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Fostering Cross-Disciplinarity in Business Model Research

Florian Lüdeke-Freund¹, Romana Rauter², Christian Nielsen³, Marco Montemari⁴, Nikolay Dentchev⁵, Niels Faber⁶

Abstract

Purpose: We illustrate how cross-disciplinarity in business model research (multi-, inter- and transdisciplinarity) can help scholars overcome silo-building and span disciplinary boundaries. The seven articles contained in the special issue 'Fostering Cross-Disciplinarity in Business Model Research' are summarised, and the authors' perspectives on the phenomena studied as well as the theories and methods adopted are portrayed.

Methodology: We provide literature-based definitions of cross-disciplinary research modes and discuss their potential for business model research informed by insights from the seven special issue articles.

Findings: There is much variety regarding the theories applied in business model research. These include design, imprinting, information asymmetry, paradox theories and many more. This variety illustrates that traditional domains, such as organisation, management and entrepreneurship studies, can be extended in creative ways, and hence can be equipped to deal with emerging and complex issues such as sustainability, circular economy, data management and base-of-the-pyramid entrepreneurship. Interdisciplinarity seems to be well developed regarding the use of theories, but more must follow in terms of research methods and collaboration formats.

Research Implications and Limitations: The common understanding of the potential and importance of cross-disciplinarity can be considered the major implication of this special issue. Beyond this, further critical reflection is required. Important questions remain open, primarily regarding research methods and collaboration formats. This editorial article reflects the perspectives of both the guest editors and the authors in this special issue. The presented understandings of cross-disciplinary business model research and implications for its future are of a preliminary nature.

Originality and Value: Business model research is growing rapidly and scholars from various fields contribute to expanding our knowledge. An explicit focus on the potential of multi-, inter- and transdisciplinary research approaches is missing so far.

Keywords: Cross-disciplinarity, multidisciplinary, interdisciplinarity, transdisciplinarity, business model research

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Introduction

The field of business model research is garnering more diverse attention, and publication activity is growing rapidly (Nielsen et al., 2018). It is remarkable that this research field attracts researchers from many diverse disciplines, including management and organisation studies, entrepreneurship and innovation, industrial design, information technologies, engineering, sociology, sustainability studies and many more (e.g. Dentchev et al., 2018; Foss and Saebi, 2017; Massa et al., 2017; Maucuer and Renaud, 2019; Wirtz and Daiser, 2018). This involvement of multiple disciplines speaks not only to the inherent complexities of business models (cf. Massa et al., 2018) but also to the richness and potential of this research field.

Referring to the latter, we can state that business model research holds potential for cross-disciplinary modes of knowledge generation, bringing together researchers from more than one discipline to investigate a specific phenomenon (Mennes, 2020). For example, several disciplines deal with shared or recurring business model phenomena from their individual perspectives, which allows juxtaposing their specific insights (e.g. what management scholars discover about business model innovation compared to what designers can tell us). However, despite, or maybe because of, this situation there seems to be a tendency towards 'silo-building' in business model research, hampering progress towards other, more integrative, *cross-disciplinary* modes, including multi-, inter- and transdisciplinary research.

Let us look at two recent developments. First, silo-building takes place *between* different business model (sub-)communities. We see at least one community dealing with 'traditional' or 'mainstream' business models, and another one interested in 'new' or 'sustainable' business models. The existence of two conference series—*International Conference on New Business Models* and *Business Model Conference*—is an indication of these different communities.¹ Similar patterns can be found in the topics typically discussed in leading journals such as *Long Range Planning* and *Journal of Management* on the one hand and *Organization &*

Environment and *Journal of Cleaner Production* on the other hand.

Second, silo-building takes place *within* these communities as well, as researchers tend to limit themselves to discipline-specific phenomena, theories and methods and fall back to their camps in the multidisciplinary spectrum. Such a tendency is natural since specialisation in once-acquired knowledge and skills together with subordination to given cultures of research, hierarchies and knowledge structures are key features of disciplines (cf. Turner, 2017) and serve the very pursuit of an academic career (Aagaard-Hansen, 2007). As a consequence, we observe some hesitation with regard to the development and application of more diverse cross-disciplinary research modes (cf. Mennes, 2020).

As guest editors of this special issue, we wondered: What if we could make use of the richness and potential of various streams of business model research early on, before specialisation turns into unsurmountable barriers, and help researchers from different disciplines to connect and learn from each other? This may have been a naive stance, but we insisted on giving it a chance and hence called for contributions showcasing cross-disciplinary research in business models applied to diverse topics and phenomena (e.g. paradoxes of business model development and performance, disruptive business models and industry dynamics, ecological and social entrepreneurship, business models for sustainability transitions and so on)—referred to as 'multi- and interdisciplinary' in the original call for papers.² Our aim was to explore the variety of current business model research and to motivate cross-disciplinary exchange to make sure that progress in specialised streams of business model research translates into progress of the field as a whole. We deliberately invited participants from both 2019 business model conferences to submit their papers to this special issue.

