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Barriers along the Digital Social Innovation Process: A Structured Literature Review

Research Paper

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Abstract. Digital social innovation (DSI) is an emerging phenomenon drawing knowledge from digital innovation (DI) and social innovation (SI), offering opportunities to contribute to societal change by leveraging the potential of digital technologies. Although DSI has evoked increasing interest, research and practice are far from realising its full potential as many barriers arise along the DSI process. Thus, holistic insights into DSI process and its barriers are essential. Therefore, we identify barriers along the DSI process through a structured literature review considering DI, SI, and DSI literature. As a result, we identified 28 barriers and classified them into the DSI barrier framework. The DSI barrier framework builds on the DI framework of Kohli and Melville (2019) and extends it by including the societal environment. We thus shed light on the DSI process and provide holistic insights into the barriers along the DSI process.

Keywords: digital social innovation, digital innovation, social innovation, barriers

1 Introduction

Societal challenges like climate change, health issues, or racial injustice receive increasing attention and become more pressing each day. As an emerging phenomenon, digital social innovation (DSI), which draws knowledge from digital innovation (DI) and social innovation (SI), appears as a ray of hope in addressing these challenges using

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digital technologies (Bonina et al., 2021; Yoo et al., 2010). For example, the DSI initiative Child Growth Monitor uses AI to efficiently detect whether a child is malnourished enabling timely help before a child's health is impaired (Welthungerhilfe, 2023).

While DSI is already highly relevant in practice, research is still in an embryonic stage, and organisations are far from realising its full potential (Bonina et al., 2021; Tim et al., 2021). So far, organisations have failed to successfully develop and implement DSI in the long term, as many barriers arise along the DSI process (Oeij et al., 2019). In the context of this paper, we understand barriers as something that hinders, challenges, or risks the progress of the DSI process, thereby inhibiting DSI's effective implementation (Fuchs and Hess, 2018; Ramilo et al., 2015).

Kohli and Melville (2019) describe a theoretical framework that structures the DI process, encompassing DI actions, environments, and outcomes. While Kohli and Melville (2019) offer a valuable contribution to understanding the DI process, addressing societal challenges has not yet been considered in this context. As we can learn a lot from the barriers that arise in the development of DSI to reach DSI's full potential (Lettice and Parekh, 2010; Neumeier, 2017), we aim to identify these barriers and thus provide insights into the DSI process. Thereby, we focus on barriers that arise along the DSI process from the perspective of the implementing organisation and aim to answer the following research question: *What are the barriers along the DSI process?*

To identify the barriers along the DSI process, we conduct a structured literature review considering DI, SI, and DSI literature (Sharma and Bansal, 2023; Wolfswinkel et al., 2013). A structured literature review is particularly suited to draw a holistic picture of the barriers along the DSI process by integrating fragmented research results across disciplines (Sharma and Bansal, 2023). To profoundly anchor our work in previous research, we use Kohli and Melville's (2019) DI framework as a basis for structuring the identified barriers. We extend this framework in the case of DSI to include the societal environment, which describes the overarching environment, i.e., society, within which DSI takes place. By classifying the 28 identified barriers into this extended framework, we build the DSI barrier framework (DBF). We thus contribute to the emerging phenomenon of DSI by identifying the barriers along the DSI process and laying the foundations for an initial framework of the DSI process. In doing so, the DBF additionally guides practitioners in implementing DSI.

2 Conceptual Framing of Digital Social Innovation

DSI is an emerging phenomenon at the interface between DI and SI (Bonina et al., 2021; Buck et al., 2020). Therefore, to define DSI it is essential to understand both underlying concepts.

DI describes the novel combination of digital and physical components (Yoo et al., 2010) and is conceptualised as consisting of DI actions, DI environments, and DI outcomes. The DI actions consist of four phases (i.e., initiation, development, implementation, exploitation) and are influenced by the internal organisational and external competitive environment (Kohli and Melville, 2019). DI strives to address unfulfilled mar-

ket and consumer demands and create economic value, by offering solutions that leverage digital technologies (Fichman et al., 2014; Kohli and Melville, 2019; Lettice and Parekh, 2010; Vega and Chiasson, 2019). Digital technologies are a crucial element of DI (Hund et al., 2021). Digital technologies have specific characteristics distinguishing them from conventional technologies, i.e., homogeneity, re-programmability, and self-referential nature (Yoo et al., 2010), as well as embeddedness, connectedness, communicability, editability, identifiability, and associability (Benbya et al., 2020). These unique characteristics of digital technologies are changing the way innovation is conducted, thus opening up new opportunities for value creation, while at the same time creating new barriers, such as the need for novel skills (Hund et al., 2021; Nambisan et al., 2017). Moreover, digital technologies are widely available and affordable, enabling broad scalability and accessibility by large parts of the population (Bonina et al., 2021; Yoo et al., 2010).

