergence at the organizational level and provide empirical insights into the challenges and opportunities connected to operationalizing and achieving organizational socio-eco-economic digital sustainability goals.**

Keywords—sustainability, IT implementation, sustainable value creation, green IS

I. INTRODUCTION

Contemporary organizations are under a lot of pressure to stay relevant in a fast-changing world. On the one hand, they are in a race with competitors to stay on top of new technological developments and effectively use digital technology to develop their operations and create new business value [1]. On the other hand, they are tasked with becoming more sustainable as policymakers, in light of the ongoing climate crisis, have come to demand increasing organizational transparency regarding the environmental and social risks inherent in organizational activities [2]. In addition, digital technology is often posited as an enabler of organizational change, which effectively means that digital solutions are expected to be part of the quest to become more sustainable. In response, we see that organizations are intensifying their investments in digital technologies that both contribute to organizational processes and comply with the expectations and demands of the sustainability imperative [3, 4, 5].

Although the convergence of digitalization and sustainability is a strategic question that should be handled by upper management, it is also a practical question that must be operationalized at all organizational levels. Given its important role in driving digitalization efforts in organizations, the task of conjoining digitalization and sustainability on an operational level is expected to mainly fall on the information technology (IT) department [6, 7]. This creates a complex situation where IT professionals would need to adopt sustainability principles to develop new assessment criteria for IT implementations [8]. Indeed, as organizations begin to prioritize sustainability outcomes, corporate expectations on the IT department are also expected to change [7]. The IT department will, for example, need to balance the traditional and single focus of IT value (i.e., economic impact, see 9) with socio-ecological effects to embody socio-eco-economic impacts that are archetypical to sustainability outcomes [10]. In addition, the IT department may need to reorganize its organizational structures and activities to support value creation for increased sustainability performance in the organization e.g., by aligning its IT strategy with business and sustainability strategies and developing new capabilities to adopt methods, standards, and tools to measure increased sustainability performance [7].

In this paper we focus on an IT department's attempt to transition from IT projects to digital sustainability projects and explore the ramifications of such a change. By asking the research question: "How can organizations leverage internal IT-projects with external sustainability demands?", we highlight the complexity of attaining digital- and sustainability convergence at the organizational level and provide empirical insights into the challenges and opportunities connected to operationalizing and achieving organizational socio-eco-economic digital sustainability goals. As such this research contributes to and extends previous research within green IT [11], green Information Systems (IS) [12], and digital social innovation [13].

II. RELATED RESEARCH

With the constant exposure to alarming reports of climate change and natural resource depletion, it should come as no surprise that sustainability is high on the agenda for most of the world's leaders. Building on the Brundtland commission report from 1987 that called for the sustainable development of society by simultaneously encompassing ecological, social, and economic sustainability goals and through the ensuing Rio Process in 1992, the United Nations has declared far reaching global social goals [14]. As a result, and with heightened urgency, policymakers have commanded increased attention to sustainability issues on all levels of society [2]. This creates

a sustainability imperative where contemporary organizations are urged to align their operations with sustainability goals. Scholars have predicted that organizations will achieve such alignment through progressively converging their digitalization processes with sustainability initiatives, thus increasing their sustainability performance by capitalizing on the capabilities of digital technologies. Recent conceptualizations of this phenomenon include digital sustainability [3], digitainability [4], and twin transitions [5] all of which strive to problematize the relationship between digitalization and sustainability by showing how digital technologies can be used to address sustainability problems and promote sustainable development, exploring the positive and negative interdependencies of digitalization and sustainability, and targeting the process of aligning the green and digital transition.

A. *Sustainability in information systems research*

Information Systems scholars have incorporated the sustainability discourse across three main different streams of research: green IT [see e.g.,11], green IS [see e.g., 12] and digital social innovation [see e.g., 13]. As such it spans over a wide variety of issues across different analytical levels [15], for example developing sustainable information systems and information systems services [16], sustainable business practices [17], "energy informatics", i.e., the use of IS to reduce energy use [18] and creating sustainable information infrastructures in developing countries [19]. However, the enabling role of IT has also been criticized from a life-cycle perspective where the unsustainable practices of extracting resources (e.g., slavery-like conditions in mines), producing IT artifacts (e.g., water and waste), using them for a short period of time (e.g., technological obsolescence) and the unsustainable disposal or recycling thereof (e.g., toxic e-waste) results in ecological and social destruction [20].

The unsustainable impact of IT artifacts and its positive and enabling effects, have been captured by two different notions: 'sustainable IT' respectively 'IT for sustainability' [7]. By following a sustainable IT approach, an organization would for example adopt purchasing guidelines for infrastructural acquisition and design its systems through user participation and for long-term use or re-use [8]. In following the second approach, an organization may choose to generate big data sets, that when collected and analyzed can be used to improve social and environmental sustainability [21]. Indeed, it has been argued that the material properties of information systems can exhibit functional affordances that enable organizations to perform environmental sustainability transformations. These affordances encourage both sensemaking and sustainable practicing, effectively creating action possibilities for understanding sustainability goals and developing environmentally sustainable work practices [22].

While IS scholars are not new to the idea of converging digitalization and sustainability [e.g., 23, 24], and have previously generated insights on the relationship between digital technology and sustainability [see e.g., 25, 26] , critical voices have, however, argued that digitalization and sustainability are too often studied independently [27], that progress is too slow relative to the needs of society, and that we as a discipline need to do more [28]. In addition, the literature has revolved around different sustainability aspects and sustainable development goals. The Green IT/IS literature has for example focused on ecological and economic effects of IT implementation [29], while the digital social innovation literature has premiered social impacts [13]. Consequently, IS scholars have yet to establish a sustainability lens for a holistic assessment of IT implementation, that would capture the socio-eco-economic impacts that are archetypical to sustainability outcomes and broaden the view on IT-value and value creation [10, 14].

B. *Sustainable value creation through IT implementation*

Previous research has shown that IT-based value can take many different forms, for example economic-, process-, affective-, strategic value, etc. [9], be both tangible and intangible [30, 31], and that it is not always obvious what types of value any given investment will produce, especially when it comes to emerging technologies and multiple stakeholders [32]. In terms of IT projects, value has been measured based on hard and soft criteria, ranging from short-term to long-term goals from the perspective of managers, users, and suppliers. The most important success factors are the ones instantly achieved by the implementation: the solution solves the problem, and it works, users are satisfied with the solution and the system has high reliability [33].