Let us take stock of what we did and did not find. But before, we briefly explain our understanding of cross-disciplinarity in business model research and why striving to overcome silos and disciplinary boundaries is a worthwhile endeavour.

¹ See <http://businessmodelconference.com/> and <https://www.newbusinessmodels.org/>

² See <http://www.journalofbusinessmodels.com/media/1253/cfp-fostering-multi-and-interdisciplinary-business-model-research.pdf>

Why Strive to Overcome Silos and Disciplinary Boundaries?

In 2011, Zott, Amit and Massa found that the business model literature was 'developing largely in silos, according to the phenomena of interest to the respective researchers. The main interest areas identified were (1) e-business and the use of information technology in organizations, (2) strategic issues, such as value creation, competitive advantage, and firm performance and (3) innovation and technology management' (Zott et al., 2011, p. 1019). From more recent reviews we can conclude that this tendency is becoming more pronounced and that other special interest groups, such as entrepreneurship and sustainability researchers, are adding new camps to the business model research landscape (e.g. Dentchev et al., 2018; Foss and Saebi, 2017; Lüdeke-Freund and Dembek, 2017; Massa et al., 2017; Maucuer and Renaud, 2019).

Increasing specialisation within a maturing research field is undoubtedly necessary to gain more detailed insights into its phenomena, improve its research methods and theories, discover new ones, and, in general, make use of efficient division of labour and variety in perspectives. In a similar vein, Lecocq et al. (2010) argued for the advantages of developing a 'research programme' for business models, which was followed by Nielsen et al.'s (2018) four distinct phases of business model research. In particular, the first phase focuses on definitions and conceptualisations of business models as well as the links between business models and strategies. The second phase is dominated by the research stream of business model innovation. The design of frameworks and the foundations for theory-building are at the core of the third phase. The fourth phase is centred on the performative approach. Studies in this phase explore what actually happens in companies when business model tools are designed, implemented and used (e.g. what works and what does not work, levers and barriers of designing, implementing and using business model tools; see Montemari, 2018). Research adopting a performative approach builds on the assumption that business models are context-dependent and are given meaning by subjects in the specific situations in which they are developed and applied (Roslender and Nielsen, 2019).

Taking these developments in business model research into consideration, this special issue builds on the conviction that the increasing specialisation and search for a research programme should be complemented by a search for cross-disciplinary approaches (cf. Mennes, 2020) or, at least, the openness to look beyond disciplinary boundaries. Our assumption is that cross-disciplinarity improves our understanding of phenomena, methods and theories, particularly regarding complex questions that scholars aim to address, for example, how entrepreneurial values motivate the shape and performance of ecologically and socially beneficial business models. Finding answers to questions such as this one requires expertise from diverse fields (e.g. entrepreneurship, psychology and sustainability). Cross-disciplinary approaches (in contrast to mono-disciplinary approaches) should be better suited to grasp these issues and to study business models as they actually are: *complex and multi-dimensional systems* (Massa et al., 2018). As such, business models integrate human interactions, organisational structures, markets and diverse stakeholders, and thus, they typically cross the boundaries of various social, economic and technological systems, for example, by connecting supply and demand, technologies and markets, stakeholders and value creation and so on (for exemplary overviews of the variety in business model research see Lüdeke-Freund and Dembek, 2017; Dentchev et al., 2018; Maucuer and Renaud, 2019).

Accordingly, Maucuer and Renaud suggest that 'disciplines should cross-fertilize in order to enrich their own conceptualization [of business models] and reinforce the co-development of their respective fields ... [and to] combine their efforts in developing transversal issues ...' (Maucuer and Renaud, 2019, p. 38). The benefits of such an approach can be illustrated with another example: Some researchers work on the cognitive micro-foundations of business model development and propose that these involve configurations of simple design and decision-making rules, so-called heuristics (Loock and Hacklin, 2015), or schemas representing firms' value-creating activities (Martins et al., 2015; Massa et al., 2017). Such cognitive perspectives are also important to understand how actors deal with ambiguous and even paradoxical issues, such as integrating sustainability considerations into business activities (Hahn et al., 2014). In turn, how such challenges can be

addressed effectively by developing new business models is a question that may be answered by building on two decades of research on business model innovation (Foss and Saebi, 2017; Wirtz, Göttel et al., 2016, Wirtz, Pistoia et al., 2016). Business model researchers have a natural tendency to deal with complex and multi-dimensional issues (cf. Massa et al., 2018) involving multiple stakeholders' needs and interests (Lüdeke-Freund et al., 2020) and hence require correspondingly integrative and diverse research modes.