SI are innovation activities aiming to drive societal change by introducing novel solutions to societal challenges (Cajaiba-Santana, 2014; Phills et al., 2008). The motivation to improve people's well-being and to create value for society rather than satisfying economic needs drives SI (Phills et al., 2008; Solis-Navarrete et al., 2021). To unfold SI's impact, acceptance and implementation by society are crucial (Eichler and Schwarz, 2019; Purtik and Arenas, 2019). SI addresses "wicked" societal challenges, i.e., deeply rooted problems that have existed for a long time, e.g., poverty, inequality, and climate change (Deserti and Rizzo, 2020; Tracey and Stott, 2017). These challenges are unstructured, complex, and continuous. Thus, they lack a clear problem definition, involve many stakeholders, and have no "once and for all" solution (Tracey and Stott, 2017; Weber and Khademian, 2008).

Especially the wide availability and affordability of digital technologies (Yoo et al., 2010) offer new opportunities to address societal challenges at a previously unimaginable scale and speed (Bonina et al., 2021; Caridà et al., 2022; Qureshi et al., 2021). Thus, using the opportunities of digital technologies as key component of DI, while creating both social and economic value has led to DSI (Bonina et al., 2021; Dong and Götz, 2021). In the context of this paper, we follow Bonina et al. (2021) in defining DSI as using digital technologies to develop new products, services, or processes that meet societal needs or stimulate societal change. Since DSI is an emerging phenomenon, developing a theoretical understanding has only just begun (Qureshi et al., 2021). While Bonina et al. (2021) consider DSI as a whole and explore its dual value orientation (i.e., collectivistic and utilitarian), Buck et al. (2020) conceptualises the characteristics of DSI outcomes in the context of incumbents. Furthermore, Rodrigo and Palacios (2021) illustrate which factors influence employees to commit to DSI in the long-term, and Suseno and Abbott (2021) focus on the perspective of women's entrepreneurship on DSI. Moreover, various contributions explore specific use cases of DSI, e.g., how to design a digital donation system for homeless people (Gebken et al., 2021), or how open-source software can support the economically disadvantaged (Dong and Götz, 2021). While there are already initial approaches to conceptualise the DSI outcomes (e.g. Bonina et al., 2021; Buck et al., 2020), there is a lack of research regarding the DSI process. To gain insights into barriers along the DSI process, we build on the established DI framework by Kohli and Melville (2019) introduced earlier and add the

societal environment. The societal environment describes the overarching environment, where DSI occurs and extends beyond the individual organisation and its direct stakeholders. As DSI addresses wicked societal challenges, acceptance and implementation by society are crucial for DSI to unfold its impact (Eichler and Schwarz, 2019; Purtik and Arenas, 2019). During the DSI process, organisations face several barriers, such as failure to achieve societal change or the lack of credibility, hindering the progress of the DSI process (e.g. Roundy and Bonnal, 2017). Thus, holistic insights into the DSI process and the barriers involved are crucial to successfully develop DSI initiatives and unleash their full potential (Bonina et al., 2021; Qureshi et al., 2021).

3 Research Design

We conducted a structured literature review to create a holistic overview of the barriers along the DSI process, building on the approaches of Wolfswinkel et al. (2013) and Sharma and Bansal (2023).

