



Dedicated Business Models: Connecting Firms' Values with the Systemic Requirements of Sustainability

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Abstract

Purpose: The concept of *dedicated business models* is drafted to bridge the gap between the micro-level value frameworks of individual firms and the macro-level systemic requirements of sustainability transformations.

Design: Three theoretical concepts are drawn on to describe the potential relations between firms' strategies and the normative orientation of economic systems: *Dedicated innovation systems* to represent the macro-level and their *innovation paradigms* as the connection to the micro-level which is represented by *business models* employed by the individual firms. Then, the scientific literature is reviewed systematically and three propositions are developed that conceptualize dedicated business models.

Findings: Business models that contribute to an increased dedication to sustainability in innovation systems take effect on the paradigmatic level and can be expected to feature: (i) an explicit commitment to sustainability-related values; (ii) the active creation and exploitation of new networks to gain access to untapped material, technological, intellectual, and institutional resources that promise higher levels of sustainability; and (iii) mechanisms to nurture and reinforce changed demands of consumers and suppliers in terms of sustainability principles.

Limitations: The paucity of relevant literature limits the substantiation of the theoretical argument. It also lacks an empirical verification, which is beyond the scope of this conceptual paper.

Originality: The study contributes to the growing scholarship on business models by highlighting their potential effect on innovation paradigms.

Keywords: Sustainable business model, dedicated business model, innovation system, dedicated innovation system, innovation paradigm, sustainability transformation

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Introduction

Scholars increasingly acknowledge that the global sustainability challenges such as climate change, ecological degradation, the accumulation of waste in the environment, or poverty are interconnected issues that must be explored and addressed from a systems perspective (Murphy, 2012; Steffen *et al.*, 2015; Swart *et al.*, 2004). The rising awareness of the complexity of societal, environmental, and economic problems and the acknowledgement of their systemic interrelations have revived systems thinking and respective notions of governance (Abson *et al.*, 2017; Meadows, 1999; Voß *et al.*, 2006). In contrast, private firms' efforts to take account of sustainability issues in business are often based upon a rather narrow and disconnected understanding of sustainability (Whiteman *et al.*, 2013). Reporting on economic, social, and environmental performance has become the credentials for corporate sustainability (Milne and Gray, 2013) rendering these three domains competitors rather than acknowledging them as inseparable and synergistic contributors to the creation of value (Fiksel, 2003). With its exclusive focus on quantitative, direct indicators, this approach to sustainability – also referred to as the *triple bottom line* (Elkington, 2013) – ignores more qualitative and structural as well as indirect and systemic impacts of businesses. Does a car manufacturer using bioplastic for interior paneling contribute sufficiently to the solution of problems originating from the drastic increase in private transport, greenhouse gas emissions, and air pollution? Notwithstanding improvements in integrating sustainability in corporate performance reporting (e.g., via integrated reporting supported by the Global Reporting Initiative), sustainability reporting in general premises a firm-centered (inside-out) perspective grounded on economic efficiency and encourages management to make incremental improvements along business-as-usual trajectories (Alexander and Blum, 2016; Dyllick and Muff, 2016). Yet, to achieve fundamental and systemic change firms must develop an understanding of the surrounding socioeconomic system and – by adopting an outside-in perspective – contribute to its continuous innovation and improvement (Dyllick and Muff, 2016; Fiksel, 2003).

One well-established framework to analyze systems in the context of progress and innovation is the notion of systems of innovation or *innovation systems* (IS) (Dosi

et al., 1988; Freeman, 1987; Lundvall, 1992). It considers innovation as a collective output of the systemic interplay among scientific, political, and business actors who continuously exchange knowledge according to given rules and structures. It has been widely acknowledged that the configuration and functioning of IS generally affects the dynamic characteristics and the development of its elements (i.e., firms, research and political institutions, etc.) (Dantas and Bell, 2011; Lundvall, 2007; Motohashi, 2005). However, the specific effect – vice versa – of individual management decisions within firms on the setup and outcome of the IS has not been explored very well. This results in a very vague conceptualization of the role of the firm in IS generally, which also holds for the characterization of the established firms' contributions to sustainability transitions. While literature about motivations and incentives for firms to engage in sustainability abounds (see, e.g., Ariely *et al.*, 2009; Bossle *et al.*, 2016; Dangelico and Pujari, 2010; Hahn and Scheermesser, 2006; Mahoney *et al.*, 2013), it is generally agreed that the dominant economic systems in their present form do not naturally promote such behavior (Hawken *et al.*, 2013; Jackson, 2009; Porter and Kramer, 2011; Schweickart, 2009). Therefore, transitions researchers have commonly framed currently successful firms as part of the problem that must be overcome in order to destabilize present unsustainable regimes (Geels, 2014). Accordingly, relatively recent conceptual advancements of IS for sustainability (Lindner *et al.*, 2016; Pyka, 2017; Urmetzer and Pyka, 2021) also neglect the potential contribution of currently powerful private actors in realizing normative improvements of the system. This underestimation is worrying considering the influence, power, and sheer number of incumbents that can hardly be entirely substituted before long (Wells and Nieuwenhuis, 2012). Luckily, the first studies of the transformative role of firms in sustainability transitions (Andersen and Markard, 2017; Augenstein and Palzkill, 2016; Hansen and Coenen, 2017; Loorbach and Wijsman, 2013) have started to bridge the observed disconnection between regime-conforming firms and transition endeavors.