What is Cross-Disciplinarity?

We follow Mennes (2020) and use the term *cross-disciplinarity* 'to refer to the general category of research that involves more than one discipline' (p. 3). Dominating taxonomies of cross-disciplinarity typically distinguish three modes. The following definitions proposed by Mennes particularly highlight the role of collaboration:

- 'multidisciplinarity' refers to the collaboration of researchers with different backgrounds where their respective disciplines are juxtaposed instead of integrated ...;
- 'interdisciplinarity' stands for the collaboration of researchers with different disciplinary backgrounds where (elements of) the respective disciplines are integrated ...; and
- 'transdisciplinarity' either refers to a collaboration where the integration of (elements from) different disciplines is so extensive that the origin of the elements gets lost, or refers to a collaboration of researchers and non-academics such as stakeholders and/or practitioners who integrate their knowledge and know-how.' (p. 4–5)

Multidisciplinarity is typically described as juxtaposing different disciplines (Klein, 2017; Vermeulen and Witjes, 2021). The involved disciplines, for example, innovation management and psychology, remain separate and their characteristics, such as theories and methods, retain their original identity. This research mode involves different approaches to studying shared phenomena, for example, how entrepreneurs come up with new business models. While innovation management scholars and psychologists may both study this phenomenon, the theories and methods they use and the knowledge

they generate remain within their respective disciplinary boundaries. The obtained results will be complementary and may even be combined in a joint framework, but they will only be loosely related and presented in a sequential or encyclopaedic manner. The multidisciplinary research mode leads to multiple perspectives on jointly studied business model phenomena, but it does not foster theoretical or methodical integration.

By contrast, *interdisciplinarity* is characterised by proactive integration and interaction between disciplines (Klein, 2017; Vermeulen and Witjes, 2021). Methods and concepts are borrowed from other disciplines to test hypotheses, develop new theories and find answers to research questions that require the knowledge and skills from more than one discipline. Such approaches are driven by, for example, the complexities of natural and social phenomena, the search for solutions to societal problems and technological change. For example, innovation management scholars can borrow psychological concepts, such as values and motivation, to study the antecedents and moderators of entrepreneurs' sustainability-oriented business model innovation processes. Beyond 'borrowing', researchers may cross disciplinary boundaries—in fact, create new disciplines—by proactively integrating their approaches and developing new theoretical constructs and empirical methods. Psychologically enhanced innovation theories and empirical investigations of 'values-based business model innovation' (e.g. Breuer and Lüdeke-Freund, 2017) or the development of new reference frames for 'sustainability-oriented business models' (e.g. Dentchev et al., 2018) serve as examples.

Attributes associated to *transdisciplinarity* include 'hyper-integrative' (Mennes, 2020), 'transcending' and even 'transgressive' (Klein, 2017). While interdisciplinarity crosses boundaries by being integrative and interactive, transdisciplinarity goes further in that the original characteristics of involved disciplines may even disappear. The use of transdisciplinary inquiry aims to reach such integration at multiple levels of abstraction (Max-Neef, 2005). Such overarching synthesis can lead to new sciences, such as anthropology as the science of humans, universal 'interlanguages' that transcend not only disciplines but also science, education and practical application (e.g. mathematics or system theory), and the redefinition of hierarchies, structures and actor roles in

the creation and application of knowledge. Transdisciplinarity is driven by the quest for systematically integrated and universal knowledge, critical evaluation of theories, concepts and methods as well as the underlying socio-political antecedents. Transdisciplinary research driven by environmental and sustainability issues (Schaltegger et al., 2013; Vermeulen and Witjes, 2021), for example, acknowledges the 'life-worlds' of humans, and not disciplinary interests, as frames for the definition of research problems and knowledge production. New forms of collaboration between academics, business and other social actors, in which scientifically reliable knowledge is merged with socially robust problem definitions and knowledge, are another result of the search for more integrative and universal modes of research.

Mono-disciplinarity represents an 'opposite' research mode in which scholars apply a rather limited or focused perspective to investigate a phenomenon. However, one must bear in mind that a clear differentiation between these different research modes is difficult to achieve and is context dependent.

It is not difficult to see that cross-disciplinary research holds some potential for contemporary business model studies as these often require, at least theoretically, cross-disciplinary collaboration, diverse theories and methods and new ways of dealing with complex phenomena such as innovation, entrepreneurship and sustainability. In the following, we briefly summarise the articles and key findings of the special issue articles and how researchers deal with various phenomena and use diverse theories and methods. These articles' contributions to, and implications for, cross-disciplinarity in business model research are discussed in the final section.

Articles in the Special Issue

This special issue contains seven articles, all of which provide inspiration for, and contribution to, future cross-disciplinary conversations and projects in the field of business model research. Table 1 provides an overview of these articles, the diversity of phenomena studied and the variety of applied theories and methods.