(1) Define: We started by defining our search protocol (Sharma and Bansal, 2023; Wolfswinkel et al., 2013). As little DSI research exists so far and DSI draws knowledge from DI and SI (Bonina et al., 2021), we build on the keywords *digital innovation* and *social innovation* for our search string, already including results for *digital social innovation*. Since we want to identify the *barriers* along the DSI process, we include this keyword and its synonyms, *challenge*, and *risk*, in our search string. Consequently, the complete search string is defined as ("digital innovation*" OR "social innovation*") AND (barrier OR challenge OR risk), which we used for title, abstract, and keyword search. We selected the Web of Science Core Collection (WoS) for the literature search to cover the whole picture of DSI as WoS contains high-quality and peer-reviewed articles from a wide range of scientific disciplines such as information systems, business, and social sciences (Clarivate, 2023). Thus, WoS is a widely used database at the intersection of digital and social topics (e.g. Di Vaio et al., 2021; Eichler and Schwarz, 2019; Guandalini, 2022). Furthermore, to identify studies eligible for our review (Sharma and Bansal, 2023), we defined inclusion criteria: (i) articles taking on a DI, SI, or DSI process perspective, (ii) articles describing at least one barrier, as well as exclusion criteria: (i) articles neither written in German or English, (ii) articles not referring to an organisational context (e.g., referring to forestry).

(2) Search: We conducted the literature search across WoS, yielding 1.128 results.

(3) Select: We selected the literature, i.e., we gradually excluded irrelevant articles, following the defined search protocol (Sharma and Bansal, 2023; Wolfswinkel et al., 2013). To ensure a representative set of articles, we carried out a three-stage selection process, including title (n = 498), abstract (n = 177), and full-text screening (n = 33). For instance, we excluded the papers Ludvig et al. (2020) and Arts et al. (2020) as they do not refer to an organisational context, but to forestry and aid conservation management, whereas we included the papers Battistella et al. (2021) and Ramilo and Embi (2014) as they cover barriers arising along the DSI process. We concluded the structured literature review with a backward search (Wolfswinkel et al., 2013) including two

additional articles, leading to a final set of 35 articles. An overview of the final article set is included in Appendix A[1].

(4) Analyse: We extracted and analysed the data, using open, axial, and selective coding (Sharma and Bansal, 2023; Wolfswinkel et al., 2013). Following Wolfswinkel et al. (2013) one author employed open coding, marking relevant passages referring to barriers along the DSI process, to extract 326 codes. To derive the barriers from the identified codes, we used axial coding and iteratively clustered similar codes into common concepts (Wolfswinkel et al., 2013), leading to 28 barriers. For instance, the barrier *lack of marketing and branding* is a compilation of the codes "*Misbelief of not investing in marketing*", "*Resource scarcity for marketing*" (Roundy, 2017), "*less attention is paid (...) to brand design"* (Komatsu Cipriani, 2017), and "*lack of proper branding strategy*" (Tim et al., 2021). To ensure reliability in deriving the barriers, three authors assigned 80 randomly selected codes out of the 326 codes to the 28 barriers. Inter-coder reliability is satisfactory, with a substantial Cohen's kappa of 0,7875 (Landis and Koch, 1977). We further grouped the 28 barriers into 12 categories, which we derived inductively from the barriers, using selective coding (Wolfswinkel et al., 2013). For instance, the category *resources* is a compilation of the barriers "*lack of financial resources*", "*lack of skilled personnel*", and "*lack of digital infrastructure*". A detailed overview of the identified barriers and corresponding categories can be found in Appendix B[1]. Finally, we used the DI framework of Kohli and Melville (2019), extended by the societal environment, as a basis to assign these categories to the different elements of the DSI process, leading to the DBF. At all stages, all authors reviewed the barriers and their descriptions to discuss ambiguities and reclassify or rename barriers or categories to ensure the same level of understanding and abstraction.

(5) Present: We present and explain the final DBF in the next chapter.

4 Digital Social Innovation Barrier Framework

We identified 28 barriers (grouped into 12 categories and five main elements) along the DSI process. Figure 1 depicts our resulting DBF. An overview of the identified barriers with short descriptions and associated references can be found in Appendix B[1].

4.1 Societal Environment

The societal environment describes barriers in the overarching environment, extending beyond individual organisations and their direct stakeholders. The societal environment comprises two barriers: poor digital literacy and triggering societal rethinking.

