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## The Role of Digital Technology in **Sustainability: A Literature Review**

Completed Research

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#### Abstract

Digital technologies can help to fulfill social needs through innovative and socially-embedded solutions. The research fields of digital sustainability, digital social innovation, and social entrepreneurship are about exploring how the tools of our digital age can be designed, adapted, and aligned to achieve local and global social needs. However, despite the current interest, there remain conceptual ambiguities regarding the focus of each field. This review examines current research by reviewing 24 articles across the Basket of Eight and two IS conferences. Our results clarify the different focus areas within each research field but also show that the three research fields overlap due to the remaining conceptual ambiguities. To enable more focus in future research, we discuss implications regarding the conceptual overlap, propose first steps to address them, and close by developing eight avenues for future research.

#### **Keywords**

Sustainability, Digital Sustainability, Sustainable Development Goals (SDGs), Digital Social Innovation, Social Entrepreneurship.

#### Introduction

Sustainability, defined as meeting our own needs without compromising the ability of future generations to meet their own needs (Brundtland 1987), is a big topic these days, both in academia and practice alike (e.g., George et al. 2021; Tim et al. 2021). Current literature shows that sustainability is a complex concept, as it includes both environmental and social aspects. Therefore, the promotion of sustainability also relates to the Sustainable Development Goals (SDGs) of the United Nations (UN), which assigned sustainable transformations to different targets. "Each SDG Transformation describes a major change in societal structure (economic, political, technological and social) to achieve long-term sustainable development" (Sachs et al. 2019, p. 805). With the rise of digital technology, it is possible to address societal challenges like climate change or social inequalities (e.g., Reinecke and Ansari 2016). In relation to this, Sachs et al. (2019) introduced six SDG Transformations as modular building blocks of SDG achievement, where the sixth SDG Transformation is the digital revolution for sustainable development. Thus, sustainable development positively and structurally affect society, the economy, people, and the environment (Sparviero and Ragnedda 2021).

Sustainability is frequently addressed in Information Systems (IS) because digital technologies can help to fulfill the social need by innovative and socially-embedded solutions, which is the focus of two research fields: Firstly, digital social innovation (DSI) involves the development and implementation of innovative products, services, processes, business models, and other innovative activities in which digital technology plays a central role and which aim to address social problems (e.g., poverty, inequality, poor access to health care or social exclusion) (Fox and Connolly 2018; Qureshi et al. 2018; Ravishankar 2021). Therefore, DSI enables businesses, non-governmental organizations, government agencies, and social entrepreneurs to leverage digital technologies to create a positive social impact (Oureshi et al. 2021). Secondly, social entrepreneurship (SE) can be seen as a means of addressing a broad range of social needs

(Sud et al. 2009) and creating social value through the creative recombination of resources (Faludi 2020) with the help of technology. In an overview and research framework, Qureshi et al. (2021) highlight various stimulating research directions and theoretical lenses to explore research fields like DSI and SE. A research field that is connected with the two fields mentioned above is digital sustainability. Digital sustainability is defined as "the organizational activities that seek to advance the sustainable development goals through creative deployment of technologies that create, use, transmit, or source electronic data" (George et al. 2021, p. 1000). In previous research, the term digital sustainability has been used to describe the goals of promoting sustainable development through the creative use of technology (Sparviero and Ragnedda 2021). To summarize, digital sustainability, DSI and SE are about exploring how the tools of our digital age can be designed, adapted and aligned to achieve local and global social needs. Except for the studies from George et al. (2016), there is little research on using digital technologies to address social problems and societal challenges in the field of IS.

However, while the convergence of sustainability and digital imperatives is gaining more prominence, insights remain fragmented and central research fields such as digital sustainability, DSI and SE remain conceptually ambiguous due to overlapping definitions. Therefore, we formulate the following research question: How are digital sustainability, digital social innovation (DSI), and social entrepreneurship (SE) conceptualized?

To answer this research question, we conduct a literature review. Therefore, we explain the fields of digital sustainability, DSI and SE provide insight into the current state of research. After that, we describe the methodology of our organizing review. The literature review results are presented next before the last chapter explains what these results imply and their possibilities for future research.

#### **Research Background**

#### Digital Sustainability

Sustainability consists of three dimensions: Environmental, Social, and Economic. The dimensions are closely interrelated since the global economy simultaneously influences all aspects of our society and environment. *Environmental sustainability* involves the continued maintenance of ecosystems and their functions and *economic sustainability* refers to the continued ability of an economic system to meet all human needs. *Social sustainability* promotes the well-being of all people, such as access to food, medicine, education, and recreation (e.g., Brenner and Hartl 2021; Schoormann and Kutzner 2020; van Gils and Weigand 2020). The focus of social sustainability is similar to that of SDGs since the main issue is fulfilling a wide range of social needs.