The short paper by Dror Etzion (2020), 'Radical Resource Productivity as an Inspiration for Business Model Innovation: The Case of Foodchain', addresses business model

innovations in the service sector. Foodchain is a fast-casual restaurant recently founded in Montreal, Canada, with the primary aim of serving uncooked, vegetable-based meals. The research objective is to understand the effects of waste-minimisation efforts, following a radical resource productivity (RRP) approach on business model design. A major RRP design choice was to use so-called Robot-Coupes for food production, which increases efficiency gains in earlier manufacturing-like stages of the value chain. Furthermore, an activity map was found to be a useful tool to visualise essential business model design choices and consequences.

The article by Michael Fruhwirth, Christiana Ropposch, and Viktoria Pammer-Schindler (2020), 'Supporting Data-Driven Business Model Innovations: A Structured Literature Review on Tools and Methods', reviews research on tools and methods for data-driven business model innovation. The analysed literature is structured according to the types of contribution (taxonomies, patterns, visual tools, methods, IT tools and processes), types of thinking supported (divergent and convergent) and the business model elements that are addressed (value creation, value capturing and value proposition). By drawing on these findings, the authors identify three avenues for future research: first, tools and methods that enable convergent thinking require additional studies; second, more research is needed to provide a holistic view that integrates single tools and methods; and third, designing software tools to support data-driven business model innovation is an area that should be further investigated.

The article by Martin Glinik, Michael Rachinger, Christiana Ropposch, Florian Ratz, and Romana Rauter (2021), 'Exploring Sustainability in Business Models of Early-Phase Start-up Projects: A Multiple Case Study Approach', explores the drivers for integrating sustainability aspects in the business models of early-stage start-ups. The authors studied the sustainability in the business models of six early-stage entrepreneurial projects. They found that most cases indicate that early-stage start-ups do not holistically integrate sustainability, but rather consider it as an additional benefit to their products and services. The authors assert that the main drivers of sustainable business models in early-stage ventures are entrepreneurial motivation, careful resource use and waste reduction. Both

Author(s) and title	Phenomena studied	Theories and methods used
Etizon, D. (2020), Radical resource productivity as an inspiration for business model innovation: The case of foodchain, <i>Journal of Business Models</i> , Vol. 8, No. 1, pp. 1-6.	Foodchain's business model Business model design driven by radical resource productivity and efficiency	Radical resource productivity; business model innovation Teaching case data; activity mapping
Fruhirth, M., Ropposch, C. and Pammer-Schindler, V. (2020), Supporting data-driven business model innovations: A structured literature review on tools and methods, <i>Journal of Business Models</i> , Vol. 8, No. 1, pp. 7-25.	Data-driven business model innovation Types of thinking related to business model innovation Tools and methods for business model innovation	Data- and analytics-enabled business model development Structured literature review; conceptual framework development
Glinik, M., Rachinger, M., Ropposch, C., Ratz, F. and Rauter, R. (2021), Exploring sustainability in business models of early-phase start-up projects: A multiple case study approach, <i>Journal of Business Models</i> , Vol. 9, No. 2, pp. 22-43.	Sustainability in business models of early-phase start-ups Imprinting processes giving shape to new business models	Imprinting theory; sustainable business model development Multiple case study approach; qualitative content analysis
Luoma, P., Toppinen, A. and Penttinen, E. (2021), The role and value of data in realising circular business models: A systematic literature review, <i>Journal of Business Models</i> , Vol. 9, No. 2, pp. 44-71.	Role of data in circular business models Data as a source of value in data-driven business models	Data- and analytics-enabled business model development; circular business models Systematic literature review; conceptual framework development
Endregat, N. and Pennink, B. (2021), Exploring the coevolution of traditional and sustainable business models: A paradox perspective, <i>Journal of Business Models</i> , Vol. 9, No. 2, pp. 44-71.	Tensions and paradoxes of sustainability-driven business model development Strategies to deal with co-evolutionary tensions and paradoxes	Business model co-evolution; paradox perspective Multiple case study approach; conceptual framework development
Alba Ortuño, C. and Dentchev, N. (2021), We need transdisciplinary research on sustainable business models, <i>Journal of Business Models</i> , Vol. 9, No. 2, pp. 72-86.	Transdisciplinary research in vulnerable entrepreneurship Data-related challenges in sustainable business model research	Information asymmetry; sustainable business models; international management; base-of-the-pyramid Case study; interviews and focus groups; data triangulation
Urmetzer, S. (2021), Dedicated business models – connecting firms' values with the systemic requirements of sustainability, <i>Journal of Business Models</i> , Vol. 9, No. 2, pp. 87-108.	Role of business models in changing innovation systems Integration and diffusion of sustainability values	Dedicated innovation systems; sustainability transitions Systematic literature review; conceptual framework development

Table 1: Articles contained in the special issue

altruistic and strategic, respectively financial motivations were found to be important for the inclusion of sustainability considerations.