Poor digital literacy refers to society, i.e., the intended users, not understanding digital technologies and the missing skills to use them, leading to the DSI being rejected and thus failing its purpose (Ramilo and Embi, 2014; Rosa, 2017). Furthermore, *triggering societal rethinking* is challenging for DSI, as it involves questioning deeply rooted informal institutions, i.e., implicit norms, values, and paradigms that emerge and

[1] Online-Appendix: https://figshare.com/s/79c7fd2724adeb7aaa00

establish unconsciously over time and guide actions (Scott, 2005). Such informal institutions reflect the societal mentality and attitude, for example, conservative thinking, focus on economic profit, or lack of proactive thinking (e.g. Battistella et al., 2021; Oganisjana et al., 2015). Informal institutions are widely accepted and difficult to change (Scott, 2005). However, DSI requires rethinking existing informal institutions to trigger societal change (Purtik and Arenas, 2019), as otherwise it contradicts the objective of societal change and hinders the implementation and social value creation of DSI (Cajaiba-Santana, 2014; Purtik and Arenas, 2019; Westley et al., 2014).

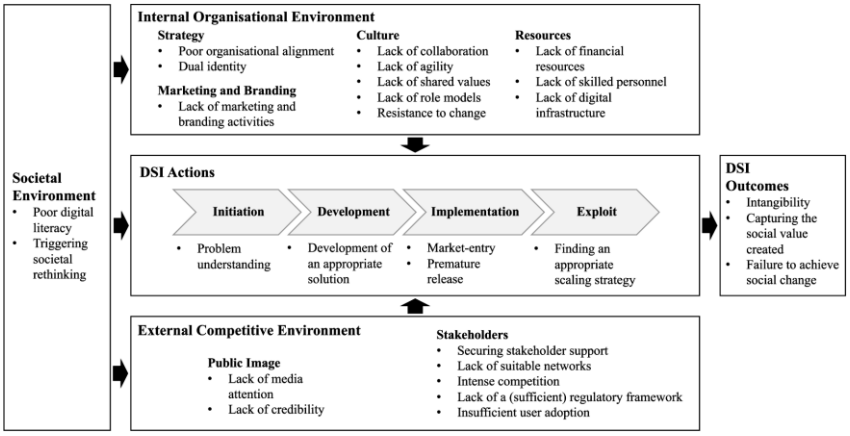

Figure 1. Digital social innovation barrier framework (based on Kohli and Melville (2019))

4.2 Internal Organisational Environment

The internal organisational environment describes organisational barriers (Kohli and Melville, 2019) and comprises eleven barriers in four categories: strategy, culture, resources, and marketing and branding.

Strategy refers to the organisation's strategic focus, determining its use of resources for value creation (Bharadwaj et al., 2013). At the strategic level, organisations must deal with the *dual identity* of DSI, i.e., the simultaneous creation of social impact and economic viability. As both objectives usually strongly interact, the barrier is to deal with the resulting tensions (e.g. Battistella et al., 2021; Deserti and Rizzo, 2020). For example, satisfying the enormous diversity of stakeholders, e.g., financial investors and societal beneficiaries (Deserti and Rizzo, 2020), or dividing scarce resources reasonably between both objectives (Roundy, 2017). Furthermore, the lack of visionary leadership, managerial support, and the resulting lack of strategic focus reflect poor *organisational alignment* for DSI (e.g. Ramilo and Embi, 2014; Vicente et al., 2020). A visionary leader takes responsibility for DSI and drives DSI in the organisation (Westley et al., 2014). In addition, managerial support is critical to create an enabling environment promoting DSI in the organisation, for example, by providing resources or increasing personnel commitment to DSI (Hsu et al., 2019). However, the novelty of integrating social, digital, and economic target dimensions makes developing a strategic

focus, and thus organisational alignment, challenging (Ribeiro et al., 2021; Tim et al., 2021; Westley et al., 2014). Additionally, poor organisational alignment leads to poor allocation of scarce resources and a lack of time allocated to DSI alongside day-to-day business (Bharadwaj et al., 2013; Moriggi, 2020; Muhos et al., 2019).

