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Towards sustainable digital transformation for SMEs: an agenda for future studies

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The concept of sustainable development draws a great deal of attention from scientists to "meet the needs of the present without compromising the ability of future generations to meet their needs" (Brundtland report, 1987, p. 1948). In 2019, the European Commission adopted the European Green Deal, a long-term strategy to achieve a more sustainable Europe¹. It launched the concept of "sustainable digitalization" as a responsible, ethical, and sustainable digitalization, delivering environmental, social, and governance (ESG) benefits while carefully managing the risks of harm².

SMEs can greatly contribute to this dual transition (towards sustainability and digitalization) thanks to their vital role in economic growth³. Indeed, new opportunities for entrepreneurs can benefit from sustainable technologies (Troise et al., 2022). Thus, the European Commission prioritizes support for SMEs' digital and sustainable transformation since "the achievement of a climate-neutral, resource-efficient and flexible digital economy requires the full mobilization of SMEs"⁴.

This paper aims to provide a literature review on the sustainable digital transformation of SMEs to determine what contributes to developing sustainable digitalization in SMEs. It

¹ <https://www.consilium.europa.eu/en/policies/green-deal/>

² <https://www.sdp.digital>

³ <https://www.oecd.org/cfe/smes/2090740.pdf>

⁴ https://single-market-economy.ec.europa.eu/smes/sme-strategy_en

would help government decision-makers and SME top managers to develop digitalization strategies for sustainable business development.

1. Sustainable digitalization as a balance

Sustainable digital transformation (SDT) is increasingly emerging in the academic literature to study the process of digitalizing the economy in a long-lasting, green, and organic way by building on its key strength: innovative companies and their business ecosystems (F. Mihai et al. 2022, N. Tsolakis et al., 2022). Due to the scale, scope, and speed involved, the SDT phenomenon can be viewed as an evolution of the transformation process thanks to information technology (Nyagadza, 2022). However, sustainable digital transformation has not yet been clearly theoretically defined which contributes to many difficulties associated with understanding it. So, our understanding of digital transformation sustainability is still in its early stages.

Thus, what does sustainable digitalization mean?

To answer this question, scholars recently developed research programs to understand better the relationship between digitalization and sustainability. In the literature review, there are two different approaches.

1st approach: positive digitalization

In the management area, the first approach focuses on “positive digitalization”, i.e. digital transformation's positive influence on sustainability. Indeed, the aim of digitalization can become sustainability. From this point of view, digital sustainability refers to efforts to design and implement digitalization to achieve sustainable economic growth while integrating sustainable goals (Mondejar et al., 2021). So, in the area of environmental goals, digitalization is supposed to be a driver of changes to protect the environment, reduce resource consumption, reduce carbon emission, reduce waste, and introduce many other business activities that support green investments and events (Happonen et al., 2020; Vozaa et al., 2022).

2nd approach: digitalization as a danger to sustainability

A second approach states that new technologies are a paradoxical injunction contributing to aggravating the ecological, geopolitical, social, and financial crises we are experiencing today (Aggeri, 2024). Despite many advantages, digitalization is indicated as a danger to environmental protection and impact on reduction goals. Indeed, there are concerns related to the social negative (e.g., workforce replacement) (Lichtenthaler, 2021) and environmental effects of digitalization, such as increased carbon emission (Acciarini et al., 2021). Studies such as Bohnsack et al. (2022), Beltrami et al. (2021), and Ghobakhloo et al. (2021) also suggest that the positive implications of I4.0 for firms do not automatically translate into positive effects on the environment or society. The development of new digitalized technologies affects climate protection, causes energy and resource consumption, and negatively affects the whole environment (Karlsson, 2017; Vozaa et al., 2022) and some research highlights the importance of some actions to mitigate the unintended negative sustainability impacts of I4.0 at a company, supply chain, and policy levels (M. Dieste et al., 2023). But at the same time, these actions may unintentionally conflict with other sustainability objectives. It raises the need to challenge the current literature on positive digitalization.