This is similar to digital sustainability (George et al. 2021), which focuses on the interplay of sustainability and digital technologies such as blockchain, artificial intelligence and machine learning, big data analytics, mobile technologies and applications, sensors, and other Internet of Things (IoT) devices. George et al. (2021) add a digital sustainability perspective that focuses on the activities of entrepreneurial and established firms that rely on digital innovation to create scalable socio-environmental value. They highlight six problems (e.g., problems of knowing, problems of valuation) from the management sector that lies beneath the surface of sustainability. To address these problems, they formulate digital sustainability pathways based on digital technologies' innovative and creative use. These include, for example, social movements for sustainability or business model innovation and ecosystems. For this reason, the IS literature recognizes that digital innovation gives a social aspect of digital innovation and digital sustainability (Majchrzak et al. 2016).

#### Digital Social Innovation and Social Entrepreneurship

Therefore, it is also an opportunity to direct the phenomenological lens to perspectives that address how sustainable development can be approached. One research field that is particularly important for sustainable development and the achievement of the SDGs is (digital) social innovation. Social innovation is defined as "innovative activities and services that are motivated by the goal of meeting a social need" (Mulgan 2006, p. 146). DSI also relies on this, with a particular focus on social innovation. Therefore, technology is innovative when it aims to solve the aforementioned social problems. In both developed and developing countries, there is evidence of information and communications technology (ICT) 's potential

to enable and drive digital transformation increasingly (e.g., Riaz and Qureshi 2017). Although there is this potential for leveraging these emerging ICTs to address social problems. But Qureshi et al. (2021) do not assume that ICT is the solution to the SDGs. They cite the negative consequences of rising income inequality, excessive electricity consumption leading to pollution, oppressive and exploitative algorithms, discriminatory sharing economy platforms, polarization caused by social media, and surveillance. Therefore, in the DSI field, "social" must be more central than digitalization (Oureshi et al. 2021). This represents an opportunity to create social values through DSI. It can also be a step forward in achieving the SDGs. So far, there has been research examining social innovation in the fight against poverty (e.g., Ravishankar 2021) or the use of technology to address individual, social, and structural factors by women entrepreneurs (e.g., Suseno and Abbott 2021). So one way to understand social innovation is through linking it to entrepreneurship (Bhatt et al. 2019; Suseno and Abbott 2021). As well as DSI, SE aims to address social problems, including but not limited to poverty, healthcare, renewable energy, and clean water (e.g., Amini et al. 2018; Muryanti 2020; Qureshi et al. 2018; Surie 2017). In a review Phillips et al. (2015) show that both SE and (digital) social innovation share common overlaps, particularly in identifying problem-solving opportunities for unmet social needs. So is evident that there are still no clear boundaries between the research fields, especially in IS. Yet, many of the social issues still face critical and intractable problems. This requires innovative and socially rooted solutions that leverage digital technology. It is important to examine the definitions and conceptual underpinnings of digital sustainability, DSI, and SE to see how the field of IS can make a valuable contribution in each.

#### Methodology

This study conducts an organizing review as defined by Leidner (2018) to make a large stream of literature understandable. To this end, we follow the guidelines of Webster and Watson (2002). They propose a process consisting of the following parts: (1) relevant literature in leading IS journals are identified, (2) research fields are summarized, and patterns are identified, (3) an overview of previous research and definitions can be provided. Additionally, we carefully report on the research process and decisions made during the search to increase the reproducibility of the results.

We began the literature search with leading IS journals included in the AIS Basket of Eight¹, and the proceedings of the two top IS conferences (International Conference on Information Systems (ICIS)² and European Conference on Information Systems (ECIS)³) to examine the most relevant articles in the IS research field. For this, we used the following search terms in the literature review, which are combined to a search query using the "or" operator: "digital" OR "innovation" OR "entrepreneurship" to find literature that contains changes in the digital context. These terms were combined with the string "sustain\*" OR "social" to limit the results to a background of sustainable or social development. We used the selected key terms to search the articles' title, abstract, and keywords without any temporal restrictions. Figure 1 below shows how we proceeded with the literature search by summarizing our search terms, the searched outlets, and the exclusion criteria. In addition, we show the results of the Forward-Backward Search.