The supposition that the sustainability imperative will challenge and extend previous conceptions of value creation, urges IS scholars to empirically investigate value creation of IT implementation from a sustainability perspective. Adding a sustainability perspective on IT-based value creation provides an opportunity to move beyond previous conceptualizations of the potential outcomes of IT implementation [29], and to encompass socio-eco-economic impacts [10]. The three aspects of sustainability should thus be studied together and simultaneously, instead of separately, asking which value is created and for whom [34], consequently, extending the focus on managers and users in IT projects to less clearly defined stakeholders, e.g., the natural environment [35]. Given these insights, a shift in focus from the predominant economic perspective on value creation to include both social and ecological impacts, as well as a stakeholder perspective, provides an opportunity to effectively explore sustainable digital value creation and discern how digital technology can help organizations develop sustainability capabilities [2, 34].

III. METHOD

The case study method is a suitable research approach for studying IT implementations since the method finds its strength in an exploratory research design which is conducted through qualitative research techniques (e.g., interviews and observations) to gather in depth and rich data within clearly defined case boundaries [36].

A. *Case description*

Our case study is situated in the context of Swedish public sector-healthcare which is managed by national, regional, and local authorities (i.e., the government, regions, and municipalities) [37]. Since the 1970s, the regions have had a financial and operational responsibility of healthcare, but their geographical and demographical differences have sometimes led to difficult challenges that hamper the regions' ability to carry out their mission, e.g., financial constraints.

The studied IT department operates in a region which has struggled with economic deficits for several years. In 2019, the regional director thereby commissioned the regional board to present a cost-reducing initiative to solve the financial situation. In response, the regional board deployed a

'sustainable economy' program that would save the region approximately 560 000 EUR between 2019-2022 (5% of the total budget based upon budget data from 2023) – specifically targeting 530 000 EUR of cost-savings in public-sector healthcare. For the IT department, this initiative took a bit of a turn when a business developer suggested that the IT department could help healthcare departments to save money through digitalization. By following this logic, the IT department suggested an increase in the region's investments in digitalization to create efficiency gains. The suggestion was well received by the regional board who appointed an additional budget for the IT department to perform and report on the cost-savings of six IT projects.

One of the IT-projects, called 'Safe printing' was described as an example of both socially and ecologically responsible digitalization. The general aim was to invest in a new software – hereby called 'safe printing software' – that would allow the IT department to redesign the printer platform in the organization: removing personal USB-printers from individual offices – also called local printers – and replacing them with a centralized and networked solution. In addition, the IT department planned to replace its conventional configuration of centralized printers with a single server solution – on which the safe printing software would be able to operate. The redesign would affect 12 000 employees and generate approximately 135 000 EUR in cost savings within the next five years to come, while increasing patient confidentiality, decreasing health issues caused by regular exposure to chemical particles from toners (as showed by e.g., 45), and minimize waste (e.g., papers and toners).

The safe printing project offers a suitable case setting for answering our research question for several reasons. First, the purpose of the printer platform redesign (i.e., cost-saving, health-promoting effects, and minimized waste) covers the socio-eco-economic impacts of sustainable value creation as presented in II.B. Second, and as predicted by previous research, the IT department becomes the key-initiator of sustainable value creation through digitalization. Finally, the safe printing project targets multiple stakeholders, including politicians, employees, patients, and IT professionals, thus, adding the multiple stakeholder dimension to sustainable value creation, e.g., for 'whom' is value created.

B. Selection of participants & qualitative interviews

In the first phase of data collection, we formulated a semi-structured interview guide to perform an exploratory interview study with six employees from the IT department. The purpose was to understand how the IT department was organized, how it performed its operations, what values it delivered towards its customers and to what extent sustainable development or sustainability was present in these activities. The larger part of the sample consisted of division managers who had advanced to their current role from previous positions as team leaders, object managers and project leaders. We therefore gained an in-depth understanding of the departmental structure and what value offerings the IT department delivered to healthcare departments, e.g., IT infrastructure and systems development.

In the second phase of data collection, we performed focused interviews with the previously mentioned business developer and three members from the Safe printing project (a project owner, a project leader, and an object manager). In addition, we enrolled five local system administrators (LSAs) to the study. LSAs have a background in healthcare e.g., a nurse or medical secretary while working as IT resources in their respective healthcare departments (see Table I) and thus serves as an important source for information on user expectations and attitudes. To make the interview sessions relevant for each stakeholder, we developed two semi-structured interview guides based upon their category of profession, i.e., IT professionals & LSAs.

TABLE I. INFORMANTS INLUDED IN THE FOCUSED STUDY

Group	**Specifications**		
	Role	***Area of expertise***	***Time***
IT	Project owner	Department manager with overall responsibility for the project outcomes	18 minutes
IT	Project leader	Divisional manger, at the time, working for a private consultancy firm, with operational responsibility for the safe printing implementation	53 minutes
IT	Object manager	Organizational developer with technical responsibility for the safe printing solution, post-implementation	50 minutes
IT	Business develop.	Supporting the project leader in creating a business case and measuring goal achievement	63 minutes
LSA	1	100% employed as an LSA at a specialist medical care center with 700 employees, with a background as assistant nurse	48 minutes
LSA	2	Part-time LSA at a local primary care center with 50 employees, also employed as assistant nurse	51 minutes
LSA	3	Part-time LSA at an emergency care department with 60 employees, also employed as nurse	78 minutes
LSA	4	Part-time LSA at a local primary care center with 30 employees, also employed as medical secretary/administrator	28 minutes
LSA5	5	Part-time LSA at a specialist medical care center with 160 employees, also employed as manager assistant	35 minutes

C. Collected documents & contextualization of interviews

During the interviews, we asked the informants to support their statements with written documentation. For example, we asked the project leader to share project related documents and the business developer to share documentation on the financial progress of the digitalization program. Additionally, we collected official documentation regarding the sustainable economy initiative from the region's official website and technical specifications about the safe printing solution from the software supplier.

D. Inductive coding & thematic analysis of qualitative data

In line with a grounded approach, we transcribed the interview material and performed inductive coding of data [38]. When creating the open codes, we used the Atlas.ti software to attach codes to different quotes and we used an explanatory language to synthesize a quote with no more than ten words. For each code we also added a description to specify its context. This process was highly iterative, meaning that we re-read the material and re-wrote the codes to make sure that each code represented the quote/s that it was attached to. In total, we created 506 open codes.

The categorizing process was characterized by a thematic procedure where we aimed to create meaningful groups of

codes [39]. Initially, one of the researchers grouped the codes based on similarities, e.g., topics, experiences, and situations. As a next step, both researchers reviewed the groups to form categories before clustering them into themes, e.g., process of implementation, experienced and measured effects, the vision, and reflections (see examples in Table II). In the findings section, we focus our attention to three of these and present quotes from the raw material to support our qualitative assessment.