From the micro-level perspective, a useful conceptual approach to address the effect of corporate strategies on the systemic surroundings is the *sustainable business model* framework, which connects the firm level with the systems level (Bocken *et al.*, 2014; Stubbs and

Cocklin, 2008). Accordingly, it has been shown in several studies that the systems context of a firm, in terms of natural, social, institutional, industry, and technology-specific systems, influences the design and content of sustainable business models (Morioka *et al.*, 2017). The same holds for impacts of IS on business models (BM) (Ahlstrom *et al.*, 2018; Hannon *et al.*, 2015). However, little research has been done to address influences in the opposite direction, i.e., the question in which way BM innovation impacts IS configuration. Consequently, the evolutionary impact of BM on IS has remained rather unspecific. Against the backdrop of the urgent systemic sustainability challenges, however, it may be crucial to understand in which way the design of BM can support the fundamental changes required in the structure, the dynamics, and the outcomes of the surrounding IS.

This gap is addressed in the article at hand by posing the following research question:

What are the characteristics of business models that have the potential to contribute to an entire innovation system's dedication to sustainability?

The business model perspective is adopted to link the micro-level orientation within firms to the mechanisms and configurations that determine outcomes on the systems level. This perspective promises insights into an individual actor's potential to contribute to systemic change. Therefore, the article does not focus on sustainable innovation (as output of an IS) as such, but explores opportunities of firms to contribute to a reconfiguration of present IS in a way that their overall capacity to produce more sustainable outcomes increases. In other words, the research at hand focuses on ways how firms can prompt a system-wide change towards a stronger systemic dedication to sustainability instead of exploring their (obviously quite limited) transformative possibilities within current IS. It provides pathways towards the better linking of concepts of management sciences with theories of innovation economics, thus contributing to the fostering of interdisciplinary BM research, which is the expressed aim of this special issue.

The following section serves as a short introduction to dedicated innovation systems and systems thinking in general, carves out the central role of paradigmatic

search heuristics in innovation-driven transformation processes, and introduces sustainable business models. Section 3 presents the procedure and results of a systematic literature review on the coevolution of business models and IS. Together with the theoretical frameworks introduced in section 2, these are used to reflect on possible BM characteristics that increase firms' systemic effect on dedicated innovation systems in section 4. Three propositions summarize the discussion and facilitate further research on 'dedicated business models'. Section 5 concludes.

Conceptual Background

Dedicated innovation systems

An innovation system (IS) consists of "interacting private and public firms (either large or small), universities, and government agencies aiming at the production of science and technology ..." (Niosi *et al.*, 1993: 212). This is achieved by the continuous creation and flow of new knowledge which is eventually introduced "into the economy in the form of innovations, [and diffused and transformed] into something valuable, for example, international competitiveness and economic growth" (Gregersen and Johnson, 1997: 482). Due to their history and application, IS have a strong (often implicit) focus on technological innovation, competitiveness, and economic development (Schlaile *et al.*, 2017).

Lately, however, IS research has started to also consider innovation as a source of the required radical changes in response to global sustainability challenges. This calls for an expanded framing of IS beyond the incubator of technological remedies by incorporating a system-wide dedication to the continuity and resilience of social and ecological systems, inter- and intra-generational justice, and quality of life (Daimer *et al.*, 2012; Lindner *et al.*, 2016; Schlaile *et al.*, 2017; Tödting and Tripl, 2018; Urmetzer and Pyka, 2021; Warnke *et al.*, 2016; Weber and Truffer, 2017). Such reframing has been accomplished on a theoretical level by the conceptualization of *dedicated innovation systems* (DIS). DIS are understood as IS that "explicitly go beyond technological innovation and economic growth and allow for paradigmatic change towards sustainability: They are 'dedicated' to foster the joint search for transformative innovations" (Pyka, 2017: 3). A dedication towards sustainability can be understood as a very specific innovation paradigm

that determines the rate and direction of innovative activity towards sustainable outcomes. Based on and expanding Dosi's evolutionary notion of *technological paradigms* (Dosi, 1982), such dedication will become manifest in changed search heuristics shared by the actors of an IS. This will influence the definition of the 'relevant' problems, the knowledge claimed necessary to solve them, as well as the common understanding of what progress or 'success' means. Simply put, the conception of 'business-as-usual' changes in DIS and innovation that promotes more sustainable production and consumption patterns is no longer regarded the exception, but the rule.

While Dosi himself recognizes "the selective and focusing effect [on the selection and emergence of new paradigms] induced by various forms of *stricto sensu* non-economic interests" (Dosi, 1982: 160), it has not been explored so far *how* such noneconomic interests like the preservation of ecosystems or the well-being of current and future generations actually influence paradigms and *who* will be in the position to intentionally do so. Since the DIS approach "targets radical transformations of existing institutions ..." (Pyka, 2017: 3), the powerful incumbent industries have so far not been expected to be the ones taking the lead. Due to their embeddedness in the system, firms have for a long time been regarded as incapable of influencing market structure, consumer demand, institutions, and infrastructures towards more sustainable configurations (Smith *et al.*, 2005). Firms that are currently successful naturally focus on the exploitation of existing procedures and infrastructure (Schaltegger *et al.*, 2016), thus rather supporting the continuation of current paradigms. Consequently, throughout a major part of the literature, incumbents play quite a passive role in that they only change their innovation logics under severe pressure from civil society, governments, and consumers (Penna and Geels, 2015), incentivized by imminent creative destruction from external forces (Kivimaa and Kern, 2016) or by rewarding public policy programs (Jacobsson and Bergek, 2011). Sustainability challenges are generally considered as negative externalities of production processes which are traditionally taken care of by the public sector. Likewise, social and environmental development beyond business interests is regarded to be the responsibility of the government (Kieft *et al.*, 2017; Málovics *et al.*, 2008; Steward, 2012).