The development of such new technologies often gives rise to debates and projections that oscillate between enthusiasm and mistrust (Simondon, 1958; Krohmer & al., 2019).

In this paper, we propose to go beyond this positive vs. negative approach to digital transformation from a sustainable point of view. It implies considering positive as well as negative effects on sustainable development and defining SDT as a balance between digital and sustainable. For Aggeri, this raises the question of responsibility and of conducting sustainable transformation compatible with planetary limits and the needs of future generations.

It is more than a question of the negative and positive side of this process - we propose to focus on how people could overcome these adverse impacts of digitalization towards sustainability due to their sustainable commitment and competencies.

2. Sustainable digitalization in SMEs

The European Digital SME Alliance defined SDT along three interrelated dimensions. First, sustainable business-to-business (B2B) digitalization focuses on long-term relationships, then second, on green technologies and circular economy, and third, on policies and regulations that promote innovation⁵. Here, we propose an alternative to the positive prevailing approach.

The prevalence of a positive approach in SMEs

Most papers dealing with SMEs adopt a positive perspective, trying to put in evidence how SMEs can promote digital transformation that has a positive impact on sustainability.

Digitalization triggers a complex mechanism of interaction between various firm factors, market dynamics, and forms of institutionalization, which are intrinsically intertwined with the concepts of sustainability and resilience (Iannone & Caruso, 2023). In this context, several papers put in evidence the positive effects of digitalization on sustainability in SMEs.

For example, some papers show positive effects of digitalization in terms of cost reductions, reduction of raw material uses and waste, and indirect improvements in customer satisfaction (Gregori & Holzmann, 2020; Acciarini et al., 2021). Digitalization has the potential to improve decision-making in SMEs to achieve greater efficiency in the production process, leading to reduced utilization of natural resources, such as water management, and minimized waste during the final stages of production (Jabbour et al., 2019; Nascimento et al., 2019).

SDT as a concern in SMEs

⁵ <https://www.digitalsme.eu/sustainable-digitalisation/>

“Digital technologies represent a key concern for SME managers and policymakers” (Morgan-Thomas, 2016, p. 1122). Some researchers suggest starting with SME digitalization and proceeding to SME digital transformation because the last one “is the most pervasive and complex phase” because the overwhelming majority of resource-constrained SMEs are not equipped for this level of complexity (Verhoef et al., 2019).

Furthermore, at the same time, SME digitalization efforts may unintentionally conflict with other sustainability objectives of SMEs. For example, even though digitalization and sustainability, although positively related to each other, may compete for growth paths when SMEs internationalize (Denicolai et al., 2021). It is also crucial to realize that most SME entrepreneurs do not manage to be simultaneously sustainable and digital. The approaches toward enhancing the organizational resilience of SMEs depend on types of sustainable digital entrepreneurs (SDEs) (Isensee et al., 2023).

Towards a third approach: digitainability in SMEs

SMEs still need to improve this sustainable digitalization process (Battaglio & al., 2010) and to find an adequate answer to the changing technological landscape to ensure both their survival and sustainability (Bos-Brouwers, 2009). But, to establish such a transformation, SMEs face core difficulties (lack of time, money, and experience) in dealing with fundamental-induced changes in organizational strategies, structures, and processes.

In this context, some authors recently started to propose a third approach to studying SDT in SMEs - digitainability. Digitainability is a mindful use of digitalization: “We are referring to the capability to be aware of where we are in the digitalization development process and how we plan to utilize it further, considering it in a comprehensive sustainability context” (Gupta et al., 2022). From this point of view, the SMEs objective is to build a balance: i.e., to combine doing good and avoiding bad to arrive at innovative solutions for achieving a “net positive impact” in the core business rather than merely targeting “no net loss” by reducing

harm for the environment and society (Lichtenthaler, 2023). The aim is to build potential cross-fertilization effects between digitalization and sustainability through SME transformation (Lichtenthaler, 2021).