TABLE II. EXAMPLE OF THEME STRUCTURE FROM QUALITATIVE ASSESSMENT

Purpose of the project	
Group of codes (ex.)	***Categories in theme***
Economic incentives were a key driver for the project Assigned an economic value to personal printers […]	Economic incentives
Experienced no governance over personal printers Replaced personal printers when they stopped working Experience increased control over printers with FMP […]	Increased control
Decrease stock of toners Toner on stock can become useless with time Avoid outdated toners in stock […]	Desired outcome
Controlled printing offers work flexibility Users can choose what to print Incorrect files can be deleted before print	User benefits

IV. FINDINGS

In this section, we present a description of the Safe printing project targets, the implementation process, the project failures, and the sustainability outcomes that the IT department could successfully report on.

A. Purpose of the project

To align the Safe printing project with the sustainable economy initiative, the IT department put together a business case of ten quantifiable project targets in which the IT department promoted the cost reducing effects of a printer platform redesign. The quantifiable targets spanned from reduced printing and administrative costs for the organization to cost-reducing effects in the IT department's own operations. In addition, the IT department saw the possibility to evaluate and optimize the printer platform through data analysis and achieve qualitative project targets, such as, a better work environment for medical staff and reduced paper waste.

A primary goal of the printer platform redesign was to replace – and preferably remove – local printers from individual offices. The business case described the local printers as a source for unnecessary hardware costs (i.e., printers and servers), costs for maintenance and IT support, time-consuming administrative tasks for medical staff, expensive toner stocks for healthcare departments and prospective health issues for users. According to the project leader, the costs and administrative problems resided in the IT department's historic and generous supply of local printers in combination with a lack of standardizing principles to govern the development of the platform. Hence, the printer platform had grown increasingly heterogenous over time and resulted in maintenance and development issues for the IT department.

"… these regular printers were installed in every office, and we didn't keep track of them more than how old they were based upon the data of purchase from the inventory list." – Project leader.

The heterogenous printer platform had also resulted in expensive printing costs, administrative issues, and toner storage for hospital staff.

"… you had to have a quite big stock of toners because we had so many different printers of different models. No one [referring to toners] could fit the other, but we did have to have a small stock just in case we ran out of toners as well." – LSA 5.

Hence, a related goal of removing local printers was to increase homogeneity of printer models. According to the object manager, increased homogeneity of printers would decrease printing costs (e.g., toners & transportation of paper), decrease toner stocks and make it easier for the IT department to prioritize support errands more effectively e.g., a centralized printer would affect a larger number of employees and thus receive higher priority amongst other errands than a local printer. In addition, by replacing local printers with centralized printers, the IT department saw an opportunity to decrease the users' exposure to toxic toner particles and offer a health promoting platform, i.e., reducing sedentary behavior by creating a walking distance to the printer (as seen in e.g., 46).

A second goal of the printer platform redesign was to invest in smart and connected printers to create a centralized configuration of new and advanced printers that supported the safe printing software. The new printers would be equipped with a card scanner and a large display for the safe printing solution to function properly. They would also be integrated with the in-house e-platform to send automatic order requests for toners. Hence, a related goal of investing in smart and connected printers was to develop automations for automatic order of toner cartridges to decrease administrative costs and expensive toner stocks for healthcare departments.

"… the printers should automatically order the cartridges themselves instead of staff making a purchase and purchasing an unnecessary stock which instead becomes old. […] that is both expensive and unsustainable" – Project leader.

From the IT department's perspective, connected printers would also create in-house opportunities for increased efficiency and future development, for example, the IT department would be able to offer proactive service and printer support to healthcare departments, collect and analyze data to evaluate the solution and make informed decision about the printer platform design.

A final goal of the platform redesign was to implement the safe printing software and a personal authentication requirement to enable confidential printing on centralized printers. According to the project owner, the increased confidentiality objective was an equally – or even more important – target than the cost reducing effects.

"… above all, the solution was a way to secure the printing process. That's why the project was called 'safe printing' and

not 'save money by minimizing your print outs'" – Project owner.

Although described as a goal of higher priority than economic incentives, it should be noted, that the patient confidentiality aspect was absent in project documents and that the only articulation that signaled this goal was the name of the project i.e., 'safe'. Nevertheless, the patient confidentiality aspect frequently appeared in the interviews with project members and the LSAs. Both parties were therefore aware of patient confidentiality incidents and described them as a recurrent issue. Patient confidentiality incidents were occasional, oftentimes accidental, and usually the result of administrative errors or automatic printing and paper-mix ups. A typical error was choosing another printer than intended, and as a result, confidential documents could disappear or end up on a different, even geographically separated, location which created situations where unauthorized people could be given access to confidential documents.

"… it was an extremely insecure setup when patient journals and referrals appeared on printers that had nothing to do with the patient and they [referring to the IT department] could not identify and solve the problem." – LSA 3.

In addition to increased patient confidentiality, the safe printing server and personal authentication card would also minimize paper waste by automatically deleting unprinted documents from the printer server within seven days and allow users to delete documents by scanning their authentication card at a printer and reviewing the printing queue prior to printing. According to the software supplier, the solution would potentially decrease paper consumption by 10-30% and the IT department expected a similar result.

"… here we have a possibility to avoid unnecessary printouts by choosing what to print, because everything is stacked in a list where you can choose to print it all or […] to print only one and three [on the list] because the second one was wrong" – Project leader.

According to the project team, the safe printing solution offered the solution needed to remove local printers. They also believed that the choice to include the Safe printing project in the digitalization program for a sustainable economy and the economic incentives of the Safe printing project actualized the printer platform redesign. Despite giving quantifiable project targets precedence, the business case also illustrated how the qualitative project targets added benefits to the business case that further motivated a transition. For example, the IT department could justify the removal of local printers from a social perspective and report on the environmental benefits of reducing toner and paper consumption in the project requirements. Based upon these findings, the project created multiple benefits across all three dimensions of sustainability (i.e., economic, social, and environmental), and by extension, the IT department chose to justify the printer platform redesign as a sustainability project towards multiple actors: the regional board, the healthcare departments (i.e., hospital managers), its users (e.g., administrators & medical staff), and the patients.