The article by Päivi Luoma, Anne Toppinen, and Esko Penttinen (2021), 'The Role and Value of Data in Realising Circular Business Models: A Systematic Literature

Review', is positioned at the crossroads between circular business models and data. It studies the role that data, such as supply-chain and life-cycle data, plays in circular business models. The review shows that this role is still poorly understood. The recognition of data as both driver and enabler for circular economic activities is common. Additionally, two approaches

regarding the value of data are distinguished: the outward-oriented approach emphasises the value of data to shape the user experience relating to the design of circular products and services, and the inward-focused approach focuses on the way in which data operationally contributes to improving economic and environmental performance.

The article by Niklas Endregat and Bartjan Pennink (2021), 'Exploring the Coevolution of Traditional and Sustainable Business Models: A Paradox Perspective', uses seven case studies to investigate the tensions and paradoxes that occur when traditional and sustainability-oriented business models co-evolve under one corporate roof. The identified tensions and paradoxes include competing demands in terms of performance and value creation, fit with organisational culture and mindset, challenges in training and staffing, the allocation of resources between traditional and sustainable business models and balancing the roles and expectations of multiple stakeholders. The authors present a framework to structure these challenges and to analyse their sample of cases. Four coping strategies are identified: 'splitter', 'operational perfectionist', 'strategic mandator' and 'transformer'.

The article by Claudia Alba Ortuño and Nikolay Dentchev (2021), 'We Need Transdisciplinary Research on Sustainable Business Models', argues in favour of transdisciplinarity in sustainable business model research. The authors developed their arguments based on a transdisciplinary programme in Bolivia and 57 interviews and 10 focus group discussions with vulnerable entrepreneurs and relevant stakeholders, alongside numerous on-site observations. The authors used the theoretical lens of information asymmetry and argue that transdisciplinary research can resolve the problems of moral hazard, information analysis and information access, which occur while investigating complex phenomena, such as sustainable business models. Based on the findings of this study, the authors make five suggestions for how scholars can adopt transdisciplinarity in their sustainable business model studies: (i) understand the context, (ii) adapt to the context, (iii) develop relationships of trust, (iv) be flexible with the research focus and (v) systematically present to other disciplines and non-academic actors.

The article by Sophie Urmetzer (2021), 'Dedicated Business Models – Connecting Firms' Values with the Systemic Requirements of Sustainability', brings together insights from innovation system theory, sustainability transitions and innovation trajectories. The main finding is that dedicated business models affect an innovation system at the level of its leading paradigms. These business models commit to sustainability values, increase their influence through expansion of their networks and actively impose these sustainability values on consumers and suppliers. The theoretical link this paper explores between innovation system and transition theories culminates in the role business models play as a linking pin to shape and instigate change at a fundamental level. More in-depth insights into diffusion mechanisms and patterns of values, and how these reconfigure leading paradigms at regime and systems levels, call for the inclusion of additional disciplines (e.g. social psychology, innovation management).

Implications and Potential for Cross-Disciplinarity in Business Model Research

The goal of this special issue is to illustrate the variety of phenomena studied by business model scholars and to shed light on the diversity of theories and methods they apply. While this special issue can of course only offer a very limited snapshot, it covers diverse topics including business model design, entrepreneurship, sustainability and data and analytics, in addition to diverse combinations of these topics. Several indications of cross-disciplinarity in studying these topics can be found in the articles, mostly in terms of interdisciplinary approaches to defining phenomena under investigation and to using theory. We discuss the implications of these observations in more detail below.

In addition to our reading of the articles, we asked the authors to appraise their research modes, using a simple continuum ranging from mono- to multi-, inter- and transdisciplinarity. The authors were provided with the definitions of research modes proposed by Mennes (2020) (see the 'What is Cross-Disciplinarity?' section). Figure 1 demonstrates how the authors appraised their own work by responding to the following question:

Research modes adopted in the special issue articles

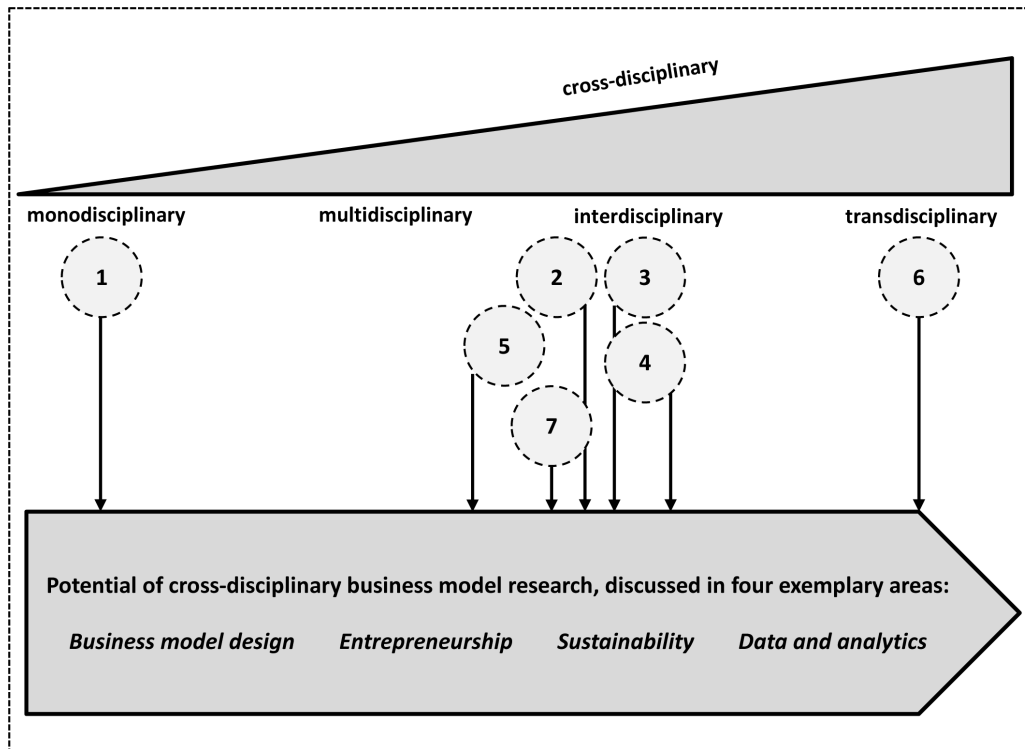


Figure 1: Research modes adopted and thematic areas covered in the special issue articles (according to the authors)

Note: (1) Etzion; (2) Fruhwirth, Ropposch and Pammer-Schindler; (3) Luoma, Toppinen and Penttinen; (4) Glinik, Rachinger, Ropposch, Ratz and Rauter; (5) Endregat and Pennink; (6) Alba Ortuño and Dentchev; (7) Urmetzer

'Please position your paper along the continuum from mono- to transdisciplinary. The cross-disciplinary aspects of your research approach adopted could refer to, for example, theories, methods, collaboration processes, or disciplinary backgrounds of the authors.' According to the authors, most of the studies presented in the special issue involve interdisciplinary research modes.

Acknowledging that interdisciplinarity seems to be a common research mode applied by the special issue authors and that future research should be more transdisciplinary, we reflect on some implications for cross-disciplinarity in business model research. We focus on the four most prominent topics covered in our special issue, namely *business model design*, *entrepreneurship*, *sustainability* and *data and analytics*. In doing so, we also present the authors' points of

view. Asked for their key learnings, they offered some interesting insights and explanations for why cross-disciplinarity makes sense in the context of business model research.

Business model design

Many special issue articles deal with topics related to business model design, including business model innovation, design principles and methods and tools for business model development. Business model design is a 'hot topic' in business model research, exemplified by a constantly growing number of journal articles focusing on it (e.g. Wirtz and Daiser, 2018). In this special issue, it is addressed from various theoretical perspectives, including engineering- and sustainability-inspired approaches to resource use (Etzion, 2020), imprinting theory to explain organisational behaviour (Glinik et al., 2021), data- and analytics-enabled

business model development (Fruhirth et al., 2020; Luoma et al., 2021) and tensions and paradoxes occurring in the co-evolution of different types of business model (Endregat and Pennink, 2021).

This variety shows that, regarding *theories*, interdisciplinary approaches are common and maybe even the norm, given the many various issues studied in relation to business model design. This is an interesting, but perhaps not surprising, observation, given that business models and related phenomena are, per se, complex and related to a huge variety of systemic and multi-level issues (cf. Dentchev et al., 2018; Massa et al., 2018). Entrepreneurship, management and business scholars seem to be accustomed to applying theoretical perspectives coming from 'alien' domains such as design, engineering and information technology, as well as domains such as psychology and biology. This openness to interdisciplinary approaches in the form of using theory seems to be a useful research strategy—first, to deal with new and complex socio-technical and socio-economic phenomena, and second, for cross-fertilisation (see 'Why Strive to Overcome Silos and Disciplinary Boundaries?' section). Novel and promising perspectives can be expected the more business model scholars delve into other domains' theories, for example, those derived from psychology (e.g. micro-foundations of business model development), biology (e.g. business model evolution and ecosystems) and data sciences (e.g. new business models driven by, and driving, big data). This expectation seems to be shared by the special issue authors:

'Not only in academia, but also in business and policy, there is a significant need for more people that have insight on the interfaces of different disciplines, opportunities and challenges etc. Multi- and interdisciplinary business model research can make a great contribution to this. Frameworks used in some disciplines could add great value when used in others.' (Luoma, Toppinen and Penttinen; personal statement)

'Most of the investigated start-up projects did not holistically integrate sustainability-related values. Instead, sustainability was considered as an ancillary benefit to providing products or services. Besides intrinsic motivation, there are also strategic reasons ...' (Glinik, Rachinger, Ropposch, Ratz and Rauter; personal statement)

The value of interdisciplinary approaches to using theory is obviously appreciated. The Glinik et al. (2021) paper, as an example, shows that better understanding of how sustainability is integrated into new business models requires both strategic management and psychological, respectively ethnographical perspectives that can be embedded in an imprinting theory framework borrowed from animal studies.

Although the potential for interdisciplinarity is obvious, questions and challenges remain beyond the special issue articles, such as whether appropriate empirical methods are available and how collaborative research settings can be instituted in a fruitful manner.

Entrepreneurship

Continuing with the Glinik et al. (2021) paper, we see how a focus on various interrelated aspects of a phenomenon, such as sustainability-oriented business model design, can give shape to interesting, yet hardly understood, research topics in the realm of entrepreneurship. These topics include the development and acceleration of new ventures with a sustainability orientation; the characteristics, motivations and intentions of entrepreneurs driving these ventures; their values and normative orientations; how they arrange value creation for multiple stakeholders; or their ventures' strategic positioning. Going deeper into any of these facets of entrepreneurial behaviour and its outcomes not only requires cross-disciplinary collaboration, theories and methods, but can also serve as a steppingstone to transdisciplinarity.

An example of moving towards a transdisciplinary research mode is presented by Alba Ortuño and Dentchev (2021). Regarding theory, they build on information asymmetry, international management and base-of-the-pyramid approaches to study the business models of vulnerable entrepreneurs in Bolivia. The authors actively participated in a programme aiming 'to contribute to the development of the Bolivian society by enhancing institutional capacity building' for local communities and entrepreneurs (Alba Ortuño and Dentchev, 2021, p. 75). Creating meaningful insights and new knowledge required intense collaboration with various stakeholders, including continuous formal and informal discussions with local communities, different participatory methods, primary data collection through interviews and focus groups and analyses of secondary data.

The authors summarise their experience as follows:

'Transdisciplinary research allows to understand the opportunities and challenges of sustainable business models (SBM) more precisely due the interaction of all involved actors. Transdisciplinary research is highly beneficial to overcome problems in information asymmetry when researching SBM.' (Alba Ortuño and Dentchev; personal statement)

This example tells us that complex entrepreneurship topics, such as vulnerable entrepreneurship and its potential for social value creation, can be addressed by combining different theoretical lenses, which are not limited to 'pure' entrepreneurship theories. Furthermore, the immersion of researchers into a local context and object of study is not only promising but maybe even required. In support of this, longitudinal research designs, action research and data triangulation are useful elements in a transdisciplinary toolbox for the study of entrepreneurship business models.

Sustainability

Sustainability, for example, in terms of integrating principles of ecological or social value creation into business model design or seeing it as an entrepreneurial motivation, has already been mentioned (Alba Ortuño and Dentchev, 2021; Etzion, 2020; Glinik et al., 2021). This shows that sustainability topics seem to be likely and promising subjects for cross-disciplinary business model research. An interesting and innovative interdisciplinary perspective is offered by Urmetzer (2021). Her conceptual work deals with how values of sustainability (e.g. customer expectations for better ecological performance) can become part of a business model and diffuse in innovation systems. Her theory is that the design of value proposition, delivery and capture is an important mechanism to diffuse certain values and hence to link business model and system-level sustainability. Values of sustainability are touched on by Glinik et al. (2021) as well, as the motivation of entrepreneurs to give their business models a certain direction, and Etzion (2020) makes a very explicit link between ecological design principles and business model design.

While Etzion (2020) and Glinik et al. (2021), in simple terms, study how sustainability becomes a part of business models, Urmetzer (2021) attempts to understand

how business models can help diffuse sustainability values throughout the wider innovation systems in which business models are embedded. Both perspectives are highly complementary and indicate a new field of study, namely values-based business models (Breuer and Lüdeke-Freund, 2017). With a view to the future, Urmetzer (2021) concludes that more in-depth insights about diffusion mechanisms and patterns of values are needed, and how these reconfigure leading paradigms at the regime and systems levels. This is a much needed, but no less ambitious call for cross-disciplinary business model research and a call for various micro-, meso- and macro-level disciplines to join in (e.g. social psychology, culture studies, policy research, innovation and sustainability transition studies).