We used the EBSCOhost Business Source Complete database and the AIS eLibrary for conference proceedings as the search engine to search for all issues from January 2022. We also searched for the same search terms in each database of the journal's website to identify all relevant articles. The initial search resulted in 695 articles. Using abstract screening (Webster and Watson 2002), we applied the exclusion criteria. We defined three exclusion criteria to reduce the initial search results to only meaningful articles. First, we excluded articles from the initial result list, with no focus on sustainability or social needs/challenges in the context of digitalization. Second, we removed articles that focused on social media instead of social needs/challenges. Third, we excluded articles that only focus on environmental sustainability because of the lacking connection to the social or economic context. After applying the exclusion criteria, we identified 11 articles that built the foundation for the following forward

<sup>&</sup>lt;sup>1</sup> The AIS Senior Scholars' Basket of Journals includes the following journals: European Journal of Information Systems (EJIS), Information Systems Journal (ISJ), Information Systems Research (ISR), Journal of AIS (JAIS), Journal of Information Technology (JIT), Journal of MIS, (JMIS) Journal of Strategic Information Systems (JSIS), MIS Quarterly (MISQ) (see https://aisnet.org/page/SeniorScholarBasket)

<sup>&</sup>lt;sup>2</sup> See https://aisel.aisnet.org/icis/

<sup>3</sup> See https://aisel.aisnet.org/ecis/

and backward search (Webster and Watson 2002), which resulted in additional 13 papers. Overall, our final sample comprises 24 research articles. To analyze our final sample, we identified the definitions of digital sustainability, digital social innovation (DSI), and social entrepreneurship (SE) within each article. To synthesize the literature systematically, we analyzed the definitions to uncover their interrelations.

Hits in the Outlets	Year	Results	
AIS Basket of Eight and IS Conferences			
ISJ	1 (2009), 5 (2021)		
EJIS	1 (2008)	Results after Exclusion: 11	
ICIS	1 (2014), 1 (2021)	articles	
ECIS	1 (2011), 1 (2020)	1	
Forward-Backward Search: VHB-JOURQUAQL3 ranked in the categories A – C			
Journal of Cleaner Production	2 (2021)		
Entrepreneurship: Theory and Practice	1 (2012), 1 (2021)		
Sustainability	1 (2019), 2 (2021)		
Ecological Economics	1 (2020)	Forward-Backward Search:	
The Journal of Management Studies	1 (2016)	13 articles	
Journal of Management	1 (2019)	7	
Business Strategy and the Environment	2 (2021)		
Technology Forecasting and Social Change	1 (2021)		

Figure 1. Literature Research Approach and Distribution Across Journals and Years

#### **Results**

Our literature search yields 24 relevant articles from 2008 to 2021 (see Figure 1). As depicted in Figure 2 most articles were published in the Information Systems Journal (ISJ). In addition, there is a dramatic increase in publications in 2021, reflecting the general attention given to the issue of sustainability. Regarding the conceptual focus: Ten articles focus on DSI; two of these ten articles also consider SE. Furthermore, five articles deal exclusively with SE and three deal with DS. Interestingly, none of the 15 articles focusing on DSI or SE deals with DS. Four articles deal with the link between sustainability and digitalization. Next, we will outline the definitions of digital sustainability, DSI, and SE used in the articles.

#### Existing Definitions in Literature

In this section, we first present existing definitions of digital sustainability, digital social innovation (DSI), and social entrepreneurship (SE). In reviewing our sample, we found ten definitions for DSI, five definitions for SE, and five definitions for digital sustainability.

A detailed overview of the definitions is available in Table 1. In a nutshell: In each of the definitions, "digital" terms are used (e.g., "digital technologies") but are not sufficiently defined (e.g., Tim et al. 2021). This is also the case with SE. Here, entrepreneurship is supplemented by a social component. Overall, the identified definitions have some commonalities but also differences. The similarities and differences of digital sustainability, DSI and SE are examined in the next step. To systematize commonalities and differences, we analyzed the definitions and compared the semantics of sentence components. Digital sustainability is abbreviated as DS in the following table.

Authors	Definitions	DS	DSI	SE
(Huh and Kim 2019, p. 2)	"a form of social and cooperative innovation where innovators, activists, and organizations utilize digital technology in order to produce ideas and deliver solutions for demanded social needs at a rate that is thought to be unimaginable before the Internet Renaissance" (Definition based on (Baeck and Bria 2014; Bria et al. 2015))		X	
(Suseno and Abbott 2021, p. 2)	"the use of digital technologies to create, implement and provide novel ideas, products, services or models to address social issues" (Definition based on Edwards-Schachter and Wallace (2017))		X	