B. Phase 1 of the implementation: prioritization of project targets & safeguarding the solution

The implementation process was initiated in 2019 when the IT department was given top-management support to execute the Safe printing project. The IT department began to test and evaluate alternative safe printing solutions and appointed a project leader to initiate a collaboration with the organization. In the end of 2019, the initial tests on two solutions had been performed by key users from three different organizations. In the early 2020, the project leader initiated a dialogue with hospital mangers and LSAs to inform the organizations about the Safe printing project. As a first step, the project leader contacted the hospital managers to communicate the objectives of the printer platform redesign, to promote the benefits of the safe printing solution, and highlight the safety aspect of the new platform to attract the support of end-users. The project team knew that the patient confidentially aspect was important for hospital staff and that it would equip the project leader with a compelling argument to convince hospital managers and staff to accept the implementation. Furthermore, the project leader leaned on the top-management decision to urge the organizations to accept the situation.

"… we have a mission where we need to get these centralized printers out there […] and we have a mission to remove the old printers, if that doesn't work right now, we have to come up with a plan for when it is going to happen." – Project leader.

As a second step, the project leader initiated a close collaboration with LSAs to perform an inventory of printers. For this purpose, the project leader formulated instructions and shared a spreadsheet with the LSAs to document the number of local printers that were going to be removed and the number of centralized printers that were going to be installed. The inventory was ongoing throughout 2020 and the safe printing software was subsequently installed until all organizations had transitioned to the centralized configuration.

The initial communication with hospital managers, illustrated an adaptive capacity to align the project objectives with the beliefs and values held by different stakeholders and an intentional prioritization of sustainability objectives (in this case socially anchored outcomes) to promote the value of the IT implementation to gain the support of users. Though economic and environmental outcomes were also communicated, our findings show an inclination to prioritize social concerns in communication with users. As a result, the safety aspect gained precedence over economic and environmental outcomes, although, the latter two were equally important from a sustainability perspective.

C. Phase 2 of the implementation: managing resistance

The implementation of centralized printers was performed by technicians from an external company who were sent to all healthcare departments in the region to remove local printers and install new ones. However, in some cases, the technicians were prevented from removing local printers, for example, some members physically held on to their printers to prevent a change for the worse.

"… it was a difficult situation for many of them, and different groups of profession felt: 'it will take time for me to print my documents on a centralized printer and I don't have time for that" – Project leader.

In other cases, medical staff argued against the solution by describing scenarios where centralized printing would impede patient confidentiality, e.g., in the meeting with patients.

"I need to have a printer on my room, otherwise I have to leave my patient in the room to collect my printed documents" – Project owner.

On the bright side, the project leader generally observed a higher level of acceptance amongst staff compared to previous attempts when implementations have failed.

"I would like to think that it somehow was more accepted today compared to ten years ago because this solution is not a new one. But previous attempts have not succeeded. So somehow, we had a good plan." – Project leader.

Moreover, where the IT department had to accept a temporary defeat, they continued to work for a possible transition to centralized printers in the future.

"… for us it became important to have this solution in place in all organizations, to remove as many old printers as possible and then continue to work with optimizations to reach that point where we only have centralized printers and nothing else" – Project leader.

Based upon our findings, the safe printing solution had attracted some support amongst hospital staff, but organizational resistance had emerged when technicians visited healthcare departments to remove local printers. The resistance showed a tension between user expectations and the strategic purpose of the printer platform redesign i.e., cost-savings. The choice to replace local printers with centralized printers had also created positive outcomes for the environment but the prioritization of economic and ecological targets resulted in negotiations between the IT department and healthcare departments. The project team was consequently presented to a situation where they had to demonstrate confidence in the centralized printers – without neglecting the users' resistance towards the new solution.

D. Phase 3 of the implementation: added user responsibility

When the centralized printers were in place and the safe printing software had been installed, the IT department expected that each user would be able to scan their card and follow a series of user-instructions to link their user-ID to the safe printing software. The IT department also expected that users would be able to manually activate the safe printing software on their respective computers and manually choose the centralized printer as the standard printer before printing their documents. However, the LSAs identified several problems with this setup, first, it created a new and time-consuming activity for staff, second, staff was required to repeat this process for each computer they used, third, the settings sometimes disappeared without any apparent reason.

"Sometimes it happens that the settings disappear. […] I find it strange. I haven't changed computer and even though the computer has been updated I believe that these settings should remain." – LSA 3.

Yet, when the LSAs made the IT department aware of these issues, they experienced poor support and felt as if their case was overlooked.

"… when there is an issue and you call the technical ones, they say: 'Everything looks good on our side' […] but we don't get our papers." – LSA 2.

"It took three days before the service centre did something about it. It was a disaster. It was bad." – LSA 1.

The implementation of the safe printing software resulted in added user responsibility and the IT department's expectations on their users gave rise to new administrative tasks. The required time and effort to perform these tasks was intensified by an unreliable solution, hence, negatively affecting the already strained work environment for medical staff. The findings also demonstrated an absent IT department which created stressful situations for medical staff who experienced long-lasting disruptions in their daily operations.

E. Post-implementation: technical deficiencies & patient confidentiality incidents

After the transition to a centralized configuration, users began to experience technical problems with the underlying infrastructure, e.g., unstable internet connection and Domain Name System (DNS)-problems, which prevented staff from printing their documents and technicians from installing the printers properly. In addition, users noticed that documents where disappearing without a trace and that the software could not support the users to retrieve their lost documents.

"The downside with this is that it doesn't say what documents I have printed. So, if there is any hassle, I don't have a back-up to see "These documents you haven't printed" or "These documents you did not get" – LSA 2.

The unreliable printers also seemed to create new situations where confidentiality incidents could arise.

"… we can scan our card and wait, and wait, and wait – nothing happens. We can scan it again and wait and wait and we know that we have printed them and after a while the documents can suddenly appear after the staff has already left." – LSA 2.

Similarly, the safe printing solution had created new situations of patient confidentiality breeches and stressful situations for medical staff who worked on shared computers and used shared logins.

"… at some workplaces we switch staff in the morning and in the afternoon. Upon leaving your computer you are supposed to log out, but we are humans, so we forget sometimes. […] and then your stressed colleague is supposed to be in charge and login to the patient record but forget to login to the computer. Then it becomes the person who is logged in to the computer that can print the documents." – LSA 2.

Shared logins produced a similar problem as shared computers since printed documents was locked to a 'pretend-user'. To circumvent this setup, staff were required to type their username and password in a small pop-up box to redirect their documents to their personal authentication card. However, the pop-up box had to catch the user's attention for mistakes to be avoided, and unfortunately, the box could disappear behind other software. As a result, a user could accidently create a similar problem of confidentiality incidents as with shared computers.