Consequently, corporate sustainability endeavors have usually not departed from dominant innovation paradigms in their continuing reliance on linear growth, increasing consumption, and maximized shareholder wealth (Sharma and Lee, 2012). In the conventional concept of IS such behavior is in full accordance with what is expected from incumbent private firms. In DIS, by contrast, that role might (have to) change. But how can we conceive a way of corporate behavior that is mindful to Dosi's noneconomic interests and contributes to an overall systemic dedication to sustainability?

Connecting collective and individual levels

From a systems perspective it is not easy to make out individual patterns of action that will collectively lead to a desired outcome of the whole. Instead, quite often the diverging aims of subunits together effectuate systemic outcomes that have not been intended by any of them. As Donella Meadows points out, "one of the most frustrating aspects of systems is that the purposes of subunits may add up to an overall behaviour that no one wants" (2008: 15). Consequently, if private and public organizations, universities, and government agencies each pursue their isolated, particular sustainability goals, this will hardly contribute to an overall system with the purpose of producing transformative innovations dedicated to sustainability. We know little of the systemic role of the various micro-processes within IS subsystems in innovation processes, a fact that makes the planning of deliberate intervention in systems towards desired outcomes extremely difficult if not impossible. Strong and instrumental links have been built between the IS literature and sustainability before (see Urmetzer and Pyka, 2021 for an overview), but these concepts hardly illuminated those individual orientations and mindsets necessary to afford the required transformation (Urmetzer *et al.*, 2018).

Figure 1 illustrates the relation of IS subsystems, innovation paradigms, and IS outcomes as conceptualized for this research. It pictures innovation paradigms as one central lever for the different IS actors to influence the way the IS functions and thus the kind of innovation it produces. The figure highlights the reciprocal interference between the elements shown: while the various subsystems in an IS collectively influence the innovation paradigm (thereby determining the rate and direction of the innovative output), the paradigm itself

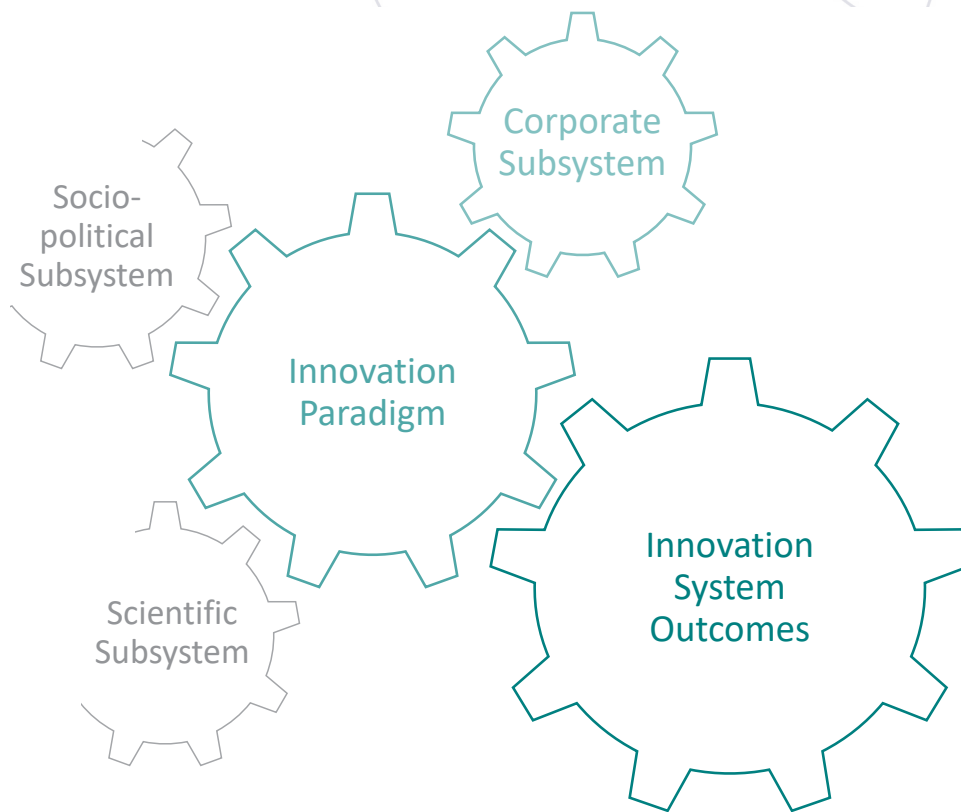


Figure 1: Interrelation of the corporate subsystems (firms) with innovation paradigms and IS outcomes as conceptualized in the context of the study. (Please note that this article explores corporate subsystems only, which is why examples of other important IS subsystems are only insinuated.)

in turn affects the innovative activity of the subsystems as well as IS outcomes.