	none			X
(Rodrigo and Palacios 2021, p. 1)	"a sort of social innovation (SI) that would rely on new technologies to solve a wide range of social problems" (Definition based on Milwood and Roehl (2019))		X	
(Gebken et al. 2021, p. 3)	"a type of social and collaborative innovation in which innovators, users, and communities collaborate using digital technologies to co-create knowledge and solutions for a wide range of social needs and at a scale and speed that was unimaginable before the rise of the Internet" (Definition based on Bria et al. (2015))		X	
(Chian Tan et al. 2014, p. 3)	"new IT-enabled solutions that simultaneously meet a social need (more effectively than existing solution) and lead to new or improved capabilities and relationships and better use of assets and resources (i.e. enhance capacity to act)" (Definition based on Caulier-Grice et al. (2012))		X	
(Bonina et al. 2021, p. 698)	"the development of new products, services or processes, that are either embodied on IT or enabled by IT, whose goal is to meet social needs or stimulate social change"		X	
	"the development of socially innovative market solutions that (a) simultaneously create value for society's members, and (b) employ revenue generating market strategies to spur economic self sustainability" (Definition based on (Austin et al. 2006; Bhatt et al. 2019; Moss et al. 2011; Santos 2012; Scarlata et al. 2016)			X
(Qureshi et al. 2017, p. 1)	"using digital technologies to co-create knowledge and solutions for a wide range of social needs of disadvantaged, socially excluded, and marginalized groups, and at a scale that was unimaginable before the rise of Internet- enabled technologies"		X	
(Tim et al. 2021, p. 2)	"the novel use of digital technology to address major societal challenges"		X	
(Qureshi et al. 2021, p. 647)	"the use of digital technologies in the development and implementation of innovative products, services, processes and business models that seek to improve the well-being and agency of socially disadvantaged groups or address social problems related to marginality, inequality and social exclusion" (Definition based on (Manoharan et al. 2021; Qureshi et al. 2017))		X	
(Ravishankar 2021, p. 746)	"in which the operating model relies primarily on digital technologies and the overarching focus is on the 'social' aspect of the innovation" (Definition based on Qureshi et al. (2017))		X	
(Saebi et al. 2019, p. 70-71)	Referred to 'social entrepreneurs' and 'social enterprises': "as individuals and organizations that use a business logic in a novel and entrepreneurial way to improve the situation of segments of the population that are excluded, marginalized, or suffering and are themselves not capable of changing this situation" (Definition based on (Peredo and McLean 2006; Seelos and Mair 2005; Thompson 2002))			X
(Irani and Elliman 2008)	none			X
(Calic and Mosakowski 2016, p. 741)	"the use of entrepreneurial behavior for social ends rather than for profit objectives, or alternatively, that the profits generated are used for the benefit of a specific disadvantaged group" (Definition based on Hibbert et al. (2005))			X
(Austin et al. 2006, p. 2)	"innovative, social value creating activity that can occur within or across the nonprofit, business, or government sectors"			X
(Datta and Gailey 2012, p. 581)	"innovative, social value creating activity that can occur within or across the non-profit, business or government sectors" (Definition based on Austin et al. (2006))			X
(Sparviero and Ragnedda 2021)	none	X		
(Cricelli and Strazzullo 2021)	none	X		
(Wut et al. 2021,	"encompassing the wide range of issues and concerns that contribute to the	X		

p. 3)	longevity of digital information. Digital sustainability, it is demonstrated, provides the context for digital preservation by considering the overall life cycle, technical, and socio-technical issues associated with the creation and management of the digital item." (Definition based on Bradley (2007))
	"create, use, and regulate digital resources in order to maximize their value for our society today and in the future" (Definition based on Stuermer (2014))
	"as the organizational activities that seek to advance the sustainable development goals through creative deployment of technologies that create, use, transmit, or source electronic data" (Definition based on George et al. (2021))
	"the sustainability of digital artifacts and their ecosystem is achieved by producing, developing, maintaining and ensuring access to digital artifacts in a way that ensures their creation and facilitates their use" (Definition based on Stuermer et al. (2017))
(George et al. 2021, p. 1000)	"the organizational activities that seek to advance the sustainable development X goals through creative deployment of technologies that create, use, transmit, or source electronic data"
Articles with the	tonic "digital and sustain*". (Rohnsack et al. 2021: Brenner and Hartl 2021: Castro et al. 2021:

Articles with the topic "digital and sustain\*": (Bohnsack et al. 2021; Brenner and Hartl 2021; Castro et al. 2021; ElMassah and Mohieldin 2020; Hellemans et al. 2021)

Table 1. Definitions of Digital Sustainability, DSI and SE

#### **Digital Social Innovation**

Since digital technology and social aspects are at the core of research on digital social innovation, we examine how social aspects are linked to digital technology and digital innovation. In all definitions, the focus is on digital technologies and social needs (e.g., Bria et al. 2015; Caulier-Grice et al. 2012; Qureshi et al. 2021). Therefore, most definitions include several "social" terms (i.e., "social needs", "social aspects", "social issues" etc.) but the terms are not clearly defined. For example, social needs, social problems, social issues, societal challenges, or social aspects are described to impact social innovation (e.g., Edwards-Schachter and Wallace 2017; Milwood and Roehl 2019). Two definitions additionally address target groups to which DSIs are directed. Here, marginalized groups are described that are affected by marginality, inequality, and social exclusion (Manoharan et al. 2021; Qureshi et al. 2017). In a definition by Milwood and Roehl (2019), DSI is derived from the term "social innovation" without explaining it in detail. In addition to this, a digital component was added to the concept of social innovation. Moreover, there are different terms for the digital component (i.e., "IT-enabled solutions" or "digital technologies") (e.g., Bria et al. 2015; Caulier-Grice et al. 2012). Thus, existing definitions as currently used in the literature remain conceptually ambiguous in regard to the terms digital, social, and innovation and how they are linked.

