

## Sustainable Business Model Innovation for Society 5.0: Towards a Collaborative, Inter- and Transdisciplinary Approach with Students and Organizations

Ananda Wyss<sup>1</sup>, Rolf Meyer<sup>2</sup>, and Michael von Kutzschenbach<sup>3</sup>[0000-0002-1174-8378]

<sup>1</sup> Institute of Management, Schools of Business, FHNW University of Applied Sciences and Arts Northwestern Switzerland, Bahnhofstrasse 6, 5210 Windisch, Switzerland  
✉ [ananda.wyss@fhnw.ch](mailto:ananda.wyss@fhnw.ch)

<sup>2</sup> Institute of Management, Schools of Business, FHNW University of Applied Sciences and Arts Northwestern Switzerland, Riggerbachstrasse 16, 4600 Olten, Switzerland  
[rolf.meyer@fhnw.ch](mailto:rolf.meyer@fhnw.ch)

<sup>3</sup> Institute of Management, Schools of Business, FHNW University of Applied Sciences and Arts Northwestern Switzerland, Peter Merian-Strasse 86, 4002 Basel, Switzerland  
[michael.vonkutzschenbach@fhnw.ch](mailto:michael.vonkutzschenbach@fhnw.ch)

**Abstract.** Digital transformation and sustainability are but two developments in a society 5.0 that challenge businesses to rethink their business models. Sustainable business model innovation should enable companies to operate within planetary boundaries while ensuring their long-term success. Following a design-based approach, this action-oriented research addresses how higher education institutions can offer educational initiatives that strengthen students' and organizations' capabilities for sustainable business model innovation. This paper confirms and addresses the need for more research on collaborative, inter- and transdisciplinary educational approaches for sustainable business model innovation with students and organizations.

**Keywords:** Sustainable Business Model Innovation, Higher Education, Know-How Transfer, Action-Oriented Learning

### 1 Introduction

Society 5.0 envisions a sustainable, inclusive socio-economic society powered by digital technologies [1]. The vision highlights two key developments that raise considerable challenges and opportunities for organizations: digital transformation and sustainability. Digital technologies have fundamentally changed how we work and interact, especially seen during the COVID19 pandemic [2]. However, although many positive aspects have been hailed, these changes have also raised considerable debates around their social, ethical, and political implications [3]. On the other hand, mounting concerns over environmental and social issues have argued for a monumental shift towards increasing sustainability [4,5], calling for businesses to move beyond the pursuit of

DOI: 10.5281/zenodo.5203145

mere profit maximization. These developments have made it imperative for organizations to rethink their business models to not only ensure long-term competitiveness but also contribute to solving societal issues [6,7].

Successful business model innovation goes beyond product, service, and technological innovation to transform how business is done [6]. Within this context, the importance of sustainable business model innovation (SBMI) has increased and should enable companies to operate within planetary boundaries [5,8], increase their competitive advantage, and improve their internal capabilities for innovation and change. However, SBMI depends heavily on harnessing the collective capabilities of diverse stakeholders and the quality of local institutions and ecosystems [7]. In this line, collaborative, inter- and transdisciplinary innovation approaches have become increasingly important. This emphasizes a need for fundamental changes in existing innovation practices and may unearth organizational or cognitive barriers [9]. Furthermore, given the transformations needed to move towards true sustainability and the bounty of ethical considerations that accompany the use of digital technologies [3], a critical reflection is required on the mental models that underscore traditional “business as usual” approaches.

Current research on SBMI acknowledges a need for more research into how organizations can transition to more sustainable business models [6,7] and the appropriate tools and processes to support them [7,10]. Consequently, research in these areas has increased [6,7,11]. However, one area that remains under researched is the educational facet in supporting organizations in such transitions [12]. Higher education institutions (HEIs) can play a significant role in helping organizations meet the challenges of SBMI [13]. On the one hand, by educating responsible future leaders [14] who see business as a means to transform and serve society [15]. On the other hand, by providing spaces for creative experimentation in collaboration with industry to benefit both student learning and businesses’ innovation capability [16]. Although several learning collaborations and formats between HEIs and organizations exist, only a few give specific focus to SBMI [12]. SBMI strongly calls for inter- and transdisciplinary approaches that are biased towards action and learning by doing and while the literature on *Higher Education for Sustainable Development* (HESD) contributes greatly to competences and learning methods [17,18]. What appears insufficiently addressed is research on the practical implementation thereof for SBMI.

Therefore, our action-oriented research project aims to provide practical insights on appropriate educational initiatives for collaborative, inter- and transdisciplinary SBMI with students and organizations. This research contributes to practice and the literature streams of SBMI and HESD. Spread over five phases, we investigate the formats, content, processes, and success factors of existing initiatives. With the information obtained, pilot projects are developed to experiment and unpack further insights. The remainder of this paper is structured as follows. Section 2 describes the key theoretical concepts relevant to this project. Section 3 introduces the project, the research design, and the preliminary results of the project’s first phase. Section 4 concludes this paper.