For the individual subsystems in IS to instigate paradigmatic change and become motors of innovation dedicated to sustainability they must (i) frame the innovation challenge as systemic and sustainability related (in Dosi's terms: define the relevant problem), (ii) explore alternative heuristics and sources of knowledge production and use (in Dosi's terms: define the knowledge required to solve the problem), and (iii) change the general perception of success from (pure) profit maximization towards societal desirability (in Dosi's terms: define the meaning of progress).

An example: The automobile industry's (representing the IS) paradigmatic turn towards sustainability would require from an individual dedicated automobile company (representing a corporate subsystem) to (i) understand and reconsider its individual role in the societal challenges connected to congestion, air pollution, and

climate change (what Dyllick and Muff (2016) term *the outside-in perspective*). Consequently, the company would have to (ii) open up and use their expertise to find solutions that provide mobility instead of combustion engines. The respective new search heuristics would probably require, for instance, experimentation with alternative mobility concepts and extraneous technologies, collaboration with public transport enterprises, competitors, consumer associations and citizens' initiatives, as well as adapted procurement policies. Accordingly, (iii) progress or 'success' would need to be redefined from 'faster, safer, more comfortable' to, for instance, 'cleaner, smarter, more convenient.'

Beyond corporate sustainability: The business model perspective

This systemic perspective on businesses' contribution to sustainability transformations has been argued to be in stark contrast to specific, incremental change initiatives such as traditional notions of corporate social responsibility or the triple bottom line (Miller Gaither

et al., 2018; Milne and Gray, 2013; Schaltegger and Burritt, 2018). For “reporting progress on sustainability influences stakeholders’ perceptions and is therefore an important tactic, but on its own it does not appear to be a significant driver of sustainability” (Stubbs and Cocklin, 2008: 115). But even without insinuating greenwashing, against the backdrop of the overall aim to transform the IS, these endeavors must be regarded as being too narrow in focus. In its current form, corporate social responsibility actually runs the risk of contributing to the manifestation of unsustainable system configurations instead of putting the firm in “the broader context of necessary structural and systemic change that stands beyond the reach of mainstream corporate responsibility initiatives” (Waddock and White, 2007: 42; see also Bocken *et al.*, 2014; Dyllick and Muff, 2016; Hart, 1997; Sharma and Lee, 2012).

To open up towards this broader context, a suitable unit for the analysis of a firm’s capacity to become a system (co-)builder of a DIS is the business model (BM). According to Teece, a BM “describes the design or architecture of the value creation, delivery and capture mechanisms employed” by a firm (2010: 179). The concept also offers great insights into businesses’ roles in sustainability transformations because it ultimately reflects the way a company ‘does business’ (Amit and Zott, 2008). It does so by combining the firm level with the systems perspective (Bocken *et al.*, 2014; Bocken, 2019; Boons and Lüdeke-Freund, 2013; Schaltegger *et al.*, 2016; Stubbs and Cocklin, 2008) and encapsulating the belief system of a company – a fundamental driver of corporate decision-making and, subsequently, action (Martins *et al.*, 2015; Massa *et al.*, 2017; Tikkanen *et al.*, 2005).

These characteristics prompted a new line of research investigating how the underlying principles guiding the technological and social innovation of a firm can be aligned with system-level sustainability via sustainable BM (also referred to as BM for sustainability, or sustainability BM) (Bocken *et al.*, 2015; Boons and Lüdeke-Freund, 2013; Schaltegger *et al.*, 2016; Stubbs and Cocklin, 2008). Sustainable business models (SBM) “draw on economic, environmental, and social aspects of sustainability in defining an organization’s purpose, use a triple bottom-line (people, profit, planet) approach in measuring performance, consider the needs of all stakeholders rather than giving priority to shareholder expectations,

treat ‘nature’ as a stakeholder and promote environmental stewardship, and encompass a system, as well as a firm-level perspective” (Bocken, 2019: 1). The contribution of SBM to system-wide sustainability is mainly seen in a direct effect on the systemic outcomes, such as a reduced resource impact through circular production or through the provision of a service instead of a product. While such concrete outcomes are indeed necessary and as innovative ideas most welcome, we must suspect that a diffusion of such BM will be slow to reach scale and momentum will not necessarily be created (Bocken *et al.*, 2014). Coming back to what has been argued before, one of the reasons may be that SBM can be expected to occur within established paradigms. BM for DIS, by contrast, aim for a *paradigmatic change* by introducing a dedication to sustainability as normative direction in innovation processes across the entire (innovation) system. In other words, SBM change individual configurations and isolated outcomes in socio-technical systems, whereas BM for DIS are expected to change the innovation paradigms thus influencing the inner logic of innovation across the system.

Coming back to the example of the automobile industry of the previous section, an SBM would be restricted to the given problem definition (e.g., combustion engines fuel climate change), the known solution space (e.g., technological alternatives to combustion engines or increased efficiency in resource use), and the agreed definition of success (mostly measured in economic terms).

To sum up, I have chosen the BM perspective as a suitable unit for exploring the potential power of firms to change the paradigmatic underpinnings of innovation in IS towards a dedication to sustainability. Dosi’s notion of technological paradigms is expanded to provide a framework that connects individual actors’ orientations (as expressed by a specific BM) with the systemic outcomes produced by the IS via modifications in the innovation paradigm (as expressed by an understanding of what problems need to be solved, what solutions need to be picked, and how success needs to be defined, shared across the IS) (see figure 2).