The IT department was aware of these issues and – prior to the Safe printing project – it had already suggested a complementary solution: simple logins. The IT department expected to implement the simple login solution in parallel to the safe printing software which would simplify the authentication requirement and solve the problems with shared computers and shared logins.

"… the idea with the simple login is to scan your card and immediately open all the sessions that you are in need of […and…] to solve this problem [of shared logins] because then you are already logged in and you can scan your card to get your printed documents" – LSA 1.

However, the IT department had not been able to implement the solution since technical incompatibilities with the electronic patient record and lengthy login times did not meet the user-requirements. Consequently, the simple login project had been postponed to the year of 2028 – after the implementation of a new electronic patient record.

The technical deficiencies created an unreliable printing platform and the apparent incompatibilities between the safe printing solution and the general IT environment resulted in new situations of patient confidentiality incidents and stress for medical staff. The IT department's attempts to resolve the situation showed its ambition to balance economic targets with qualitative goals, but without a complementary solution in place, the fast-paced transition illustrated a push towards economic sustainability. Similarly, the IT department had increased patient confidentiality at permanent workstations, but failed to consider the consequences for medical staff if the simple login project would fail. The IT department had therefore achieved social sustainability outcomes for a single stakeholder (i.e., medical secretaries and administrators) in the internal organization, and sustainability outcomes for patients – whose confidential information is processed by medical secretaries and administrators. As a result, patient confidentiality incidents continued to occur after the new printer platform had been installed.

F. Achieved and experienced sustainability outcomes

With the centralized printers and the safe printing software in place, the IT department could successfully report on a drastic decline in the number of local printers in the organization and a homogenization of the printer platform. It therefore achieved several of its cost reducing targets for its own operations, including, costs for hardware, server maintenance and IT support along with reduced maintenance, support, and toner costs for healthcare departments. In addition, the IT department achieved the qualitative target of creating a better working environment for staff and increased patient confidentiality at permanent workplaces by enforcing personal authentication at centralized printers. According to our interviews with the LSAs, the safe printing solution had also increased the ecological awareness amongst staff – with new printing practices as a result. The centralized printers along with the removal of local printers had thereby created a successful threshold to make users aware of their paper consumption.

"Before, it happened that people could print, well: "Oh, I would really like this 48-page document to be printed" and then they did that at work. With the safe printing software, it's somewhat of a barrier to do so. I no longer see people printing private documents at work. Because it becomes so obvious." – LSA 3.

"Well, I might settle with reading the information from the screen rather than printing it on paper." – LSA 4.

On the contrary, the IT department had failed to deliver toner automations and, by extension, toner administration for staff. Hence, the IT department was unable to report on one of the most promising cost-reducing effects of the Safe printing project.

"… the cost benefit [of the safe printing solution] relied on a decreased need for organizations to order their toners. […] And that was never achieved because they couldn't integrate it with our e-commerce platform and business system." – Business developer.

Moreover, the IT department had failed to increase patient confidentiality for temporary workplaces – a more common setup in the organizations – which resulted in negative implications for medical staff.

"… it works fine for staff who have a permanent workplace and I believe many of them are happy with the solution, that they are content and that it feels good to move from the computer. […] but as I said, it is a smaller group of people who have their own workplace if you consider the hospital departments. Almost no one has their own workplace there." – LSA 5.

It had also proved difficult for the IT department to measure a decrease in paper waste – a somewhat fuzzy outcome which was only assessable through the users' own experiences of decreased paper waste at centralized printers and workstations.

"I don't know if we have measured it, but I have just felt it, that we throw away less paper. You know the paper-document box, I think it is less frequently emptied now. And I have noticed that there are fewer paper piles at the workstations than prior to the safe printing software." – LSA 3.

The sustainability outcomes of the Safe printing project illustrated an economic success and an inclination to prioritize economic targets which created a fast-paced transition to a centralized configuration of the printer platform. Our findings showed that the fast-paced transition created consequences for the sustainability outcomes in the social dimension – in particular the social dimension of medical staff – whose outcomes relied on the success of other IT projects, i.e., simple logins and automations of toner orders. Hence, the social dimension would have benefited by a less time and cost-focused project agenda, especially, as the printer platform was dependent on the outcomes of other IT projects. The lack of measurements to assess environmental targets also illustrated a lack of competence at the IT department or an inclination to view ecological outcomes as beneficial but not essential to digital sustainability projects. In the following illustration, we have plotted the project targets across the three sustainability dimensions (i.e., economic, social, and ecological) to show the relationships between project goals and the stakeholders that were influenced by the goals. The model does not take into account under what conditions, or the extent to which, project targets have been achieved, nor does it expand upon the consequences for achieving (e.g., decreasing sedentary behavior), respectively not achieving these goals (e.g., automatic toner orders). These nuances are instead further elaborated upon in our discussion.

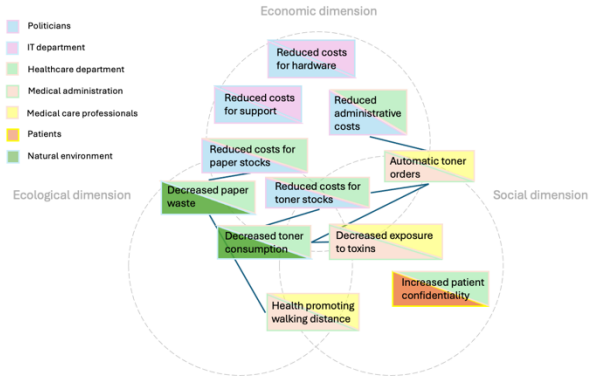

Fig. 1. Illustration of project targets and the stakeholder/s influenced by the goals.

V. Discussion

With the current push to converge digitalization and sustainability on an operational level, organizations are expected to intensify their investments in digital technologies and develop sustainable value creation practices to achieve long-term profitability through digital sustainability [3]. Joining the ongoing efforts of exploring and characterizing the role of the IT department in this transition [8, 6, 7], we set out to investigate the following research question: How can organizations leverage internal IT-projects with external sustainability demands? By leaning on the findings, as presented in the previous section, we discuss how an IT department operationalized external demands and addressed multiple stakeholder interests through its sustainable digital value creation efforts. Before ending this section, we discuss the implications of our research.