A novel firm-level perspective is offered by Endregat and Pennink (2021). They identify tensions and paradoxes that occur when companies operate traditional business models and aim to add sustainability-oriented business models to their portfolios. Competing demands regarding performance and value creation, lack of fit with the dominant organisational culture and mindset, as well as challenges related to training, staffing and resource allocation are observed. While these challenges and the theoretical lens through which they are studied remain largely in the field of organisation and management studies, deeper analysis of the origins of the corresponding tensions and paradox will require a broad multi- or interdisciplinary approach. As with the examples above, various disciplines are required to understand how business performance is impacted (e.g. accounting), how organisational and business cultures are formed and (de-)stabilised (e.g. cultural studies, institutional theory), how human resources can be managed with regard to sustainability demands (e.g. psychology, human resource research and how decision-makers find solutions to paradoxical decisions about resources (e.g. paradox theory, psychology, leadership studies).

The authors' statements below show that such issues offer promising contexts for cross-disciplinary business model research:

'Integrating theories from different disciplines is a challenge but worth doing: It results in interesting new questions and 'black-boxes' to discuss from multiple

angles. Introducing more philosophical arguments in your research broadens the theoretical perspective, for example it can overcome previously established divides (as in the concepts of TBM [traditional business model] and SBM [sustainable business model]).' (Endregat and Pennink; personal statement)

'I learned that business models tell us so much more about the true values and objectives of a firm than mission statements, sustainability reports, or interviews with CEOs.' (Urmetzter; personal statement)

Again, the availability of corresponding research methods and collaboration formats is crucial. Given the attention that universities and funding bodies are currently paying to issues of sustainability and circular economy, the future looks quite promising for business model research in these fields.

Data and Analytics

An interesting direction at the junction of sustainability and data sciences has been taken by Luoma et al. (2021). They studied the role and value of data for the development of circular economy business models and found an outward-oriented and inward-focused approach to business model development, the former emphasising how data (such as product life cycle data) can be used to shape the user experience with circular products and services, and the latter focusing on how using data can improve the economic and environmental performance of circular economy business models. For the outward approach, further studies may encourage behavioural sciences to obtain more insights into consumer behaviour and the data requirements this creates. In addition to data on products and services, this approach calls for the inclusion of data on user behaviours and attitudes. The inward approach calls for a more intimate relation with the discipline of information management, obtaining a clearer picture of the requirements for data process optimisation, information systems, storing and search, or artificial intelligence for the optimisation of circular economy business models. While it seems reasonable to continue with a multi-disciplinary approach in which, for example, data sciences and psychology prepare the ground, later stages will most likely require inter- and transdisciplinary approaches in which theories and methods from these fields are merged.

In a similar vein, Fruhwirth et al. (2020) call for a more intense integration of different disciplines for future studies on data-driven business model design. These include, for example, innovation management, information systems and data sciences. Further integration issues, such as the need to better understand the role of collaboration and to integrate insights from data-specialists, are mentioned by Luoma et al. (2021), all pointing to the need for further theoretical and methodical advances. In addition, Fruhwirth and colleagues emphasise in their statement that more knowledge at cross-disciplinary intersections is needed, particularly when there is the need to combine different business model conceptualisations and tools:

'Tool support for (data-driven) business model innovation needs more conceptualisation and integration in the scientific community. Tools typically are very specific to a single element of a business model or phase of business model innovation – and very little knowledge has been created about how these different conceptualisations map to each other, and how tools can be used in combination, and in a coherent process.' (Fruhwirth, Roppasch, and Pammer-Schindler; personal statement)

Researchers, managers and entrepreneurs obviously have different understandings of business models. The same holds true for engineering, organisation theory, circular economy and data experts. This is a challenge and an opportunity, as for example, Alba Ortuño and Dentchev (2021) tell us very explicitly.

In short, we have just begun exploring the business model concept, but we can see that cross-disciplinary business model research can deliberately create situations in which theoretical and methodical diversity, fruitful deviance and sometimes tensions and conflicts are created to make the most of the otherwise unconnected expert perspectives.

For the moment, this is maybe our conclusion, we are moving rapidly towards interdisciplinary applications of theory, but in terms of research methods, more must come. This might result also in different perceptions of (empirical) findings, or different findings, per se, and allow for diverse implications. This relates to the overall idea of interdisciplinarity that describes a collaboration

of researchers leading to an integration of elements of the disciplines involved (Mennes, 2020), but it does not need to happen all at once.

The same for the 'ultimate' move towards transdisciplinarity, of course, without falling into the fallacy that more cross-disciplinarity is always the best solution. As with many things in life, it depends. Our colleague Dror Etzion nicely reminded us of that:

'My paper suggests avenues for future research that remain mono-disciplinary, within the management discipline, but I do not want to suggest that cross-disciplinary business model research is a bad idea. Quite the opposite.' (Etzion; personal statement)

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