Although the reference to the SDGs is made in Qureshi et al. (2021) or Gebken et al. (2021), the thematic area of sustainability is only highlighted in 1 out of 10 definitions. Caulier-Grice et al. (2012) relate to the sustainability mindset for better use of resources. The idea of sustainability or sustainable development is not considered in the other definitions, although sustainable development is mentioned as the core of DSI

#### **Social Entrepreneurship**

Bonina et al. (2021) describe that the focus of SE is on economic sustainability, which implies that the focus is less on social sustainability or the social aspect of social entrepreneurship (SE). Yet, the individual components of the term (social and entrepreneurship) are not defined (e.g., Austin et al. 2006; Hibbert et al. 2005), and there is no explicit link to digital technologies in the definitions. The term innovation is also used in two out of five definitions (both definitions based on Austin et al. 2006). What "innovative, social value-creating activities" or "socially innovative market solutions" mean is not described or defined (Austin et al. 2006; Bhatt et al. 2019; Moss et al. 2011; Santos 2012; Scarlata et al. 2016). Similar to the research field of DSI, the definitions from the articles of Saebi et al. (2019) and Calic and Mosakowski (2016) comprise excluded and marginalized or disadvantaged persons as the target group of SE.

#### **Digital Sustainability**

The definitions of digital sustainability vary widely (e.g., Bradley 2007), besides George et al. (2021), who reference the SDGs. Stuermer (2014) explicitly shows the connection to the concept of sustainability. Therefore, the aim is to maximize the value of digital resources (Stuermer 2014) and the longevity of digital information (Bradley 2007). The SDGs are to be promoted creatively using technologies (George et al. 2021). The definition of Bradley (2007) adds that it is a broad range of issues and concerns. It becomes clear that this spectrum is not yet sufficiently defined at this time.

#### **Discussion**

In this paper, we examined the current state of sustainability in IS research by searching for publications until January 2022 that deal with sustainability in the fields of digitalization, innovation, and entrepreneurship. Our research question was: How are digital sustainability, digital social innovation (DSI), and social entrepreneurship (SE) conceptualized? Our results show that the three research fields overlap, yet considerable conceptual ambiguities remain, hindering the progress within each domain and making cross-disciplinary exchange difficult. Regarding our results, one commonality also emerges. The three research fields are concerned with sustainable development. Table 2 shows the topics in each research field and the open issues we identified.

Research Fields	Topics adressed	Open Issues
Digital Sustainability	Focus on digitalization and sustainability (social challenges)	Definitions vary widely, overlap with DSI and SE
Digital Social Innovation (DSI)	Focus on social aspects, achievement of SDGs	Lack of definition – "social innovation" is not defined, addressing of the SDGs
Social Entrepreneurship (SE)	Focus on economy	Missing link to SDGs, link to digital technologies

Table 2. Excerpt of Results

Based on the definitions of digital sustainability, DSI and SE, we identified the following insights: First, the definitions of the terms "digital" and "innovation" are not defined at all. To increase conceptual clarity, adopting extant definitions that defined digital innovation as "the creation or adoption, and exploitation of an inherently unbounded, value-adding novelty (e.g., product, service, process, or business model) through the incorporation of digital technology" (Hund et al. 2021; p. 6), might help. In view of the field of DSI, digital innovations are used to address social needs. Thus, the focus is mainly on social sustainability and the achievement of goals outlined in the Sustainable Development Goals (SDGs). Therefore, a connection to the SDGs and their achievement is brought into focus in many articles (e.g., Castro et al. 2021; Qureshi et al. 2021). It would be interesting for future research to investigate how exactly the SDGs are addressed and which role DSI plays in this process. In addition to this, a precise definition should follow in future research. It would be possible, for example, to examine the role of the social component in "digital innovation" and derive a definition for DSI on this basis. Second, SE focuses less on the digital aspect and more on innovation. Future research should also investigate the role of digital entrepreneurship, particularly regarding the connection to digital technologies. Furthermore, although there is no direct reference to the SDGs, social needs and societal challenges are addressed. Here is a clear connection to DSI, but the focus is more on the economic aspects of sustainability (e.g., "market strategies to spur economic self sustainability" (Bonina et al. 2021, p. 698)). Because of that, SE is more specific than DSI (e.g., Austin et al. 2006). Therefore, other research fields, such as digital or sustainable entrepreneurship, should be considered (Saebi et al. 2019). Third, digital sustainability is not yet a research field with clear boundaries. It combines the topics of digital and sustainability. However, there is still a lack of definition that specifies digital technologies on the one hand and sustainability on the other, highlighting the need for a more comprehensive review of digital sustainability. At this point, digital sustainability can be seen as a kind of umbrella term under which DSI and SE can also be understood. Further research on the goals of digital sustainability should follow to specify this research field.