In our research, we propose to focus on this new approach because boundaries between the physical and the digital world have included social and environmental impacts. Indeed, some previously mentioned research highlights the predominance of organizational drivers over technological and environmental ones.

3. How to foster digitainability?

Most papers related to this new approach have three objectives (Lichtenthaler, 2021): 1. To characterize SDT by refining the digitainability definition, 2. To identify transformation enablers, and 3. To empower balanced digitainability by putting in evidence initiatives that are directed at combining sustainable and digital transformation.

The transformation enablers

Some recent empirical surveys (Saari et al., 2022; Tick & al., 2022) put in evidence different clusters of SMEs, depending on the perception of digital transformation's positive and negative impacts on sustainability - Concerned Inspires and Indifferent Conservative. To understand this difference strategic intent has a role to play, but also transformation enablers (i.e., catalysts for SDT).

A study by Ardito et al. (2021) helps to understand the strategic dimension. It shows that SME digital and environmental orientation positively affects product and process innovation performance, while a dual strategy towards digitization and environmental sustainability negatively affects process innovation performance and is not significant for product innovations.

Some other papers identify the “green digitalization tools” as enablers of digitainability, suggesting SMEs adopt these tools to improve their sustainable performance and integrate digitalization into their sustainability strategy.

A third enabler is sustainability culture, i.e., when ecological issues shape organizational culture and digitization processes. For example, a case study on a German company shows that company members widely believe that digital technologies enable pro-environmental behavior (Isensee et al., 2022).

However, none of the reviewed studies investigated the impact of environmental sustainability on organizational culture or the level of digitalization.

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Develop sustainable competencies

Over the past few years, competencies for sustainable development have received much attention in sustainability literature. Grounded on UNESCO 8 competencies for sustainability, Dentoni et al. (2012) have developed a framework consisting of seven competencies which are required”: systems-thinking competence, foresight-thinking competence, normative competence, embracing diversity and inter-disciplinarity, interpersonal competence, action competence, and strategic management.

Among these competencies, current literature shows that collective intelligence is a key step in promoting SME stakeholders' acceptance of sustainable digital transformation.

Collective intelligence is defined as groups of people acting in a collectively intelligent manner (Malone & Berstein, 2022). Developing this competence has become a major goal of current research (Chédotel & Krohmer, 2021).

Adopting a collective competence perspective facilitates initiating transformations (Geissenger & al., 2018) and refers to how SMEs use sustainable digital technologies, by helping people achieve this common goal (Le Dinh & al., 2018).

Leadership style is connected to the development of such competencies (e.g., Brulhart, Favoreu & Loufrani-Fedida, 2019). Findings highlighted that managers are responsible for shaping positive employee attitudes toward digitalization. However, there is a gap in determining the role of employees. It may be explored by operating a distinction between the mental states of owner-managers and employees and the reciprocal influence of managers and employees (Isensee et al., 2020).

The road map for a future research program

Sustainable digitalization is a hot topic and requires research and empirical studies. As mentioned above, the priority task is to increase considerably the number of SMEs engaging in SDT.

Current study on SMEs also shows the urgent need to involve all stakeholders in sustainable digital transformation (Berger-Douce, 2022) due to the difficulties of adopting such a strategy and specific problems encountered by SMEs (lack of money, time, and resources). In this context, our research project aims to explore how to promote sustainable digital transformation of SMEs. An emergent literature review shows that to promote a balanced approach to SDT in SMEs, we need to overcome the positive vs. negative traditional approach and deepen our understanding of digitainability.

So, our objective is to conduct some exploratory surveys to identify enabling factors and key competencies that lead to SDT in SMEs thanks to a 2-year-long research project entitled CIDI STEP (The potential of collective intelligence for sustainable digital transformation in SMEs), funded by MSCA4Ukraine.

Thanks to the EU-Green project, we propose to develop new collaborations about SDT to help public decision-makers and SME managers implement a successful digitalization of their organization.

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