## 2 Key Concepts

### 2.1 From Business Models to Sustainable Business Model Innovation

**Business Models.** Although *Business Models* (BM) and *Business Model Innovation* (BMI) have grown into a robust body of knowledge over the last 15 years, the theory is still in a consolidation period with some conceptual inconsistencies and ambiguity [6,19]. In essence, a business model (BM) explains how business is conducted and “describes the design or architecture of the value creation, delivery and capture mechanisms” of a firm [20 p.191]. A BM is often depicted in an overarching concept comprised of the business’s different components [20-23]. The extant literature provides many representations emphasizing a lack of consensus about what a BM consists of [24]. One of the most referenced, *The Business Model Canvas* (BMC), considers nine blocks for value creation [25]. Further well-known examples include the 7-Keys model of the University of Applied Sciences Northwestern Switzerland (FHNW) [26], and Gassmann et al.’s [22] conceptualization with four central dimensions: The Customer (Who), the value proposition (What), the value chain (How), and the profit mechanism (Why). On the rise are depictions that include social and ecological considerations such as the *Sustainable Business Canvas* (SBC) [27]. A BM, however, consists not only of its components but also the linkages and interactions among them [28]. Table 1 provides a comparison of the four mentioned forms of representation and their components.

**Table 1.** Comparison of Selected Business Model Representations and their Key Components.

<i>BMI</i> Gassmann et al. [22]	<i>BMC</i> Osterwalder et al. [25]	<i>7-Keys Model</i> Meyer & Tavic [26]	<i>SBC</i> Tiemann & Fichter [27]
Who?	Customers	Customers	Vision & Mission with Social & Environmental Goals Customers Competitors Other Stakeholders
What?	Value Proposition	Products & Services Competition	Value Proposition
How?	Sales Channels Customer Relationships Key Partners Key Activities Key Resources	Market Development Resources	Key Partnerships Key Activities Key Resources
Why?	Cost Structure Revenue Streams	Money Person/Team	Cost Structure Revenue Model

Evident in Table 1 is that the focus of the first three representations remains more closely on the organization as the main object. In contrast, the SBC acknowledges the business as embedded in a bigger context, including social and ecological considerations and with broader stakeholder involvement.

**Business Model Innovation.** Rapid technological advances and resulting competitive pressures have pushed *Business Model Innovation* (BMI) to the top of management and academic agendas [6,29]. BMI refers to the process of altering a BM in response to internal and external incentives by developing, diversifying, acquiring, or transforming it [6, 7]. Innovating a BM differs from product or process innovation in that it significantly affects at least two dimensions [30]. BMI, according to Foss and Saebi [6], is a dynamic process that may occur in varying degrees of intensity, depending on the degree of innovation implemented, such as new to the firm or new to the market, or the extent of the changes, such as individual components or systemic/architectural structure. Successful BMI generates value for customers, various stakeholders in the ecosystem and captures value for the firm [30]. However, BMI presents a challenge for firms, and organizational or cognitive barriers may arise [9]. Organizational barriers may be linked to resource allocation, complexities surrounding BM development parallel to existing BMs, or inertia triggered by concerns about the efficacy of new BMs [9,24]. Managers' ability to imagine or identify alternative BMs, and their knowledge of the critical systems, skills, or processes, may be hindered by cognitive barriers [9,24].

**Sustainable Business Model Innovation.** Mounting concerns over social and environmental issues have led governments, investors, companies, and civil society's growing interest in sustainability. To the good of current and future generations, sustainability envisions a balanced convergence of economic performance, social inclusion, and environmental resilience [31].

Consequently, Sustainable Business Model Innovation (SBMI) has received increasing attention [7,32] which involves *"the analysis and planning of transformations to a more sustainable business model or from one sustainable business model to another. This comprises both the development of an entirely new business model and the transformation of an existing business model"* [7 p.409]. In this context Sustainable Business Models (SBMs) have been defined as boundary-spanning and interactive systems [10], which according to Geissdoerfer et al. [7] *"incorporate pro-active multi-stakeholder management, the creation of monetary and non-monetary value for a broad range of stakeholders and hold a long-term perspective"* [7 p.403]. SBMI, therefore, builds on traditional BMI but applies to an extended context, incorporating sustainability as guidelines for BM design, and seeks to contribute positively to the environment and society in addition to capturing economic value [19,33,34]. Several SBMIs have emerged, and a few examples include circular-, regenerative-, decarbonized-, equity-focused-, local- or degrowth-inspired BMs [35].

Companies are increasingly recognizing that sustainability can be a source of innovation and competitive advantage. Geissdoerfer et al. [7] go as far as to argue that the comprehensive advantages SBMs offer organizations will ultimately render the concept of non-sustainable BMs obsolete. The challenge, however, lies in considering a broader context and moving beyond incremental innovations such as technological innovations or operational changes that reduce cost and risk to more radical organizational, institutional, and social innovations [36]. To this end, researchers have called for more research into how organizations can transition to more SBMs [6,7] and the appropriate tools and processes to support them [7,10].

## 2.2 Process & Tools for Sustainable Business Model Innovation

A shared understanding of what constitutes SBMs and how they can be developed is still lacking [10]. However, in recent works, the innovation process has evolved from what was initially conceived as a linear, step-by-step process to a more dynamic and systemic process involving different iterative phases [6,10,12,36]. Characterized by some as discovery-driven, the process also emphasizes the need for experimentation and ongoing learning by doing [12,37,38] and the need for collaboration and inclusion of various actors in the business model ecosystem [10,36,39,40]. In fact, although challenging, the need for even more diverse stakeholders to come together in efficient and effective networks is seen as one of the specific necessities for SBMI [10,36]. Thereby increasing the need to use systems thinking and stakeholder discovery to expand the business canvas and better understand the broader context.