Although notions and usage of BM vary widely across literature and practice, the following three fundamental elements are generally seen to make up a BM (Bocken *et al.*, 2014) and shall serve as the baseline for

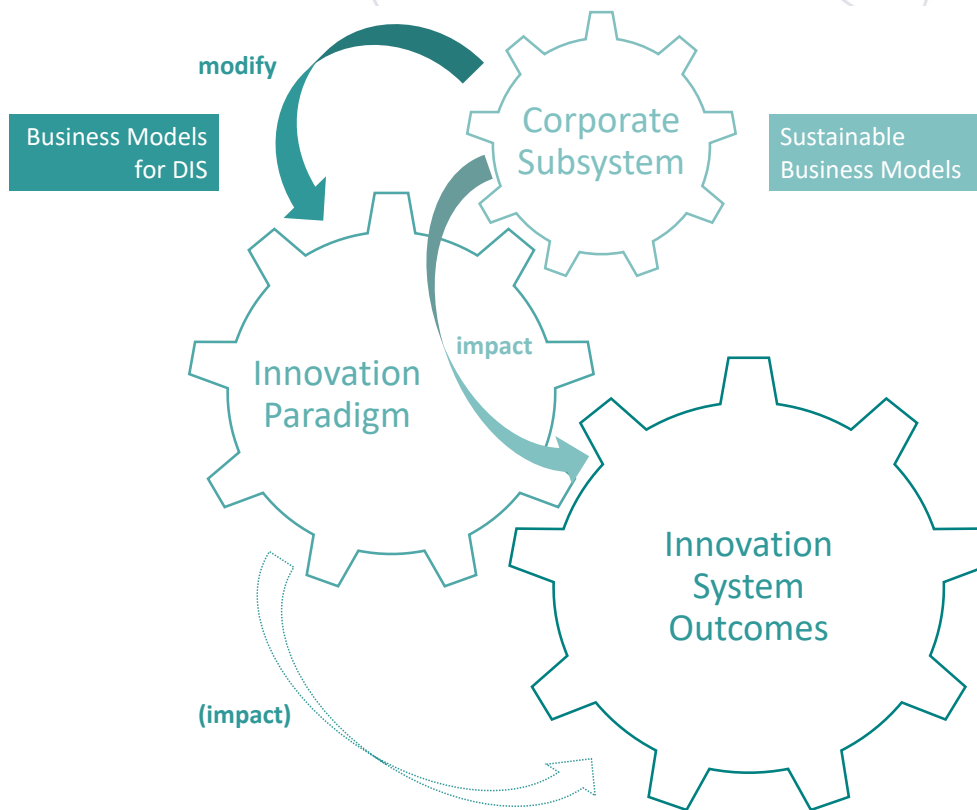


Figure 2 The different modes of action of SBM (right) and BM for DIS (left): While the former impacts IS outcomes on the basis of a given paradigm, the latter is expected to operate through actively modifying paradigms (via redefining problems, solutions, and success), thus potentially affecting IS outcomes indirectly.

exploring the systemic relationship between BM and DIS: (1) value proposition (the way to describe the product or service offered), (2) value creation and delivery (the way new business opportunities are created and realized), and (3) value capture (the way revenues are earned from the provision of goods or services).

The following section presents a systematic review of the literature to map the coevolutionary relationships between BM and IS discovered and described by earlier research. The findings will serve as a basis for developing three propositions for outlining the contours of dedicated BM.

Business Models in Innovation systems

An increasing number of studies have explored the role of BM in socio-technical systems transitioning to

sustainability (Bocken *et al.*, 2014; Bocken and Short, 2016; Boons and Lüdeke-Freund, 2013; Schaltegger *et al.*, 2012, 2016; Stubbs and Cocklin, 2008). In the following, I will zoom in on the intricate relationship between (changes in) the corporate innovation rationale (as embodied in BM) and the introduction of a dedication towards sustainability across the IS.

Methodology and data

To explore the literature on BM in the context of IS, a systematic literature review was carried out (Kivimaa *et al.*, 2019; Petticrew and Roberts, 2008). A scientific literature repository search based on keywords was conducted using Scopus – a database which has been proven to excel in covering literature in social sciences and outcompeting other repositories, such as Web of Science (Bartol *et al.*, 2014; Gavel and Iselid, 2008; Mongeon and Paul-Hus, 2016). It was explicitly searched for research contributions at the interface of BM and IS to gain insights into conceptual work on

the coevolutionary relation of the two. The selection of articles was completed in four steps. First, the database was browsed combining the search terms “business model” AND (“innovation system” OR “system of innovation”) in the title/abstract/keywords fields, which yielded 74 items. The publication had to be (1) a peer-reviewed piece of academic work in the field of social science and business studies and (2) indexed in Scopus as of April 4, 2019. Second, the respective article abstracts were carefully analyzed using the following exclusion criteria: (3) Articles that used one of the search terms in a fundamentally different sense were excluded (i.e., the term “business model” needed to be used in the sense of design or architecture of the value creation, delivery, and capture employed by a firm (Teece, 2010), whereas “innovation system” needed to refer back to the evolutionary framework as described by the fathers of the concept (e.g., Freeman, 1987; Lundvall, 1998)); (4) articles that treated the two focal key concepts only superficially or separately without addressing their interplay were excluded from the analysis. Abstract reading resulted in a selection of 37 articles, of which 22 were omitted based on reading the full papers (exclusion criteria 3 and 4), resulting in 15 articles feeding into the next step. This involved searching the reference lists of the selected 15 articles for earlier relevant contributions, also considering terms with similar meaning. This “backward citation snowballing” added two articles to the analysis. The “cited by” option in Google Scholar helped to carry out a “forward citation snowballing” for each of the 17 articles. The resulting list of citing articles was then scanned according to the above exclusion criteria. This offered an additional set of three new articles. The final list of articles considered in the systematic review numbered 20. All the articles were read and coded according to the following criteria: The type of IS covered (IS in general, technological, national, regional, or sectoral IS), the business/industrial sector studied, the consideration of sustainability (yes or no), the BM element in focus, the BM definition, the question addressed by BM (what, how, for whom), the empirical field explored, the relation of BM and IS (which influencing which), proposed points of intervention, the research question, the formulation and addressee of recommendations, the focus (economics, business administration, or politics), the related theories covered, and central statements (citations).