Culture describes the overall working environment and the organisation's attitude towards DSI. The *lack of collaboration* within and between different organisational units and the lack of communication and mutual alignment lead to missing trust and different development schedules (e.g. Brock et al., 2020; Dufour et al., 2014). As DSI development is highly interdisciplinary, the collaboration between different organisational units (e.g., innovation department, legal department, IT) is essential (Charalabidis et al., 2014; Guinan et al., 2019). The lack of collaboration makes it challenging to unify different organisational units working on DSI (Brock et al., 2020; Dufour et al., 2014), which leads, for example, to the technical development not matching the digital literacy of the target group. The *lack of shared values* regarding the attitude toward societal challenges, the use of digital technologies, and innovation in general (Newth and Woods, 2014; Solov'eva et al., 2018; Vicente et al., 2020) is challenging as it reduces the individual's motivation and commitment to DSI (Rodrigo and Palacios, 2021) and weakens trust in collaboration (Arena et al., 2018). For example, social and economic thinking often represent trade-offs in the DSI process, leading to the potential for conflict. However, creating a shared value base is particularly challenging for DSI, as DSI requires rethinking conventional values and business practices to achieve societal change (e.g. Solov'eva et al., 2018; Vicente et al., 2020). Furthermore, a *lack of agility* due to rigid rules and processes impedes, as requirements and circumstances can change throughout the process (e.g. Brock et al., 2020; Kayser et al., 2018). The increasing speed of digital technologies and rapid changes in societal challenges require organisations to react quickly to external changes (Battistella et al., 2021; Chalmers, 2013; Ramilo and Embi, 2014). Otherwise, DSI might fail to achieve its desired impact, e.g., by not correctly considering changed societal contexts and needs in development (Battistella et al., 2021). Due to a *lack of role models* exemplifying social responsibility and the use of digital technologies, an essential source of inspiration to pursue DSI is missing. As DSI is novel and brings uncertainty, the lack of role models leads to missing encouragement and confidence to take on the responsibility for DSI (e.g. Brock et al., 2020; Suseno and Abbott, 2021). *Resistance to change* is particularly prevalent in DSI through novel digital technologies and the questioning of informal institutions (e.g. Battistella et al., 2021; Newth and Woods, 2014). The novelty of DSI is often associated with fears, uncertainties, and a lack of openness to change (e.g. Ramilo and Embi, 2014; Roundy, 2017). DSI questions deeply rooted economic attitudes within the organisation and thus norms of "proper" business, where economic value creation is central (Battistella et al., 2021; Newth and Woods, 2014). Thus, a DSI idea might be rejected out of the fear of diminishing economic success.

Resources describe the assets and capabilities of an organisation, which are essential in detecting and pursuing DSI ideas (Wade and Hulland, 2004). Missing required resources hinder the DSI process as it leads to the organisation discarding a relevant DSI idea or implementing a DSI idea only in a limited way (e.g. Battistella et al., 2021; Cichosz et al., 2020). The *lack of financial resources* limits necessary investments, e.g.,

investments in digital infrastructure (e.g. Chalmers, 2013; Grant, 2017). Especially the dual identity of DSI makes acquiring financial resources challenging. Due to its commercial nature, it is difficult to obtain donations. Due to its social nature, it is difficult to attract (private) investors, which are usually mainly interested in financial returns (Newth and Woods, 2014; Popov et al., 2016). In addition, the *lack of skilled personnel* (i.e., managers and employees) (e.g. Arena et al., 2018; Battistella et al., 2021) is caused by the lack of appropriate education and training (e.g. Dufour et al., 2014; Kayser et al., 2018). The lack of digital, social, and managerial expertise hinders identifying new opportunities and implementing DSI (e.g. Muhos et al., 2019; Ramilo and Embi, 2014). This mainly includes understanding and using digital technologies reasonably (e.g. Brock et al., 2020; Kayser et al., 2018) as well as comprehending societal challenges and handling them appropriately (Battistella et al., 2021; Schartinger et al., 2020). Apart from that, as DSI is often mainly driven by a social mission, there is a common lack of knowledge about the commercial side of the business, for instance, funding, networking, and leadership. Without managerial expertise, it is challenging to ensure that DSI stays financially viable (e.g. Deserti and Rizzo, 2020; Živojinović et al., 2019). Finally, the *lack of digital infrastructure* hinders the DSI process. DSI uses digital technologies as a means or purpose in the DSI process and the outcomes (Bonina et al., 2021; Nambisan et al., 2017). Thus, the availability and functionality of digital technologies as a functioning digital infrastructure are fundamental to the DSI process, and their absence inhibits DSI implementation (e.g. Tim et al., 2021; Vicente et al., 2020).