A. Managing digital sustainability projects

There are several sources of external pressure e.g., legislation, policies, new costumer expectations, norms and market conditions that causes organizations to develop their operations in a more sustainable direction [15, 40]. For the IT department, this boils down into an integration of sustainability principles when developing the IT infrastructure [8]. Our findings suggests that the IT department identified several synergies between external demands and the Safe printing project. More specifically, we observed an operationalization of external pressure into project targets and project aims. For example, the IT department aligned the cost-saving measures with the sustainable economy initiative, and the purpose of implementing the safe printing solution with patient confidentiality demands, both of which are regulated by Swedish law. Moreover, we observed an alignment between the sustainability assessment in the project requirements – a healthy work environment and decreased consumption of toner and paper – and the climate and environmental strategy (i.e., an internal policy measure aspiring to align the regions sustainability efforts with the SDGs).

For sustainability to be integrated in practice, these external demands need to be translated into actionable procedures and organizational activities [8] which requires new practices that are sensitive to value pluralism [34]. Here we observed a continuous process of prioritizing, communicating, and negotiating the benefits of the safe printing solution with regards to the project targets, the projects aims and in interaction with different stakeholders. Our findings demonstrate an adaptive capacity amongst project team members to address different sustainability goals and align them with the interests of different stakeholders. Previous research has shown that addressing co-existing and sometimes different individual and organizational agendas is a way to unify different sustainability narratives [41]. This was, for example, evident in the case when the project leader chose to articulate and emphasize the social gains of the safe printing solution to gain the support of users, as well as when the business developer chose to emphasize the potential financial gains of the project to gain the support of the regional board. By doing so, the IT department aligned the Safe printing project with national legislation and regional policies, and identified – both internal and external – economic, social, and environmental goals with the printer platform redesign.

Aligning the Safe printing project with the organizational agenda is a form of value reinforcement of organizational goals [as seen in 41]. However, by targeting communication to different stakeholders, the IT department also attempted to capture and appease individual concerns. In order to drive sustainable digital value creation [7], a question remains, for whom was value created and how was this achieved through the safe printing implementation?

B. Sustainable value creation

Transitioning from performing IT projects to digital sustainability projects challenges IT departments to broaden their perspectives on value creation. Not only do they have to ascertain the organizational value of investing in new technology, but they also need to develop assessment criteria for IT implementations that consider sustainability goals [8]. While previous research has highlighted that the application of a socio-eco-economic sustainability perspective to an IT implementation process can lead to new ways of conceptualizing IT project outcomes [42], there are few empirical studies that explore how such a process is operationalized within organizations [43, 22, 34, 12].

This study follows an IT department's attempt to move from its predominant focus on economic values to sustainable digital value creation. The results show that the IT department considered the Safe printing project to be successful based on measurable socio-eco-economic effects. The reduction of local printers in favor of a networked solution meant that they hit most of the anticipated cost reducing targets, thus creating economic value. In addition, although they were derived from an initial process of cost-saving measures, the safe printing solution afforded both ecological and social value in terms of providing a better work environment through reduced exposure to both printer chemicals and noise, as well as changing work practices to provide increased patient confidentiality. The economic incentives motivated the printer platform redesign, but the qualitative targets also added benefits to the business case that further encouraged a transition. For example, the IT department pointed to the health-related issues to lower resistance amongst users and presented reduced paper consumption as an environmental benefit in the project requirements. Previous research has suggested that paying specific attention to what types of value are created is an important step in creating sustainable value [34]. Our study shows that setting specific measurable targets and consequently evaluating which different types of value were created along the three dimensions of sustainability,

were indeed crucial in maintaining the idea that this was a digital sustainability project, and not an ordinary IT project.

However, when including the perspective of other stakeholders such as the medical staff, the narrative changed. Indeed, it seemed that the Safe printing project failed to deliver on several of the set targets, largely due to functional constraints of the safe printing system which negatively influenced users' perception of the system. For example, the safe printing platform relied on the general IT infrastructure which at times did not function very well– as seen in the examples of lost internet connection and DNS-problems – and a personal authentication requirement which was incompatible with the general IT environment for medical staff i.e., shared computers and shared logins. As a result, the IT department had introduced a somewhat whimsical and thus unreliable printer platform for medical staff who indicated that they experienced more stress, less efficiency, and new situations of confidentiality incidents. The stakeholder perspective provides an opportunity to explore "for whom" value is created, which in turn helps unravel the complex dynamics of sustainable digital value creation. The organizational resistance gives us an idea of what 'value' is for hospital staff, i.e., work efficiency and patient confidentiality – which explains the IT department's inclination to focus on and prioritize the potential for sustainable value creation along the social values dimension in its interaction with users. At the same time there was a tension between fulfilling user expectations and realizing the strategic purpose of the Safe printing project i.e., cost-savings. Ultimately, while local printers were appreciated tools for medical staff in their daily operations, the IT department decided to remove them for economic purposes, which suggests that economic incentives gained precedence over both social and ecological concerns.

C. Framing digitalisation within sustainability dimensions

The IT department in our case study aimed to save money through digitalization. As such, they identified a number of cost factors with the established printer infrastructure and presented the economic, social and ecological gains with a new printer solution which would, among other things, reduce the number of machines, contribute to a better working environment, create thresholds for unnecessary printing, reduce toner cartridges and contribute to increased patient confidentiality. The IT department thereby identified financial and thus quantifiable goals that could also be justified with qualitative, and thus socially and ecologically, sustainable benefits. Moreover, the IT department identified quantitative indicators to measure financial benefits and expected to achieve the qualitative benefits, by achieving the financial goals. It was also suggested that the ecological benefits came as a consequence of economic targets. Thus, our interpretation is that the IT department lacked the competence required to anchor ecological benefits based on nature's interest.

In this research, we focused on how a digital sustainability project was operationalized within an organization to achieve digitalization and sustainability convergence at the operational level. Our results show that during the course of the project, the IT department was faced with several goal conflicts, and therefore had to choose different strategies to deal with this. One strategy was to prioritize how to communicate the project goals to different stakeholders, for example in the case where the project manager chose to articulate and emphasize the social gains with the implementation, or when the IT department emphasized the financial benefits of a new printer infrastructure. In both cases, the IT department and by extension, also the success of the project, found itself in a position of being dependent on the approval from its internal counterparts. The IT department therefore sought support for its projects in the form of internal and targeted marketing that highlighted the benefits of the project from the recipient's perspective, e.g., better working environment or increased patient confidentiality. The result of this strategy was broad support from various interest groups within the region who identified with the proposed value that the project would create.