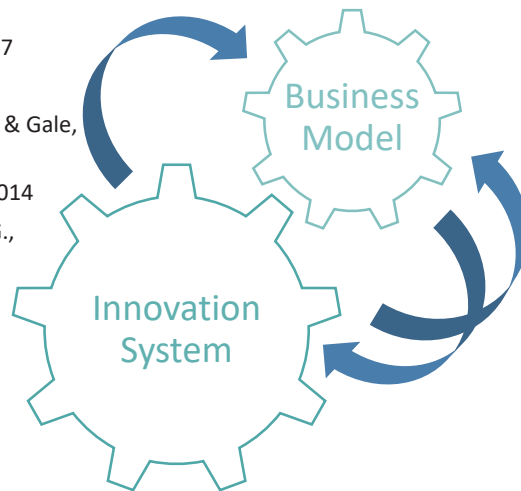
Results

The way business models operate in IS and how specific IS configurations and functions affect business models has rarely been studied. The number of studies has increased over time though, with four of the articles published between 2000 and 2009 and 16 between 2010 and 2019. This approximately concurs with the period during which the two concepts evolved (Klein and Sauer, 2016; Massa *et al.*, 2017). Most of the articles either refer to national IS (six articles) or to technological IS (six articles), while three studies explore regional IS, one a sectoral IS, and the remainder just use IS as a general approach without specifying a particular level of analysis. The types of industry studied vary greatly, from low-tech fields (agriculture, gardening) to high-tech sectors (nanotechnology, biotechnology) and typical “transitions industries” such as the energy or the mobility sector. Nine publications – and since 2014 almost all of them – explicitly consider the contribution of BM to sustainability in IS. This observation and the fact that also the sustainability transition community is increasingly discovering BM research (Bidmon and Knab, 2018) confirms the general suitability of this concept to explore long-term systemic transitions from a micro perspective (Arevalo *et al.*, 2011).

The notion of the term BM varies across the publications, ranging from encompassing certain innovation and marketing strategies of the focal firm (Casper, 2000), an “interplay between innovation strategies and resources” (Markard and Truffer, 2008: 460), the organizational method of how the firm does business (Kalvet, 2010), to how it creates, proposes, and/or captures value (Adams *et al.*, 2016; Breznitz, 2007; Grin *et al.*, 2018; Hannon *et al.*, 2015; Provance *et al.*, 2011; Sarasini and Linder, 2018). Not surprisingly, those authors who stress the *value creation* element of BM also appear to be the ones that ascribe to BM an active role in shaping the IS (Grin *et al.*, 2018; Kishna *et al.*, 2017; Yun *et al.*, 2017). From this perspective, firms no longer only respond to the demands and interests of customers, policy, or competitors, but partake in defining what is of value.

About half of the selected studies describe the relation between BM and IS as being purely unidirectional, in that the authors do acknowledge the influence of different IS configurations and specifications on the

1. Ahlstrom D., Yang X., Wang L., Wu C., 2018
2. Atteridge A., Weitz N., 2017
3. Segers J.-P., 2016
4. Hannon, M. J., Foxon, T. J., & Gale, W. F., 2015
5. Laukkanen M., Patala S., 2014
6. Provance M., Donnelly R.G., Carayannis E.G., 2011
7. Kalvet T., 2010
8. Breznitz D., 2007
9. Casper S., 2000



1. Bidmon, C.M., Knab, S.F., 2018
2. Grin J., Hassink J., Karadzic V., Moors E.H.M., 2018
3. Sarasini S., Linder M., 2018
4. Kishna, M., Negro, S., Alkemade, F., Hekkert, M., 2017
5. Planko J., Cramer J., Hekkert M.P., Chappin M.M.H., 2017
6. Yun J.J., Won D., Park K., Yang J., Zhao X., 2017
7. Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., Overy, P., 2016
8. McCall T., 2013
9. Musiolik, J.; Markard, J.; Hekkert, M., 2012
10. Chiaroni D., Chiesa V., De Massis A., Frattini F., 2008
11. Markard, J., Truffer, B., 2008

Figure 3 The relation between BM and IS: While nine publications describe an effect of IS on BM (single arrow, to the left), eleven studies explicitly refer to an effect of BM on IS or a mutual relationship (double arrow, to the right).

emergence of certain BM but not vice versa. Some of those scholars, for instance, show how national institutional frameworks influence organizational structures and innovation strategies of individual firms (Ahlstrom *et al.*, 2018; Casper, 2000) or whole industries (Breznitz, 2007) (figure 3, left).