Marketing and branding refer to developing strategies to communicate the value of DSI to the customer (Roundy, 2017). The *lack of marketing and branding* activities arises partly due to a lack of experience (Tim et al., 2021). Their importance is mainly underestimated because of the misconception that it would be contrary to the social mission to invest resources in marketing and branding activities instead of directly devoting them to societal challenges. The lack of investment in marketing activities and the failure to build a brand result in a lack of visibility of DSI in public, i.e., to potential customers and users (Komatsu Cipriani, 2017; Roundy, 2017; Tim et al., 2021).

4.3 External Competitive Environment

The external competitive environment describes barriers outside the organisation influencing the DSI process (Kohli and Melville, 2019). The external competitive environment comprises seven barriers in two categories: *stakeholders* and *public image*.

Every organisation interacts with **stakeholders** in its external competitive environment, including regulatory, organisational, and community stakeholders, as well as mass media (Henriques and Sadorsky, 1999). As DSI is highly interdisciplinary and involves different societal groups, organisations must deal with many stakeholders, which must be considered individually (Battistella et al., 2021; Živojinović et al., 2019). Stakeholder support is essential for DSI's existence by providing resources or contributing to its social value through DSI usage (Tanimoto, 2012). However, *securing stakeholder support* is challenging as stakeholders must be convinced of the value created by DSI. Moreover, the stakeholders' economic, social, and technological expectations must be constantly met (e.g. Solov'eva et al., 2018; Wood, 2012). Due to the novelty

of DSI, however, it is challenging to properly communicate the mission of DSI and the benefits that each stakeholder will receive (Muhos et al., 2019). Furthermore, in pursuing DSI, organisations often experience a *lack of suitable networks* (Chalmers, 2013; Lettice and Parekh, 2010; Sammut et al., 2020). Networks enable better handling of the complexity of the wicked societal challenges DSI seeks to address by engaging partners for mutual support and exchange (e.g. Qureshi et al., 2021; Sammut et al., 2020). However, due to DSI's dual identity, an organisation neither belongs entirely to the commercial nor the social side. Both networks have reservations about DSI as DSI questions their fundamental principles of either creating social or economic value, but not simultaneously (Battistella et al. 2021). In addition, the *lack of a (sufficient) governmental framework* results in DSI taking place in an institutional void, i.e., there are no or no sufficient rules, regulations, or laws concerning DSI (e.g. Newth and Woods, 2014; Popov et al., 2016). Missing supportive regulations lead, for example, to a lack of public funding (Newth and Woods, 2014; Živojinović et al., 2019) or a deficiency of suitable organisational and legal forms, limiting applicable business and investment models (Newth and Woods, 2014). Furthermore, DSI faces *intense competition* (Tim et al., 2021). Through digital technologies, which enable accelerated dissemination independent of time and place (Nambisan et al., 2017; Yoo et al., 2010), competition occurs locally and globally (Ramilo and Embi, 2014). In addition, DSI competes both in ethical markets, i.e., with social objectives (Nicholls 2007), and traditional markets, i.e., with economic objectives (Komatsu Cipriani, 2017). Moreover, *insufficient user adoption* is a barrier for DSI. Across different user groups, the novelty of DSI causes uncertainty and hesitation (Purtik and Arenas 2019; Roundy 2017). For instance, there are often doubts about technical functionality and usability or the fear of sacrificing privileges (Purtik and Arenas, 2019). In addition, many users presume lower quality and attractiveness for products and services generating social value and view these products and services with great scepticism (Roundy, 2017). If the user does not adopt DSI, it cannot unfold its social value (Eichler and Schwarz, 2019; Purtik and Arenas, 2019).

Public image describes how society perceives DSI. The individual DSI often experiences a *lack of media attention* as it competes with other DSIs for media attention. This leads to the concept and relevance of the individual DSI remaining unknown by the public, thus limiting awareness of the DSI and its social impact. This results in fewer customers, users, or partners becoming aware of DSI, leading to less growth and support (Schartinger et al., 2020; Solov'eva et al., 2018). Furthermore, DSI often *lacks credibility*, which results from the social aspect often being misused as a marketing measure to improve an organisation's image. In doing so, the organisation's communication is misleading as it presents its societal engagement more positively than the truth (Roundy, 2017; Roundy and Bonnal, 2017). As a result, if the customer does not believe in an honest link between DSI and the societal challenge, the customer loses trust and denies DSI's legitimacy (Roundy, 2017).

4.4 DSI Actions

The DSI actions comprise five barriers in four categories: *initiation, development, implementation,* and *exploitation* (Kohli and Melville, 2019).