Our study has certain limitations. First, the search and literature captured may not include all relevant research articles due to keyword and outlet limitations. Second, we focused on articles on digitalization

and sustainability. Therefore, we did not include all research areas dealing with the topic (e.g., digital and sustainable entrepreneurship).

Overall, the research fields digital sustainability, DSI, and SE are not sufficiently developed from a conceptual point of view, hindering the progress within each field. The overlaps are also evident in the definitions, resulting in the following problems: unclear boundaries for any field of research and no comprehensive definitions for digital sustainability, DSI, and SE. Thus, in light of the results of our review, we close with the following recommendations for future research, as displayed in Table 3. In particular, we refer to research on the achievement of the Sustainable Development Goals (SDGs).

Research Fields	Avenues for Future Research	
<b>Digital Sustainability</b> (Open Issues: Focus, overlap DSI and SE)	<ul> <li>How is technology used to achieve sustainable development?</li> <li>How to sharpen the focus of digital sustainability?</li> </ul>	
<b>Digital Social Innovation (DSI)</b> (Open Issues: Lack of definition, link to SDGs)	<ul> <li>How social is digital innovation?</li> <li>How can DSI reduce poverty (SDG1), hunger (SDG2) or inequalities (SDG5, 10)?</li> </ul>	
Social Entrepreneurship (SE) (Open Issues: Link to digital technologies and SDGs)	<ul> <li>How can SE improve decent work and economic growth (SDG8)?</li> <li>How does digital and sustainable entrepreneurship relate to digital sustainability, DSI, and SE?</li> </ul>	
Sustainable Development Goals (SDGs): SDG 1: reduce poverty, SDG 2: zero hunger, SDG 5: gender equality, SDG 8: decent work and economic growth, SDG 10: reduced inequalities		

Table 3. Avenues for Future Research

#### **REFERENCES**

- Amini, Z., Arasti, Z., and Bagheri, A. 2018. "Identifying Social Entrepreneurship Competencies of Managers in Social Entrepreneurship Organizations in Healthcare Sector," *Journal of Global Entrepreneurship Research* (8:1), pp. 1-14.
- Austin, J., Stevenson, H., and Wei–Skillern, J. 2006. "Social and Commercial Entrepreneurship: Same, Different, or Both?," *Entrepreneurship theory and practice* (30:1), pp. 1-22.
- Baeck, P., and Bria, F. 2014. "Digital Social Innovation: What It Is and What We Are Doing," *London: Nesta*).
- Bhatt, B., Qureshi, I., and Riaz, S. 2019. "Social Entrepreneurship in Non-Munificent Institutional Environments and Implications for Institutional Work: Insights from China," *Journal of Business Ethics* (154:3), pp. 605-630.
- Bohnsack, R., Bidmon, C. M., and Pinkse, J. 2021. "Sustainability in the Digital Age: Intended and Unintended Consequences of Digital Technologies for Sustainable Development," *Business Strategy and the Environment*), pp. 1-9.
- Bonina, C., López-Berzosa, D., and Scarlata, M. 2021. "Social, Commercial, or Both? An Exploratory Study of the Identity Orientation of Digital Social Innovations," *Information Systems Journal* (31:5), pp. 695-716.
- Bradley, K. 2007. "Defining Digital Sustainability," Library Trends (56:1), pp. 148-163.
- Brenner, B., and Hartl, B. 2021. "The Perceived Relationship between Digitalization and Ecological, Economic, and Social Sustainability," *Journal of Cleaner Production* (315), pp. 1-12.
- Bria, F., Sestini, F., Gasco, M., Baeck, P., Halpin, H., Almirall, E., and Kresin, F. 2015. "Growing a Digital Social Innovation Ecosystem for Europe: Dsi Final Report," *Brussels: European Commission*).
- Brundtland, G. 1987. "Report of the World Commission on Environment and Development: Our Common Future," *Oxford University Press*).
- Calic, G., and Mosakowski, E. 2016. "Kicking Off Social Entrepreneurship: How a Sustainability Orientation Influences Crowdfunding Success," *Journal of Management Studies* (53:5), pp. 738-767.
- Castro, G. D. R., Fernandez, M. C. G., and Colsa, Á. U. 2021. "Unleashing the Convergence Amid Digitalization and Sustainability Towards Pursuing the Sustainable Development Goals (Sdgs): A Holistic Review," *Journal of Cleaner Production* (280), pp. 1-40.