The remaining eleven papers of the set of publications either describe the mutual relationship of BM and IS (Adams *et al.*, 2016; Bidmon and Knab, 2018; Grin *et al.*, 2018; Kishna *et al.*, 2017; Planko *et al.*, 2017; Sarasini and Linder, 2018) or explicitly scrutinize different ways of how business models have been found to change the configuration or behavior of IS (Chiaroni *et al.*, 2008; Laukkanen and Patala, 2014; Markard and Truffer, 2008; McCall, 2013; Yun *et al.*, 2017) (figure 3, right). Of this latter half, three studies (Laukkanen and Patala, 2014; Markard and Truffer, 2008; Planko *et al.*, 2017) analyze the effect of BM according to their ability to drive IS processes, conceptualized by various scholars as *functions* of technological innovation systems (Bergek *et al.*, 2008; Hekkert *et al.*, 2007; Jacobsson and Bergek, 2004). The functions offer a validated concept to break down overall IS performance and thus provide the theoretical foundation for empirical studies on the interface between the system and the actors. Markard and Truffer (2008), for example, consider the IS as composed of a variety of actor groups

each contributing a specific set of resources and innovation activities necessary to fulfil the basic functions of the IS (knowledge creation, guidance of the search, supply of resources, the creation of positive externalities, and market formation). Although in their analysis the authors do not explicitly consider BM, they do come close to the concept by distinguishing three different corporate innovation strategy types: leading, learning, and image shaping. They conclude that firms adopting a leading innovation strategy can actively shape IS trajectories by (strongly) influencing all system functions, especially the direction of innovation (function: guidance of search). The two other studies that draw on systems functions (Laukkanen and Patala, 2014; Planko *et al.*, 2017) use the concept rather to describe different setups of IS while not further elaborating on the potential impact of BM on the fulfilment of the IS functions.

One recurrently identified role of firms in shaping IS via BM is that of system builders (Adams *et al.*, 2016; Grin *et al.*, 2018; Musiolik *et al.*, 2012) or network and cluster creators/changers (Adams *et al.*, 2016; Bidmon and Knab, 2018; Kishna *et al.*, 2017; Musiolik *et al.*, 2012; Yun *et al.*, 2017). Musiolik and colleagues (2012) analyze the potential of individual organizations and formal networks to pool their abilities, influence, and endowments (referred to as resources) to strategically change

Potential BM effects that impact IS	References
1. Open communication of new visions and paradigms	Laukkanen and Patala, 2014; Grin et al., 2018
2. Networking with peers and other allies	Yun et al., 2017; Adams et al., 2016; Kishna et al., 2017; Bidmon and Knab, 2018; Musiolik et al., 2012; McCall, 2013; Planko et al., 2017; Sarasini and Linder, 2018
3. Collaboratively aligning existing institutions	Grin et al., 2018; Yun et al., 2017
4. Reconfiguring supply chains	Kishna et al., 2017; Laukkanen and Patala, 2014; Bidmon and Knab, 2018; Sarasini and Linder, 2018; Musiolik et al., 2012
5. Stakeholder involvement	Adams et al., 2016; Laukkanen and Patala, 2014
6. Educating consumers and suppliers	Chiaroni et al., 2008; McCall, 2013; Planko et al., 2017; Grin et al., 2018
7. Creating legitimacy and new markets	Grin et al., 2018; Planko et al., 2017

Table 1 BM effects observed to actively influence the IS they are part of as found in the literature reviewed.

the IS they are part of. In a literature review, Adams and colleagues (2016) find evidence that establishing more sustainable systems requires firms to proactively and radically change their philosophy and behavior, be creative, acquire new knowledge, redefine their purpose in society, and collaborate with peers, government, and NGOs. The latter requirement, i.e. to collaborate with others in order to increase the business's impact on systemic outcomes, is brought up by six studies examined (Adams *et al.*, 2016; Grin *et al.*, 2018; McCall, 2013; Musiolik *et al.*, 2012; Planko *et al.*, 2017; Sarasini and Linder, 2018).

A few interesting additional points are made by McCall (2013), who emphasizes the important role of collaboration to increase a firms' success. Working together with others helps to strengthen regional competitiveness, facilitate long-term planning among traditionally rather short-term considerations of single firms, and share and improve knowledge and competences. Further possibilities for businesses to shape IS include the creation of legitimacy and new markets (Grin *et al.*, 2018; Planko *et al.*, 2017), the creation and diffusion of knowledge relevant for systems change (including, e.g., consumer awareness campaigns or technical know-how) (Chiaroni *et al.*, 2008; Grin *et al.*, 2018; McCall, 2013; Planko *et al.*, 2017), an open communication of alternative visions and paradigms (Grin *et al.*, 2018; Laukkanen and Patala, 2014), and the active destruction of current institutions (e.g., practices or regulations) (Grin *et al.*,

2018; Yun *et al.*, 2017). An overview of the possibilities of firms to influence IS via their BM is given in table 1.

Discussion: Business Models for Dedicated Innovation Systems

The literature on the potential impact of BM on the functioning of IS is scarce and lacks concrete implications for research as well as for practice. Against the conceptual background of DIS and the expected nature of BM in DIS as unraveled in section 2, a concrete indication of an IS-wide paradigm-changing effect of BM is missing. The findings, however, do provide insights that help us to better understand the potential of incumbents to introduce a dedication to sustainability into the entire IS by changing their BM in a certain way. This section will discuss some of the findings and use them to conceptualize the elements of BM effective in DIS.