The **initiation** phase identifies new business opportunities and creates novel ideas for DSI (Kohli and Melville, 2019). The central barrier is *problem understanding*, i.e., understanding the underlying problem and its ecosystem from both a social and an economic perspective and ultimately developing a corresponding DSI idea (Lettice and Parekh, 2010; Roundy and Bonnal, 2017). Understanding the underlying problem in-depth and finding its root cause is difficult due to the multi-layered nature of the wicked societal challenges DSI seeks to address (Chalmers, 2013). However, a thorough understanding of the problem is crucial to not only alleviate symptoms but ultimately drive societal change (Lettice and Parekh, 2010).

The DSI idea is realised in the **development** phase by building a new solution or adapting an existing one (Kohli and Melville, 2019). However, *developing an appropriate solution* is challenging and requires economic and technical feasibility to ensure DSI's long term success (e.g. Kayser et al., 2018; Roundy and Bonnal, 2017). Economic feasibility is questionable if it is not sure that the DSI can build a viable business, for instance, in the case of a niche challenge. DSI cannot survive in the long term, if economic feasibility is not ensured (Roundy and Bonnal, 2017). Technical feasibility is questionable if it is uncertain that the DSI idea can be technically implemented (Kayser et al., 2018). Barriers in technical implementation include, for instance, selecting a suitable digital technology (Cichosz et al., 2020) or considering relevant data processing and data protection regulations (Kayser et al., 2018). If the technical feasibility is not adequately assessed, it leads to subsequent implementation problems and the unnecessary consumption of scarce resources (Dufour et al., 2014; Rosa, 2017).

The **implementation** phase describes the launch of DSI (Kohli and Melville, 2019). As DSI enters conventional market structures and approaches societal challenges in a new way, *market-entry*, i.e., placing a new solution in the market and finding customers, is challenging (Lettice and Parekh 2010). If the customer does not understand the value of using digital technologies to address societal challenges, is unaware of, or does not understand the societal challenge, it becomes difficult to convey DSI's value proposition (Battistella et al., 2021; Purtik and Arenas, 2019; Ramilo and Embi, 2014). The lack of awareness and understanding of the societal challenge leads to questioning DSI's relevance (Schartinger et al., 2020). If DSI is not granted legitimacy, it will not attract customers (Lettice and Parekh, 2010; Ramilo and Embi, 2014; Schartinger et al., 2020), thus, leading to the DSI not surviving financially in the long term (Roundy and Bonnal, 2017). Furthermore, a *premature release* is a barrier to DSI. A hastily introduced solution that does not sufficiently consider interrelationships might have a negative impact by exacerbating the societal challenge or causing adverse side effects (Roundy and Bonnal, 2017). Moreover, DSI should only be introduced to the customer once a certain level of technical maturity has been reached and the business model has been sufficiently elaborated. Otherwise, DSI could fail critical evaluations due to significant technical bugs or contradictions in the business model (Muhos et al., 2019).

Finally, **exploitation** refers to DSI's utilisation (Kohli and Melville, 2019). The barrier with exploitation is *finding an appropriate scaling strategy* that leverages the easy scalability of digital technologies while considering the environmental context, for instance, local regulations (Deserti and Rizzo, 2020), and the organisational context, for instance, access to resources (Deserti and Rizzo, 2020; Tim et al., 2021). In the context

of DSI, scaling refers to reaching more and more users and aiming at solving the underlying societal challenge. If an appropriate scaling strategy is not found, societal change may not be achieved, or only to a limited extent (Westley et al., 2014).

4.5 DSI Outcomes

The DSI outcomes are either a product, a service, or a process (Bonina et al., 2021). The DSI outcomes comprise three barriers: *intangibility, capturing social value,* and *failure to achieve societal change.*