- Caulier-Grice, J., Davies, A., Patrick, R., and Norman, W. 2012. "Social Innovation Overview: A Deliverable of the Project," in: *European Commission, DG Research, Brussels*.
- Chian Tan, F. T., Pan, S. L., and Cui, L. 2014. "An Information Processing Perspective of Digital Social Innovation: Insights from China's Taobao Villages," in: *Thirty Fifth International Conference on Information Systems*. Auckland: pp. 1-12.
- Cricelli, L., and Strazzullo, S. 2021. "The Economic Aspect of Digital Sustainability: A Systematic Review," *Sustainability* (13:15), p. 8241.
- Datta, P. B., and Gailey, R. 2012. "Empowering Women through Social Entrepreneurship: Case Study of a Women's Cooperative in India," *Entrepreneurship theory and Practice* (36:3), pp. 569-587.
- Edwards-Schachter, M., and Wallace, M. L. 2017. "'Shaken, but Not Stirred': Sixty Years of Defining Social Innovation," *Technological Forecasting and Social Change* (119), pp. 64-79.
- ElMassah, S., and Mohieldin, M. 2020. "Digital Transformation and Localizing the Sustainable Development Goals (Sdgs)," *Ecological Economics* (169), p. 106490.
- Faludi, J. 2020. "How to Create Social Value through Digital Social Innovation? Unlocking the Potential of the Social Value Creation of Digital Start-Ups," *Journal of Social Entrepreneurship*), pp. 1-18.
- Fox, G., and Connolly, R. 2018. "Mobile Health Technology Adoption across Generations: Narrowing the Digital Divide," *Information Systems Journal* (28:6), pp. 995-1019.
- Gebken, L., Kurtz, C., Drews, P., Schirmer, I., and Böhmann, T. 2021. "Human-Value-Oriented Digital Social Innovation: A Multilevel Design Framework," in: Forty-Second International Conference on Information Systems. Austin.
- George, G., Howard-Grenville, J., Joshi, A., and Tihanyi, L. 2016. "Understanding and Tackling Societal Grand Challenges through Management Research," *Academy of management journal* (59:6), pp. 1880-1895.
- George, G., Merrill, R. K., and Schillebeeckx, S. J. 2021. "Digital Sustainability and Entrepreneurship: How Digital Innovations Are Helping Tackle Climate Change and Sustainable Development," *Entrepreneurship Theory and Practice* (45:5), pp. 999-1027.
- Hellemans, I., Porter, A. J., and Diriker, D. 2021. "Harnessing Digitalization for Sustainable Development: Understanding How Interactions on Sustainability-Oriented Digital Platforms Manage Tensions and Paradoxes," *Business Strategy and the Environment*).
- Hibbert, S. A., Hogg, G., and Quinn, T. 2005. "Social Entrepreneurship: Understanding Consumer Motives for Buying the Big Issue," *Journal of Consumer Behaviour: An International Research Review* (4:3), pp. 159-172.
- Huh, T., and Kim, J. H. 2019. "Multiple Conjunctural Impact on Digital Social Innovation: Focusing on the Oecd Countries," *Sustainability* (11:18), p. 4887.
- Hund, A., Wagner, H.-T., Beimborn, D., and Weitzel, T. 2021. "Digital Innovation: Review and Novel Perspective," *The Journal of Strategic Information Systems* (30:4), pp. 1-39.
- Irani, Z., and Elliman, T. 2008. "Creating Social Entrepreneurship in Local Government," *European Journal of Information Systems* (17:4), pp. 336-342.
- Leidner, D. E. 2018. "Review and Theory Symbiosis: An Introspective Retrospective," *Journal of the Association for Information Systems* (19:6), pp. 552-567.
- Majchrzak, A., Markus, M. L., and Wareham, J. 2016. "Designing for Digital Transformation," MIS quarterly (40:2), pp. 267-278.
- Manoharan, B., Parthiban, R., Qureshi, I., Bhatt, B., and Rakshit, K. 2021. "Digital Technology-Enabled Transformative Consumer Responsibilisation: A Case Study," *European Journal of Marketing*).
- Milwood, P. A., and Roehl, W. S. 2019. "Towards a Measurement Scale for Digital Social Innovation: A Responsibility-Sustainability Framework," in *Information and Communication Technologies in Tourism 2019.* Springer, pp. 371-382.
- Moss, T. W., Short, J. C., Payne, G. T., and Lumpkin, G. 2011. "Dual Identities in Social Ventures: An Exploratory Study," *Entrepreneurship theory and practice* (35:4), pp. 805-830.
- Mulgan, G. 2006. "The Process of Social Innovation," innovations (1:2), pp. 145-162.
- Muryanti, M. 2020. "Towards Social Entrepreneurship in the Village through Village-Owned Enterprises," *Society* (8:1), pp. 163-174.
- Peredo, A. M., and McLean, M. 2006. "Social Entrepreneurship: A Critical Review of the Concept," *Journal of world business* (41:1), pp. 56-65.
- Phillips, W., Lee, H., Ghobadian, A., O'regan, N., and James, P. 2015. "Social Innovation and Social Entrepreneurship: A Systematic Review," *Group & Organization Management* (40:3), pp. 428-461.