To complement the process of SBMI, the literature provides a variety of tools for analyzing and developing BMs. Prior research has emphasized their roles in creating shared conceptualizations and enabling communication between the stakeholders involved in BMI [40]. Tools can be broadly understood as techniques, methods, frameworks, and approaches that support decision-making in BMI [40] and facilitate various activities such as BM exploration, design, testing, implementation, or growth [41]. One of the most widely known and used tools is the business model canvas [23], a simple and intuitive tool used to describe and think through the different elements of a business model. With increasing importance placed on digitalization and sustainability to ensure firms' future fitness and positive contributions to society, several variations and additional tools have surfaced to focus more on SBMI. There has, however, been a lack of clarification on where existing tools for conventional BMs are adequate and where new tools are needed for embedding sustainability in BMI [42].

Nonetheless, Pieroni et al. [19] found that SBMI approaches are becoming more heterogeneous, relying on multiple theories that deviate from the more traditional view depicted in the BM canvas. Pieroni et al. [19] systematized a comprehensive collection of conceptual frameworks, methods, and tools currently available to support BMI towards sustainability. Based on Teece's [43] dynamic capabilities view, Pieroni et al. [19] differentiate the functional role of these methods and tools into ones that can be used to help identify opportunities for new BMs (sensing), be applied for designing and testing new BM concepts for sustainability (seizing) or can support experimenting, testing, and implementing the business model concepts (transforming). However, there appears to be still a lack of methods or tools for the latter "transforming" role [19], and many existing tools remain unused due to their increased complexity, resource requirements, or context-specificity [44].

Nonetheless, it can be deduced that successful SBMI requires diverse stakeholder involvement in a dynamic, iterative process that allows for experimentation and learning by doing. Therefore, the literature emphasizes tools that support organizations' dynamic capabilities to adapt and develop BMs and embed sustainability throughout the process. As an orientation, Breuer et al. [10] provide the following set (Table 2) of guiding principles and process-related criteria to inform the choice or design of processes and tools for SBMI.

**Table 2.** Guiding Principles & Process-Related Criteria for SBMI. Source: Breuer et al. [10].

Guiding Principles	Process-Related Criteria
<b>Sustainability Orientation</b> with clearly communicated vision.	<b>Reframing BM components</b> and their relations into a sustainability perspective.
<b>Extended Value Creation</b> beyond only for the company, customers, and shareholders.	<b>Context-Sensitive Modelling</b> , that integrates externalities in traditional BM's.
<b>Systemic Thinking</b> , recognizing BMs as a boundary-spanning interactive system.	<b>A Collaborative Modelling Process</b> , that involves key stakeholders into the process.
<b>Stakeholder Integration</b> , while recognizing their needs, interdependence, and influence.	<b>Managing Impacts and Outcomes</b> - monetary and non-monetary impacts.

Breuer et al.'s [10] guiding principles and process-related criteria compile the most relevant theoretical works in the field to set the minimum requirements for SBMs and criteria to support their development. Their work re-iterates the importance of considering the expanded context in which businesses are embedded and the integration of a wider net of stakeholders in the process of SBMI.

### 2.3 Recent Collaborative, Inter- & Transdisciplinary Approaches for Business Model Innovation with Students and Organizations

Collaboration between higher education institutions (HEIs) and industry is increasingly seen as a vehicle to enhance innovation. HEIs are encouraged to build partnerships and multidisciplinary innovation projects based on real-world problems to benefit both student learning and businesses' innovation capability [16]. Beyond this, attention has been given to an emerging mission for HEIs, one of co-creation for sustainability between HEIs, industry, and civil society [45]. In teaching, the concept of students engaging with organizations in action-learning projects, which allows them to work on real-world and increasingly sustainability-related challenges, is not new, and variations of these can be found in many MBA and other programs across the world. Further learning methods, such as inter-/transdisciplinary, collaborative, and problem-based learning, have received increasing attention in higher education and are believed to be fruitful for developing competences for sustainable development and entrepreneurship [18]. Table 3 provides an overview of how these methods are defined.

Given that SBM's are seen as boundary-spanning, interactive systems incorporating pro-active multi-stakeholder management [7,10] make transdisciplinary and collaborative approaches of particular interest. Furthermore, digital transformation and sustainability constitute a "wicked" problem for many organizations [46] that require different ways of understanding and (re-)solving the issues involved. Thus, calling for perspectives from different disciplines and diverse stakeholders' interests in the development process, allowing for rich combinations of otherwise disconnected pools of ideas and solutions to complex problems. Diversity seems to contribute not only to creativity phases and development but also to implementation [16].

**Table 3.** Teaching and Learning Methods for Sustainability Education (based on [47-48]).

Method	Definition
Action Learning	Active participation in the problematization process through research and problem solving.
Interdisciplinary Learning	Incorporating different disciplines and the expertise of multiple methods to solve a particular problem.
Transdisciplinary Learning	Aims to go beyond the concept of the academic discipline, including stakeholders like organizations, customers, and citizens.
Collaborative Learning	Refers to methods, activities, and environments where two or more learners engage in a common task.
Problem-Based Learning	A transdisciplinary, systemic approach to problems where learning is organized around societal, environmental, and economic issues both globally and locally, potentially enabling complex decision-making processes.