Intangibility refers to the digital materiality of DSI, which makes it difficult to perceive the outcome as such. Digital materiality, which enables and requires continuous development even after market entry, leads to difficulty in clearly defining the outcome, which triggers uncertainty (Brock et al., 2020). Furthermore, as social value creation cannot be expressed in economic figures, *capturing social value* is challenging (Battistella et al., 2021; Geobey et al., 2012). While economic value can be measured and uniformly represented by figures, social value is individual, highly subjective, and often deferred and implicit, restricting uniform valuation (Geobey et al., 2012; Popov et al., 2016). This is particularly challenging for funding as most investors are interested in clearly measurable and consistently recorded figures, but these often cannot reflect the impact and value of DSI (Antadze and Westley, 2012; Battistella et al., 2021). Ultimately, the *failure to achieve societal change* contradicts DSI's central objective (Bonina et al. 2021). Societal change is challenging to achieve as often only symptoms are alleviated instead of reaching the societal challenge's core (Lettice and Parekh, 2010; Westley et al., 2014). Furthermore, due to the complexity of societal challenges (Chalmers, 2013), there is a risk of neglecting systemic interrelationships and thus exacerbating the societal challenge to be addressed or triggering adverse side effects, i.e., solving one problem might cause or worsen another one (Roundy and Bonnal, 2017).

5 Contribution and Implication

To unleash the full potential of DSI, capturing the barriers along the DSI process to prevent and counteract them timely is crucial (Bonina et al., 2021; Neumeier, 2017; Qureshi et al., 2021). Addressing this issue and following the call for further DSI research (Qureshi et al., 2021), we contribute the DBF. The DBF includes 28 barriers in 12 categories along the DSI process, structured around five main elements (i.e., societal environment, internal organisational environment, external competitive environment, DSI actions, and DSI outcomes).

Our theoretical implications are twofold. First, we contribute to research on factors influencing the DSI process by identifying 28 barriers along the DSI process. While literature describes capturing and counteracting barriers as crucial for successfully developing DSI, these barriers have not yet been comprehensively identified (Neumeier, 2017; Ribeiro et al., 2021). With the DBF, we contribute descriptive knowledge, which provides a holistic overview of the barriers along the DSI process and thus lays the foundation for further descriptive, explanatory, and prescriptive knowledge (Gregor,

2006). Second, we extend existing DSI research by laying the foundations for theorising the DSI process. So far, the focus has been on the DSI outcome (Bonina et al., 2021; Buck et al., 2020), whereas the DSI process has been insufficiently explored. To profoundly anchor our work in previous research, we build on the DI framework of Kohli and Melville (2019) and extend it to a DSI framework. To this end, we introduce the societal environment as an additional element in the DSI process, as acceptance and implementation by society are crucial for DSI to unfold its impact (Eichler and Schwarz, 2019; Purtik and Arenas, 2019). In this way, we propose an initial framework of the DSI process.

Additionally, our research offers two valuable recommendations for practitioners. First, our DBF provides an overview of and thus raises awareness for, the various barriers organisations face in the DSI process. For example, organisations can use the DBF to analyse their organisation-specific barriers and thus identify and understand their weaknesses and threats in developing DSI. Such an assessment, in turn, allows considering possible barriers in advance and taking countermeasures at an early stage, enabling organisations to allocate their scarce resources wisely. Second, our DBF offers organisations insights into the DSI process. The five elements of the DSI process serve as a guide to delineate the individual process steps and reflect on possible influences. Guiding organisations in the DSI process, our framework supports practitioners in developing strategies to implement DSI and thus realise the full potential of DSI.

6 Conclusion

DSI is an emerging phenomenon that enables organisations to address societal challenges by leveraging the opportunities of digital technologies (Bonina et al., 2021). To realise the full potential of DSI, it is essential to gain insights into the DSI process and its barriers to address them timely and adequately (Neumeier 2017). Therefore, we derived the DBF, including 28 barriers in 12 categories assigned to the five elements of the DSI process, i.e., societal environment, internal organisational environment, external competitive environment, DSI actions, and DSI outcomes.

Further research can broaden the scope of the literature search and include additional articles to get a more comprehensive picture. Furthermore, due to our research's qualitative nature, all barriers must be treated as hypotheses and propositions. Thus, although each barrier is based on a theoretical foundation, we do not provide validation. Therefore, the explanatory power of the DBF has yet to be investigated through confirmatory research. Further research should employ quantitative approaches as an opportunity to generalise and validate our findings. Moreover, we have treated all barriers equally important, as we cannot deduce from the literature that some barriers are generally more critical than others. Additionally, we did not investigate interactions between different barriers. Therefore, further research should determine the barriers' relevance and interactions across different industries and organisational contexts. Finally, we noted a lack of knowledge regarding systematic recommendations for organisations to manage DSI. Accordingly, we call for future research on DSI in general.

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