- Qureshi, I., Pan, S. L., and Zheng, Y. 2017. "Call for Papers: Digital Social Innovation," Information Systems Journal), pp. 1-8.
- Qureshi, I., Pan, S. L., and Zheng, Y. 2021. "Digital Social Innovation: An Overview and Research Framework," (31:5), pp. 647-671.
- Qureshi, I., Sutter, C., and Bhatt, B. 2018. "The Transformative Power of Knowledge Sharing in Settings of Poverty and Social Inequality," Organization Studies (39:11), pp. 1575-1599.
- Ravishankar, M. 2021. "Social Innovations and the Fight against Poverty: An Analysis of India's First Prosocial P2p Lending Platform," *Information Systems Journal* (31:5), pp. 745-766.
- Reinecke, J., and Ansari, S. 2016. "Taming Wicked Problems: The Role of Framing in the Construction of Corporate Social Responsibility," Journal of Management Studies (53:3), pp. 299-329.
- Riaz, S., and Qureshi, I. 2017. "Emergence of a New Institutional Logic: Shaping the Institutionally Complex Field of Community Radio in India," in Emergence. Emerald Publishing Limited.
- Rodrigo, L., and Palacios, M. 2021. "What Antecedent Attitudes Motivate Actors to Commit to the Ecosystem of Digital Social Innovation?," Technological Forecasting and Social Change (162), p. 120394.
- Sachs, J. D., Schmidt-Traub, G., Mazzucato, M., Messner, D., Nakicenovic, N., and Rockström, J. 2019. "Six Transformations to Achieve the Sustainable Development Goals," Nature sustainability (2:9), pp. 805-814.
- Saebi, T., Foss, N. J., and Linder, S. 2019. "Social Entrepreneurship Research: Past Achievements and Future Promises," Journal of Management (45:1), pp. 70-95.
- Santos, F. M. 2012. "A Positive Theory of Social Entrepreneurship," Journal of business ethics (111:3), pp.
- Scarlata, M., Zacharakis, A., and Walske, J. 2016. "The Effect of Founder Experience on the Performance of Philanthropic Venture Capital Firms," International Small Business Journal (34:5), pp. 618-
- Schoormann, T., and Kutzner, K. 2020. "Towards Understanding Social Sustainability: An Information Systems Research-Perspective," in: Forty-First International Conference on Information Systems. India: pp. 1-17.
- Seelos, C., and Mair, J. 2005. "Social Entrepreneurship: Creating New Business Models to Serve the Poor," Business horizons (48:3), pp. 241-246.
- Sparviero, S., and Ragnedda, M. 2021. "Towards Digital Sustainability: The Long Journey to the Sustainable Development Goals 2030," Digital Policy, Regulation and Governance).
- Stuermer, M. 2014. "Characteristics of Digital Sustainability," Proceedings of the 8th international conference on theory and practice of electronic governance, pp. 494-495.
- Stuermer, M., Abu-Tayeh, G., and Myrach, T. 2017. "Digital Sustainability: Basic Conditions for Sustainable Digital Artifacts and Their Ecosystems," *Sustainability science* (12:2), pp. 247-262.
- Sud, M., VanSandt, C. V., and Baugous, A. M. 2009. "Social Entrepreneurship: The Role of Institutions," Journal of business ethics (85:1), pp. 201-216.
- Surie, G. 2017, "Creating the Innovation Ecosystem for Renewable Energy Via Social Entrepreneurship: Insights from India," Technological Forecasting and Social Change (121), pp. 184-195.
- Suseno, Y., and Abbott, L. 2021. "Women Entrepreneurs' Digital Social Innovation: Linking Gender, Entrepreneurship, Social Innovation and Information Systems," Information Systems Journal (31:5), pp. 717-744.
- Thompson, J. L. 2002. "The World of the Social Entrepreneur," International journal of public sector management).
- Tim, Y., Cui, L., and Sheng, Z. 2021. "Digital Resilience: How Rural Communities Leapfrogged into Sustainable Development," Information Systems Journal (31:2), pp. 323-345.
- van Gils, B., and Weigand, H. 2020. "Towards Sustainable Digital Transformation," in: 2020 IEEE 22nd Conference on Business Informatics (CBI). IEEE, pp. 104-113.
- Webster, J., and Watson, R. T. 2002. "Analyzing the Past to Prepare for the Future: Writing a Literature Review," MIS quarterly), pp. xiii-xxiii.
- Wut, T. M., Lee, D., Ip, W. M., and Lee, S. W. 2021. "Digital Sustainability in the Organization: Scale Development and Validation," Sustainability (13:6), p. 3530.