The call for diverse (external) stakeholder inclusion emphasizes the need to strengthen communication and participatory leadership skills to engage with diverse groups of people. The importance of collaborative and participatory leadership approaches and practices has already been emphasized for both SBMI and digital transformation processes [46,49,50]. One approach that specifically applies to this is *The Art of Hosting*, which may be seen as both inter- and transdisciplinary as it draws on different techniques and emphasizes the inclusion of diverse groups of stakeholders [51,52]. The approach offers a "space" and practice area for building participatory leadership through conversation and focuses on moving from strategic conversations to wise action and systemic change. It can be offered as a complimentary training program in which participants learn to facilitate and host conversations, challenge their thinking, stretch their imagination, cultivate creativity, and co-create interventions.

Interdisciplinary approaches are of further importance in this context as it allows for the integration of disciplines that can complement the more dynamic and systemic processes of SBMI. In this line, integrating more "designerly" approaches and creative thinking tools has increased and are said to enhance the learning experience and process [53]. One, in particular, *Design Thinking* (DT), has gained increasing popularity in the business environment [54]. DT is an approach and collection of techniques from different disciplines, which should lead to solving complex problems and developing new user-centered ideas. Design thinking includes context analysis, problem identification and framing, idea and solution generation, creative thinking, sketching and drawing, modelling and prototyping, testing, and evaluation [55]. DT provides a compelling process for idea development [56], and more research into its use to stimulate SBMI has been encouraged [54].

The increasing interest in innovation and BMI has led to several learning collaborations between HEI and organizations. These have taken the shape of curricular and extracurricular activities that include semester courses, innovation labs, summer

schools, hackathons, or workshops that bring students together to work on challenges that start-ups, SMEs, or bigger organizations face.

However, research focusing specifically on SBMI with students and organizations remains scarce [12]. SBMI strongly calls for inter- and transdisciplinary approaches that are biased towards action and learning by doing, and although a rich body of literature under the umbrella of *Higher Education for Sustainable Development* (HESD) contribute by delineating competences for sustainable development [17] and teaching and learning methods [42]. What appears insufficiently addressed is research on the practical implementation thereof for SBMI. Furthermore, approaches in practice remain fragmented and educational silos can hinder the effective collaboration needed to enable learning in a landscape of practice. Overall, despite the rapid increase in research on SBMI [6,7,11], the educational facet in building SBMI capabilities of students and supporting organization's transitions to SBMs remains under-researched [12]. Thus, emphasizing a need for more research in this area, which our action-oriented project seeks to address.

### **3 Exploring & Designing an Inter- & Transdisciplinary Student Think Tank for Sustainable Business Model Innovation with Organizations**

#### **3.1 Project Description and Objectives**

Currently, little is known on effective educational initiatives that connect students and organizations for SBMI. Our action-oriented research project aims to gain a deeper understanding of what an appropriate educational initiative should look like to enable collaborative, inter- and transdisciplinary SBMI with students and organizations. Spread over five phases, we investigate the formats, content, processes, and success factors of existing initiatives. The information obtained will then flow into developing a pilot project, which will be launched to experiment and unpack further insights.

The project aims to develop a think tank for SBMI that will focus on connecting students from different universities and faculties with organizations in the Upper Rhein region. The think tank will provide students with a unique opportunity to explore the connection between business models, society, and the environment. Furthermore, take on real-world challenges that organizations face and co-create innovative solutions in cross-border, interdisciplinary student teams. Organizations will benefit from extended know-how, resources, and tools to identify and drive ideas and build their innovation capability. In turn, the project will provide insights into existing approaches of HEIs and how to strengthen students' and SMEs' sustainable business model innovation capability in the Upper Rhein region.

Thus, the potential value of this research is twofold. On the one hand, the results will offer practical insights and recommendations for providing education for collaborative, inter-and transdisciplinary SBMI with students and organizations, benefiting both educators and organizations. Furthermore, contribute to the literature streams of SBMI and HESD. In the long term, we hope to enhance both student's and organizations' abilities

in the region to navigate towards more sustainable practices, including ethical and responsible use of digital technologies.

### 3.2 Research Design

The research project is both exploratory and action-oriented. It follows a design-based research approach defined by Wang and Hannafin [57, p.6] as “*a systemic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioners in real-world settings, and leading to contextually-sensitive design principles and theories*”. In line with our goals, the approach is seen as suitable for advancing both theory and practice [58]. As illustrated in Figure 1, our project is structured over five phases and builds on McKenney & Reeves’s [58] core phases of educational design research. This includes 1) analysis and exploration, 2) design and construction, and 3) evaluation and reflection, to move towards implementation and the provision of both practical and theoretical insights.