A second strategy was to prioritize financial goals over other sustainability aspects. In theory, this strategy should have generated the sustainability goals that the IT project aimed to fulfill because the IT department identified financial and thus quantifiable goals that would also fulfill qualitative and thus socially and ecologically sustainable benefits. Judging from the results, one succeeded in achieving ecological benefits by prioritizing economic goals because the ecological benefits came from resource optimization. On the other hand, social benefits were not necessarily achieved through economic prioritization, which could be seen in how the IT department developed several smaller projects whose project-specific goals depend on the success of all projects, for example, automatic toner orders and simple logins. It should be added that economic and ecological benefits were also missing when the IT department failed to deliver automatic toner orders - here, too, there was no prioritization between economic and ecological values because the economic benefits came from ecological gains with resource optimization. In theory, they had therefore created an overall solution that would generate socio-eco-economic values, but in practice the result was different.

Our observations of an ongoing target adjustment of project goals and benefits therefore show a prioritization of economic values. This can of course be explained by the fact that the IT department has support from the regional management in carrying out the project within the framework of the region-wide initiative 'sustainable economy' and that the IT department had drawn up financial project goals, the fulfillment of which would also lead to social and ecological benefits. There was therefore a clear economic condition in the development of the goals. In a sense, therefore, the IT department showed an ability to handle goal conflicts between different actors, but based on our observations of eco-efficiency goals, we could see that there was a lack of project goals that highlighted more nuances based on the ecological dimension, e.g., the ecological costs of replacing the IT infrastructure and the ecological values of removing local printers etc.

VI. Conclusions

Our findings suggest that an organization's ability to drive digital sustainability projects relies on its ability to formulate project targets across all dimensions of sustainability and identify measurements to assess them independently and their synergetic effects respectively. On that account, the IT department in our case study needed to implement an IT solution whose infrastructure and design afforded sustainability outcomes.

In addition, this research shows that digital sustainability project success relies on the ability to address and prioritize

project targets in relation to multiple stakeholders and create tangible or intangible value for all stakeholders involved. If not, the IT department will have to safeguard the synergetic effects between targets, e.g., by negotiating terms. Simply put, the push to converge digitalization and sustainability forces the IT department to undertake an orchestrating role to ascertain that sustainable digital value is created.

We thus conclude that organizations can leverage internal IT-projects with external sustainability demands by developing managerial-, project target prioritization-, and negotiation practices that support digital and sustainability convergence. To that end, this research highlights and discusses the complexity of attaining organizational digital- and sustainability convergence at the operational level and contributes empirical insights for both researchers and practitioners into the challenges and opportunities connected to operationalizing and achieving organizational socio-eco-economic digital sustainability goals.

The empirical contributions provided in this paper presents a digital sustainability project which aspired to achieve sustainability outcomes through digitalization (i.e., IT for sustainability). By performing qualitative interviews with project stakeholders i.e., people involved and affected by the project, we have tapped into the intended and the experienced outcomes of the digital sustainability project, as well as the shared concerns and challenges experienced during and post-implementation. As such, we have been able discuss *how* the IT-department leverage its IT-projects to meet external sustainability demands and what outcomes the project has created from the perspective of multiple stakeholders. To support our interpretation of the data, we have provided the reader with the code structure of the thematic analysis and demonstrated how the analysis proceeded with validating techniques, such as, iteration and internal reviewing of categories and themes. In addition, we have deliberately included quotes from all informants (except for the object manager who explicitly requested not to be cited) to ground our findings across multiple stakeholders' statements. Nevertheless, we recognize that our choice of method has some limitations. For example, our choice of case study, paints the picture of sustainability outcomes achieved in the internal organization. It does not give an account of the sustainability outcomes (whether good or bad) from e.g., a life cycle perspective of the technical solution. Indeed, critical voices have been raised against this perspective since it oftentimes excludes a sustainability assessment of the IT implementation itself, e.g., the negative impact of the IT artifact throughout its life cycle [44]. Hence, we suggest that future research in this area could provide new insights into the sustainability outcomes of digital sustainability projects by combining the 'IT for sustainability' dimension with 'sustainable IT' in their research agenda.

REFERENCES

[1] D. A. Skog, H. Wimelius, and J. Sandberg, "Digital disruption," Bus. Info. Sys. Engin, vol. 60, pp. 431-437, 2018.

[2] V. Dao, I. Langella, and J. Carbo, "From green to sustainability: Information Technology and an integrated sustainability framework," Jour. Strat. Info. Sys, vol 20, pp. 63-79, 2011.

[3] G. George, R. K. Merrill, and S. J. Schillebeeckx, "Digital sustainability and entrepreneurship: How digital innovations are helping tackle climate change and sustainable development," Entre. Theo. Prac, vol. 45, pp. 999-1027, 2021.

[4] U. Lichtenthaler, "Digitainability: The combined effects of the megatrends digitalization and sustainability," Jour. Innov. Manag, vol 9, pp. 64-80, 2021.

[5] M. Salvi, K. Jensen, E. Stoermer, F. Scapolo, T. Asikainen and S. Muench, Towards a green & digital future, Luxembourg: Publication Office of the European Union, 2022.

[6] J. Dedrick, "Green IS: Concepts and issues for information systems research," Com. of the Ass. for Info. Sys, vol. 27, pp. 173-184, 2010.

[7] B. Pernici, M, Aiello, J. Vom Brocke, B. Donnellan, E. Gelenbe and M. Kretsis, "What IS can do for environmental sustainability: a report from CAiSE'11 panel on Green and sustainable IS," Com. Ass. Info. Sys, vol. 30, pp. 275-292, 2012.

[8] C. Standing, and P. Jackson, "An approach to sustainability for information systems," Jour. Sys. Info. Tech, vol. 9, pp. 167-176. 2007.

[9] R. Kohli, and V. Grover, "Business value of IT: An essay on expanding research directions to keep up with the times," Jour. Ass. Info. Sys, vol. 9, pp. 23-39, 2008.

[10] T. Dyllick, and K. Hockerts, "Beyond the business case for corporate sustainability," Bus. Strat. Env, vol. 11, pp. 130-141, 2002.

[11] T. A. Jenkin, J. Webster, and L. McShane. "An agenda for 'Green'information technology and systems research," Info. Org, vol. 21, pp. 17-40, 2011.

[12] J. Kotlarsky, I. Oshri, and N. Sekulic. "Digital Sustainability in Information Systems Research: Conceptual Foundations and Future Directions," Jour. Ass. Info. Sys, vol. 24, pp. 936-952, 2023.

[13] I. Qureshi, S. L. Pan, and Y. Zheng, "Digital social innovation: An overview and research framework," Info. Sys. Jour, vol. 31, pp. 647-671, 2021.