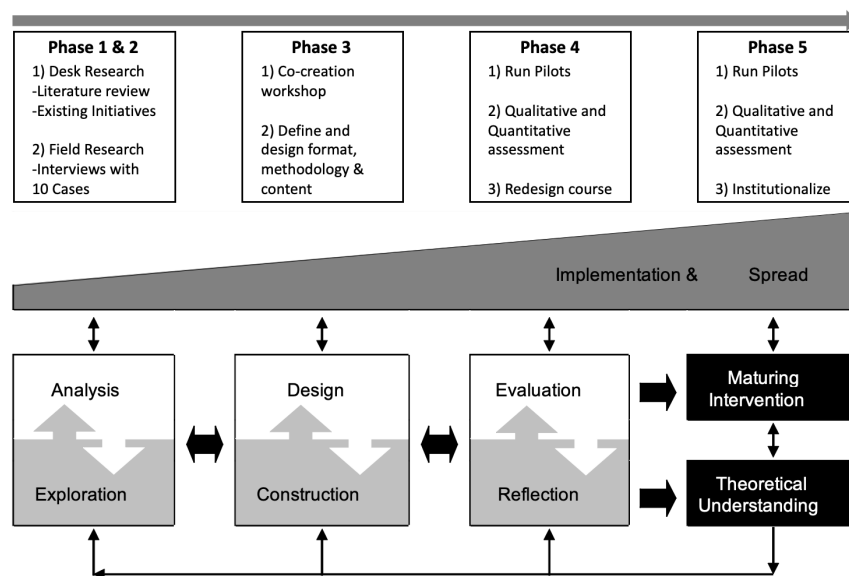


Fig. 1. Research Model. Adapted from McKenney & Reeves [58].

Phase 1 of the project consisted of desk research. Firstly, to review the extant literature on the topic to better define and delimit the key aspects relevant for the project. Secondly, to gain practical examples of similar initiatives focused on BMI or SBMI with students and organizations. The aim was to gain an overview of existing formats, approaches, methodologies, and tools in practice. Initiatives were selected based on their

focus on (sustainable) business model innovation and connecting students with organizations. Another focus was placed on collaborative, action-learning, and inter- and transdisciplinary approaches. The preliminary findings of this phase are presented in Section 3.3.

Phase 2 of the project is currently running and involves field research. From the initiatives identified in phase 1, ten cases situated in Europe and the USA are studied. Each case consists of a “good practice” example, which can be understood as cases that were selected based on how closely their offering related to collaborative, inter- and transdisciplinary SBMI with students and organizations and the level of innovativeness of their offering. The level of innovativeness can be understood as offerings that move beyond education in the classic sense towards innovative inter- and transdisciplinary approaches, formats, methods, and tools. Within each case, the person responsible for the initiative is interviewed. Furthermore, the aim is to engage additional interview partners to gather different perspectives (participating organizations and students). In-depth semi-structured interviews will be conducted, transcribed, coded, and analyzed using Atlas.ti software. This phase aims to provide deeper insights into the approaches, methods, and tools used and the success factor and outcomes of the initiatives.

Phase 3 will involve the co-creation and development of a set of approaches and tools for educational pilot projects for SBMI with students and organizations. This phase strongly builds on co-creation with various stakeholders including project partners, students, and lecturers from different faculties of participating educational institutions and a selection of business practitioners. The phase aims to define the overall approach and a variety of formats that can be experimented with as well as methodologies, and content.

Phase 4 involves the launch of pilot projects, which will include different HEIs and organizations in the Upper Rhine region. This phase will aim to experiment with and test the developed concept. The phase will include qualitative and quantitative data collection in the forms of interviews, observations, and surveys to aid in assessing and redesigning the offering.

Phase 5 will utilize the insights gained from the previous phases to evaluate and improve the concept. Furthermore, to assist in launching further pilots in varying forms for further development. The project aims to be institutionalized into formal structures as an ongoing experimentation platform and think tank for innovative inter- and transdisciplinary action-learning for SBMI.

The project is ongoing and currently in Phase 2. The following section provides insights into the learnings derived from Phase 1.

### **3.3 Preliminary Results**

This section summarizes the preliminary results of phase one of this ongoing action-oriented research project [59]. Phase 1 included desk research to gain practical examples of similar initiatives focused on BMI or SBMI with students and organizations. The aim was to gain an overview of existing formats, approaches, methodologies, and tools in practice.

In total, 120 initiatives were identified that matched aspects of the criteria laid out in Section 3.2. The initiatives were then narrowed down to a selection of 59 initiatives that either met the criteria more closely or showed particularly promising approaches and methods or novel formats. These initiatives were then examined more closely to conclude their overall focus, their most common target groups, the types and duration of their offering, and their methods, approaches, and tools.

The overall findings from these 59 initiatives show that although many initiatives focus on innovation, sustainability, and business model optimization in a general sense, only a few (6) are focused explicitly on SBMI. Furthermore, when SBMI is included, it is often combined with other innovation and business improvement objectives. Most of the initiatives are targeted at master level students, although some are open to a mix of Bachelor and Master students, and five initiatives also included Ph.D. students. More than half of the initiatives were open to students from different faculties. Few initiatives focus on SMEs, while the majority focus either on large companies or a mix of organization types and industries. Only 6 initiatives focused specifically on start-ups were included in the selection as these were otherwise considered beyond the scope of our research. In line with the objectives of our project, most of the initiatives are university-based and connect students with organizations. Some other combinations were found, where students rather independently provide consultancy-like services to organizations or where universities provide services directly to organizations.

More than half of the offerings consist of semester courses, followed by mixed offers of workshops that last either a few days or up to 2 weeks. Some initiatives were found to offer independent courses that vary between 4 weeks and 10 months in length. All initiatives include some form of collaborative action or project-based learning methods in line with the selection criteria. Most of the initiatives are inter- and transdisciplinary in nature, and 23 initiatives also include design approaches and creative thinking tools. Many of the initiatives do not specify the tools utilized. Thus, it was only possible to identify 9 initiatives that explicitly mention the use of SBMI tools. The majority appear to work with classic BMI tools, such as the Business Model Canvas and other creative thinking tools. About 13 of the initiatives were specifically design-oriented and used only design-related tools.

The initial findings of this research appear to confirm a lack of initiatives (beyond those focused on start-ups) that focus on collaborative SBMI with students and organizations [12]. Promisingly, however, there appears to be an overall trend towards inter- and transdisciplinary approaches that bring students from different faculties together with organizations and utilize a mixture of methods and tools from various disciplines. In particular, the inclusion of design approaches and creative thinking tools by almost a third of the initiatives appears to reflect its increase in popularity in the literature [53,54]. The low use of SBMI tools would support the literature on finding that many existing tools remain unused [44]. However, since many initiatives do not specify the tools they use, this remains inconclusive. The next phase of our project work will more intensively research a selection of cases to gain deeper insights into the approaches, methods, and tools used and the success factors and outcomes of the initiatives.

## 4 Conclusion

Sustainability and digital transformation are but two developments that will challenge organizations to rethink their business models in a Society 5.0. In this line, the importance of sustainable business model innovation (SBMI) has increased and should enable organizations to operate within planetary boundaries while ensuring their long-term success. Successful SBMI requires diverse stakeholder engagement, integrating multiple disciplines, and quality local institutions and ecosystems. Thus, emphasizing the importance of collaborative, inter- and transdisciplinary innovation approaches. However, this may pose a considerable challenge for organizations and future leaders, requiring changes in their current practices and ways of thinking. Higher education institutions can play a major role in helping organizations meet the challenges of SBMI. Yet, research focusing specifically on SBMI with students and organizations and its practical implementation remain scarce.

This paper confirms and addresses the need for more research on appropriate educational initiatives for collaborative, inter-and transdisciplinary SBMI with students and organizations. The initial findings from the first phase of this ongoing action-oriented research project show that although many educational initiatives are applying collaborative inter-and transdisciplinary approaches that, as in the literature, only a few explicitly focus on SBMI with students and organizations. The findings also support the increased popularity of design approaches and creative thinking tools and emphasize the use of systems thinking and stakeholder discovery to understand the broader context better. However, several questions remain regarding how these approaches and tools are implemented and how they can be combined with SBMI tools. The remainder of this ongoing research project will continue to address these questions, among others, to contribute both practical and theoretical insights.

## References

1. UNESCO.: *Japan pushing ahead with society 5.0 to overcome chronic social challenges*. 21 Feb 2019. [Online] Available from <https://en.unesco.org/news/japan-pushing-ahead-society-50-overcome-chronic-social-challenges> [Accessed 27 Mar 2021].
2. George, G., Lakhani, K. R., & Puranam, P.: What has changed? The impact of Covid pandemic on the technology and innovation management research agenda. *Journal of Management Studies*, 57(8), 1754-1758 (2020). <https://doi.org/10.1111/joms.12634>
3. Trittin-Ulbrich H, Scherer AG, Munro I, Whelan G.: Exploring the dark and unexpected sides of digitalization: Toward a critical agenda. *Organization*, 28(1), 8-25 (2021). <https://doi.org/10.1177/1350508420968184>
4. Ehrenfeld, J.: *Sustainability by Design: A Subversive Strategy for Transforming Our Consumer Culture*. Yale University Press, New Haven, CT (2009).
5. Schaltegger, S., Beckmann, M., Hockerts, K.: Sustainable entrepreneurship: creating environmental solutions in light of planetary boundaries. *International Journal of Entrepreneurial Venturing*, 10(1), 1-16 (2018). <https://doi.org/10.1504/IJEV.2018.090990>
6. Foss, N.J., Saebi, T.: Fifteen years of research on business model innovation. *Journal of Management*, 43, 200-227 (2017). <https://doi.org/10.1177/0149206316675927>.
7. Geissdoerfer, M., Vladimirova, D., & Evans, S.: Sustainable business model innovation: A review. *Journal of Cleaner Production*, 198, 401-416 (2018). <https://doi.org/10.1016/j.jclepro.2018.06.240>
8. Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., ... & Sörlin, S.: Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223) (2015). <https://doi.org/10.1126/science.1259855>
9. Chesbrough, H.: Business model innovation: Opportunities and barriers. *Long Range Planning*, 43(2-3), 354-363 (2010). <https://doi.org/10.1016/j.lrp.2009.07.010>
10. Breuer, H., Fichter, K., Lüdeke-Freund, F., & Tiemann, I.: Sustainability-oriented business model development: Principles, criteria and tools. *International Journal of Entrepreneurial Venturing*, 10(2), 256-286 (2018). <https://doi.org/10.1504/IJEV.2018.092715>
11. Evans, S., Vladimirova, D., Holgado, M., Van Fossen, K., Yang, M., Silva, E. A., & Barlow, C. Y.: Business model innovation for sustainability: Towards a unified perspective for creation of sustainable business models. *Business Strategy and the Environment*, 26(5), 597-608 (2017). <https://doi.org/10.1002/bse.1939>
12. Hoveskog, M., Halila, F., Mattsson, M., Upward, A., Karlsson, N.: Education for Sustainable Development: Business modelling for flourishing. *Journal of Cleaner Production*, 172, 4383-4396 (2018). <https://doi.org/10.1016/j.jclepro.2017.04.112>.
13. Wyss, A., & von Kutzschenbach, M.: How to Better Educate for More Sustainability: Entrepreneurship for Sustainability in Business Schools. *Proceedings 5th International Online Conference on New Business Models: Sustainable, Circular, Inclusive*. Radboud University Nijmegen, 1-2 July, 302-309 (2020).
14. Leal Filho, W.: *Sustainability at Universities: Opportunities, Challenges and Trends*. Peter Lang Scientific Publishers, Frankfurt (2010).
15. Hoffman, A.J.: *Management as a Calling: A Blueprint for Management Education in the 21st Century*. Ross School of Business Working Paper. *Stanford Social Innovation Review*, working paper No. 1387 (2018). <http://dx.doi.org/10.2139/ssrn.3244003>
16. Hero, L. M., & Lindfors, E.: Students' learning experience in a multidisciplinary innovation project. *Education + Training*, 61(4), 500-522 (2019). <https://doi.org/10.1108/ET-06-2018-0138>