[14] S. Sparviero and M. Ragnedda, "Towards digital sustainability: the long journey to the sustainable development goals 2030," Dig. Pol. Reg. Gov, vol 23, pp. 216-228, 2021.

[15] S. Elliot, "Transdisciplinary perspectives on environmental sustainability: a resource base and framework for IT-enabled business transformation". Mis Quart, vol. 35, pp 197-236, 2011.

[16] G. Chowdhury, "Building environmentally sustainable information services: A green is research agenda," Jour. Ameri. Soc. Info. Sci. Tech, vol. 63, pp. 633-647, 2012.

[17] N. P. Melville, "Information Systems Innovation for Environmental Sustainability". Mis Quart, vol. 34, pp. 1-21, 2011.

[18] R. T. Watson, M. C. Boudreau, and A. J. Chen, "Information systems and environmentally sustainable development: Energy informatics and new directions for the is community," Mis Quart, vol. 34, pp. 23-38, 2010.

[19] S. C. Srivastava, and G. Shainesh, "Bridging the service divide through digitally enabled service innovations: Evidence from Indian healthcare service providers," Mis Quart, vol. 39, pp. 245-267, 2015.

[20] Y. K. Dwivedi, et al., "Climate change and COP26: Are digital technologies and information management part of the problem or the solution? An editorial reflection and call to action," Inter. Jour. Info. Manag, vol. 63, pp. 1-39, 2022.

[21] R. Dubey, A. Gunasekaran, S. J. Childe, T. Papadopoulos, Z. Luo, S. F., Wamba, and D. Roubaud, "Can big data and predictive analytics improve social and environmental sustainability?," Tech. Fore. Soc. Change, vol. 144, pp. 534-545, 2019.

[22] S. Seidel, J. Recker, and J. Vom Brocke, "Sensemaking and sustainable practicing: functional affordances of information systems in green transformations," Mis Quart, vol. 37, pp. 1275-1299, 2013.

[23] A. Malhotra, N. P. Melville, and R. T. Watson, "Spurring impactful research on information systems for environmental sustainability," Mis Quart, vol. 37, pp. 1265-1274, 2013.

[24] H. Z. Henriksen, D. Thapa, and A. Elbanna, "Sustainable Development Goals in IS Research,"Scan. Jour. Info. Sys, vol. 33, pp. 97-102, 2021.

[25] J. vom Brocke, R. T. Watson, C. Dwyer, S. Elliot, and N. Melville, " Green Information Systems: Directives for the IS Discipline," Com. Ass. Info. Sys, vol. 33, pp. 509-522, 2013.

[26] S. Seidel et al., "The sustainability imperative in information systems research," Com. Ass. Info. Sys, vol. 40, pp. 40-52, 2017.

[27] Y. Karki, and D. Tapa, "Exploring the Link Between Digitalization and Sustainable Development: Research Agendas," in Responsible AI and Analytics for an Ethical and Inclusive Digitized Society. D. Dennehy, A. Griva, N. Pouloudi, Y. K. Dwivedi, I. Pappas and M. Mäntymäki (eds). Lecture Notes in Computer Science, vol. 12896. Springer, 2021.

[28] R. Gholami, R. T. Watson, H. Hasan, A. Molla, and N. Bjorn-Andersen, “Information systems solutions for environmental sustainability: How can we do more?,” Jour. Ass. Info. Sys, vol. 17, pp. 521-536, 2016.

[29] S. Elliot, and J. Webster, “Special issue on empirical research on information systems addressing the challenges of environmental sustainability: an imperative for urgent action,” Info. Sys. Jou, vol. 27, pp. 367-378, 2017.

[30] G. Schryen, “Revisiting IS business value research: what we already know, what we still need to know, and how we can get there,” Euro. Jour. Info. Sys, vol. 22, pp. 139-169, 2013.

[31] U. H. Westergren, J. Holmström, J. and L. Mathiassen, “Partnering to create IT-based value: A contextual ambidexterity approach. Information and organization,” Info. Org, vol. 29, pp. 1-18, 2019.

[32] A. Bharadwaj, O. A. El Sawy, P. A. Pavlou, and N. V. Venkatraman, “Digital business strategy: toward a next generation of insights,” Mis Quart, vol. 37, pp. 471-482, 2013.

[33] J. T. Karlsen, J. Andersen, L. S. Birkely and E. Ødegård, ”What characterizes successful IT projects,” Inter. Jour. Info. Tech. Deci. Mak, vol. 4, pp. 525-540, 2005.

[34] F. Lüdeke-Freund, R. Rauter, E. R. G. Pedersen and C. Nielsen, ”Sustainable Value Creation Through Business Models: The What, the Who and the How,” Jour. Bus. Mode, vol. 8, pp. 62-90, 2020.

[35] R. M. Davison, “Researchers and the stakeholder's perspective,” Info. Sys. Jour, vol. 28, pp. 1-5, 2018.

[36] R. K. Yin, Case study research: Design and methods, third edition, Sage, 2009.

[37] B. Kullander, Municipalities and Regions, Swe. Ass. Loc. Author. Reg, <https://skr.se/skr/englishpages/municipalitiesandregions.1088.html> 2023.

[38] K. Charmaz, Constructing grounded theory, second edition, Sage, 2014.

[39] V. Braun, and V. Clarke, “Using thematic analysis in psychology,” Qual. Res. Psy, vol. 3, pp. 77-101, 2006.

[40] J. Corbett, “Unearthing the value of green IT,” ICIS 2010 Proceedings, 198.

[41] J. Hedman, and S. Henningsson, “Developing ecological sustainability: a green IS response model,” Info. Sys. Jour, vol. 26, pp. 259-287, 2016.

[42] C. Fuchs, “The implications of new information and communication technologies for sustainability,” Env. Dev. Sus, vol. 10, pp. 291-309, 2008.

[43] F. Bengtsson, and P. J. Ågerfalk, “Information technology as a change actant in sustainability innovation: Insights from Uppsala,” Jour. Strat. Info. Sys, vol. 20, pp. 96-112, 2011.

[44] S. C. El Idrissi, and J. Corbett, “Green IS research: A modernity perspective,” Com. Ass. Info. Sys, vol. 38, pp. 596-623, 2016.

[45] A. Nandan, N. A. Siddiqui, and P. Kumar, ”Assessment of envrionmental and ergonomic hazard associated to printing and photocopying: a review”, Env. Geochem. Health, vol. 41, pp. 1187-1211, 2019.

[46] C-L. Hwang, et al., ”The physiological benefits of sitting less and moving more: Opportunities for future research”, Prog. Cardiov. Dis, vol. 73, pp. 61-66, 2022.