17. Wiek, A., Withycombe, L. and Redman, C.L.: “Key competencies in sustainability: a reference framework for academic program development”, *Sustainability Science*, 6(2), 203-218, (2011). <https://doi.org/10.1007/s11625-011-0132-6>
18. Mindt, L., & Rieckmann, M.: Developing competencies for sustainability-driven entrepreneurship in higher education: A literature review of teaching and learning methods. *Teoría de la Educación; Revista Interuniversitaria*, 29(1), 129-159 (2017). DOI:10.14201/teoredu2017291129159
19. Pieroni, M. P., McAloone, T. C., & Pigosso, D. C.: Business model innovation for circular economy and sustainability: A review of approaches. *Journal of cleaner production*, 215, 198-216 (2019). <https://doi.org/10.1016/j.jclepro.2019.01.036>
20. Teece, D.J.: Business models, business strategy and innovation. *Long Range Planning*, 43, 172-194 (2010). <https://doi.org/10.1016/j.lrp.2009.07.003>.
21. Demil, B., Lecocq, X.: Business model evolution: in search of dynamic consistency. *Long Range Planning*, 43, 227-246 (2010). <https://doi.org/10.1016/j.lrp.2010.02.004>.
22. Gassmann, O., Frankenburger, K., Csik, M.: The St. Gallen Business Model Navigator. White paper (updated version 2019). [www.bmilab.com](http://www.bmilab.com) [Accessed 15 Mar 2021].
23. Osterwalder, A., Pigneur, Y.: Business Model Generation. Self-Published, Amsterdam (2010).
24. Fallahi, S.: A Process View of Business Model Innovation. PhD Thesis, Gothenburg, Sweden: Chalmers University of Technology (2017).
25. Osterwalder, A., Pigneur, Y., Tucci, C.L.: Clarifying business models: origins, present, and future of the concept. *Communication of the Association for Information Systems*, 16, 1-25 (2005). <https://doi.org/10.17705/1CAIS.01601>
26. Meyer, R., & Tavic, S.: Time to getlaunched, 7 Schlüssel zum Erfolg ihres Startups. Quergründer (2017). <http://hdl.handle.net/11654/23513>
27. Tiemann, I. and Fichter, K.: Developing Business Models with the Sustainable Business Canvas: Manual for Conducting Workshops, Oldenburg and Berlin (2016).
28. Foss, N. J., and Saebi, T.: Business Models and Business Model Innovation: Bringing Organization into the Discussion. In Foss, N., and Saebi, T. (Eds.) *Business Model Innovation the organizational dimension*, 1–23. Oxford University Press, New York (2015).
29. Schallmo, Daniel R. A. & Williams, Christopher A.: Digital Transformation Now!: Guiding the Successful Digitalization of Your Business Model. Springer International Publishing (2018).
30. Gassmann, O., Frankenberger, K., und Csik, M.: Geschäftsmodelle entwickeln – 55 innovative Konzepte mit dem St. Galler Business Model Navigator. 2. überarbeitete und erweiterte Auflage, Carl Hanser Verlag, München (2017).
31. WCED: World Commission on Environment and Development: *Our Common Future*. Oxford University Press, Oxford (1987).
32. Bocken, N.M.P, Geradts, T.H.J.: Barriers and drivers to sustainable business model innovation: Organization design and dynamic capabilities, *Long Range Planning*, 53(4), 101950, (2020). <https://doi.org/10.1016/j.lrp.2019.101950>.
33. Lüdeke-Freund, F.: Towards a conceptual framework of business models for sustainability. In: Knowledge Collaboration & Learning for Sustainable Innovation ERSCP-EMSU Conference, Delft, The Netherlands, 1-28 (2010). <https://doi.org/10.13140/RG.2.1.2565.0324>.
34. Stubbs, W., Cocklin, C.: Conceptualizing a sustainability business model. *Organization & Environment*, 21, 103-127 (2008). <https://doi.org/10.1177/1086026608318042>.
35. Makower, J.: What’s a sustainable (and just) business model? *Greenbiz*.(2021). Retrieved from [Online]. <https://www.greenbiz.com/article/whats-sustainable-and-just-business-model> [Accessed 20 Mar 2021].

36. Jay, J., & Gerard, M.: Accelerating the theory and practice of sustainability-oriented innovation. MIT Sloan Research Paper No. 5148-15 (2015). <http://dx.doi.org/10.2139/ssrn.2629683>
37. Bocken, N.M.P., Schuit, C.S.C., Kraaijenhagen, C.: Experimenting with a circular business model: Lessons from eight cases. *Environmental Innovation and Societal Transitions*, 28, 79-95, (2018). <https://doi.org/10.1016/j.eist.2018.02.001>.
38. McGrath, R. G.: Business models: A discovery driven approach. *Long Range Planning*, 43(2-3), 247–26 (2010). <https://doi.org/10.1016/j.lrp.2009.07.005>
39. Brown, P., Baldassarre, B., Konietzko, J., Bocken, N., Balkenende, R.: A tool for collaborative circular proposition design, *Journal of Cleaner Production*, 126354 (2021). <https://doi.org/10.1016/j.jclepro.2021.126354>.
40. Schwarz, J. S., & Legner, C.: Business model tools at the boundary: exploring communities of practice and knowledge boundaries in business model innovation. *Electronic Markets*, 30(3), 421-445 (2020). <https://doi.org/10.1007/s12525-019-00379-2>
41. Heikkilä, M., Bouwman, H., Heikkilä, J., Haaker, T., Lopez-Nicolas, C., & Riedl, A.: Business Model Innovation Paths and Tools. In *Bled eConference* (p. 6) (2016).
42. Lüdeke-Freund, F., Dembek, K.: Sustainable business model research and practice: Emerging field or passing fancy? *Journal of Cleaner Production*, 168, 1668-1678 (2017). <https://doi.org/10.1016/j.jclepro.2017.08.093>.
43. Teece, D.J.: Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategy & Management Journal*, 28, 1319-1350 (2007). <https://doi.org/10.1002/smj.640>.
44. Bocken, N., Strupeit, L., Whalen, K., & Nußholz, J.: A Review and Evaluation of Circular Business Model Innovation Tools. *Sustainability*, 1–25 (2019). <https://doi.org/10.3390/su11082210>
45. Trencher G., Yarime M., McCormick K.B., Doll C.N. & Kraines S.B.: Beyond the third mission: Exploring the emerging university function of co-creation for sustainability. *Science and Public Policy* 41(2), 151-179 (2014). <https://doi.org/10.1093/scipol/sct044>
46. von Kutzschenbach M., Daub CH.: Digital Transformation for Sustainability: A Necessary Technical and Mental Revolution. In: Dornberger R. (eds) *New Trends in Business Information Systems and Technology. Studies in Systems, Decision and Control*, vol 294. Springer, Cham (2021). [https://doi.org/10.1007/978-3-030-48332-6\\_12](https://doi.org/10.1007/978-3-030-48332-6_12)
47. Figueiró, P. S., & Raufflet, E.: Sustainability in higher education: a systematic review with focus on management education. *Journal of cleaner production*, 106, 22-33 (2015). <http://dx.doi.org/10.1016/j.jclepro.2015.04.118>
48. Muff, K.: Developing globally responsible leaders in business schools: A vision and transformational practice for the journey ahead. *Journal of Management Development*, 32(5), 487-507 (2013). <http://dx.doi.org/10.1108/02621711311328273>
49. Larjovuori, R., Bordi, L., and Heikkilä-Tammi, K.: Leadership in the digital business transformation. In Proceedings of the 22nd International Academic Mindtrek Conference (Mindtrek '18). Association for Computing Machinery, New York, NY, USA, 212–221 (2018). <https://doi.org/10.1145/3275116.3275122>
50. Madsen, H.L.: Business model innovation and the global ecosystem for sustainable development, *Journal of Cleaner Production*, 247, (2020). <https://doi.org/10.1016/j.jclepro.2019.119102>.
51. Art of Hosting. *What is the Art of Hosting Conversations that Matter?* [Online] Available from <https://www.artofhosting.org/what-is-aoh/> [Accessed 25 Mar 2021].
52. Mosse, R., & Muirhead, L.: The Art of Hosting Participatory Practices in Social Labs: Moving Beyond Participation to Deep Engagement: A case study of the Economic Immigration

- Lab in New Brunswick, Canada. *FormAkademisk - Forskningstidsskrift for Design Og Designdidaktikk*, 13(4), Article 3 (2020). <https://doi.org/10.7577/formakademisk.3383>
53. Brook, C., & Milner, C.: Reflections on 'creative' action learning in business education: some issues in its theory and practice. *Teaching in Higher Education*, 19(2), 126-137 (2014). <https://doi.org/10.1080/13562517.2013.827651>
  54. Geissdoerfer, M., Bocken, N.M.P. & Hultink, E.J.: Design Thinking to enhance the sustainable business modelling process – A workshop based on a value mapping process, *Journal of Cleaner Production*, Vol. 135, pp. 1218-1232 (2016). <https://doi.org/10.1016/j.jclepro.2016.07.020>
  55. Cross, N. (2011). *Design thinking: Understanding how designers think and work*. Berg.
  56. Guldmann, E., Bocken, N. M., & Brezet, H.: A design thinking framework for circular business model innovation. *Journal of Business Models*, 7(1), 39-70 (2019). <https://doi.org/10.5278/ojs.jbm.v7i1.2122>
  57. Wang, F., & Hannafin, M. J.: Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development*, 53(4), 5–23, (2005). <https://doi.org/10.1007/BF02504682>
  58. McKenney, S., & Reeves, T.: *Conducting educational design research*. Routledge, London (2012).
  59. Wyss, A., von Kutzschenbach, M., Meyer, R.: Studierende innovieren zukunftsfähige Geschäftsmodelle für KMUs: Übersicht zu bestehenden Initiativen und Ansätzen. Forschungsbericht, Institut für Unternehmensführung, Fachhochschule Nordwestschweiz, (Forthcoming).