With reference to what has been deducted in section 2, the introduction of a dedication in IS must be conceptualized as paradigmatic change through the alteration of the search heuristics. The literature analyzed suggests that IS influence the development and behavior of firms and are at the same time influenced by firms and other important subsystems, such as policy, science, and civil society. Furthermore, it has been acknowledged that BM can be understood as an internal agreement of a firm on how business is done. As such,

BM of firms in an IS collectively cocreate (together with other important IS subsystems that are not considered here) the baseline of its innovation paradigms, which means that the collective of BM in an IS determine its problem definition (in the following referred to as *Dosi I*), its search heuristics (including *what* to search and *where* to search, in the following referred to as *Dosi II*), as well as its definition of what successful innovations are (in the following referred to as *Dosi III*). Businesses are thus capable of changing innovation paradigms, for instance towards more sustainable modes of production, by innovating their BM. The research question posed at the outset of this article regarding the characteristics of BM that contribute to an IS's dedication to sustainability shall be answered by the following discussion of the results and the successive formulation of propositions to guide further research. The propositions are summarized in the subsequent figure 4.

Value proposition

The fundamental philosophy behind a firm's business is reflected in the way how and in relation to whom it proposes the value it intends to create. A proactive shift in an incumbent firm's value proposition, e.g., away from pure profit maximization towards attending societal goals, must thus be regarded crucial for a firm intending to shape IS towards a dedication to sustainability. One possible expression of the commitment of a firm to such change is the exposition of innovation behavior that takes on a leading position within an industry. Albeit not in a sustainability context, Markard and Truffer (2008), for instance, substantiate the power of firms that adopt a leading innovation strategy to actively shape an IS's paradigm by (strongly) influencing all system functions, especially the direction of innovation (function: guidance of search). The empirical evidence points to the power of a changed value proposition to co-determine innovation paradigms – a potential with strong implications for the dissemination of a dedication to sustainability (see also Schaltegger *et al.*, 2012). Some authors bring to mind that such changes in value proposition relating to the core business logic are systemically most effective when undergone in collaboration with peers (Adams *et al.*, 2016; Grin *et al.*, 2018; Vargo *et al.*, 2015), since “the ultimate objectives of sustainability lie beyond the individual capacity of firms to achieve” (Adams *et al.*, 2016: 193).

Such BM innovation concerning the value proposition can be regarded the decisive link between firm-level dedication and its proliferation throughout DIS: it extends the decision-making basis for innovation strategies traditionally comprising cost, risk, margin, reputation, and innovative capability (Schaltegger *et al.*, 2012) towards sustainability-related value propositions ranging from the reduction of social and environmental harm to an increase of positive impact or solving societal challenges (Bocken *et al.*, 2014). Following this and based on reflections of other scholars (Abdelkafi and Täuscher, 2016; Miller Gaither *et al.*, 2018; Schaltegger *et al.*, 2012; Schaltegger and Burritt, 2018), it seems that the degree of dedication of corporate sustainability endeavors, as reflected in bold value propositions, correlates with their potential effect on the IS-wide innovation paradigm. That way, firm-specific value propositions hold the power to contribute to the IS's dedication towards alternative values that, for instance, promote more sustainable systemic outcomes. The literature review has shown that open communication of such extended visions and paradigms is essential if IS are to be affected (Grin *et al.*, 2018; Laukkanen and Patala, 2014) (see table 1, no. 1).

Proposition 1: The value proposition of a BM that contributes to IS' dedication towards sustainability reflects a firm's commitment to sustainability-related values and open communication of the same. This way a firm can act upon the IS-wide problem definition (*Dosi I*: problem definition).

Value creation and delivery

It has been suggested that firms which make a conscious decision regarding the business opportunity they aim to seize by emphasizing the value creation and delivery element in their BM tend to have a strong influence on the evolution of the surrounding IS (Grin *et al.*, 2018; Kishna *et al.*, 2017; Yun *et al.*, 2017). In fact, value creation is seen as being “at the heart of any business model” (Bocken *et al.*, 2014: 43). In the context of shaping alternative paradigms, changes in the operational aspects of business, such as the determination of key activities, resources, stakeholders, and technologies bear a special meaning. This is the part of the BM where decisions regarding the search heuristics for innovative activity become manifest. For subordinating one's innovation activity to an alternative paradigm, it

can, for instance, be fundamental to determine new sources of knowledge (outside the traditional expertise and suppliers) by seeking new collaboration partners. This could improve the success of the adoption of whole new value creation concepts as provided, for instance, by a circular business model disrupting the traditional take-make-waste industrial logic (The Ellen MacArthur Foundation, 2013). For a reduction of uncertainty in innovative endeavors for the value creation and delivery, various authors recommend the involvement of the surrounding IS by networking with peers and other allies (Adams *et al.*, 2016; Bidmon and Knab, 2018; Kishna *et al.*, 2017; McCall, 2013; Musiolik *et al.*, 2012; Planko *et al.*, 2017; Sarasini and Linder, 2018; Yun *et al.*, 2017) to collaboratively align existing institutions (Grin *et al.*, 2018; Yun *et al.*, 2017) and to eventually reconfigure traditional supply chains (Bidmon and Knab, 2018; Kishna *et al.*, 2017; Laukkanen and Patala, 2014; Musiolik *et al.*, 2012; Sarasini and Linder, 2018) (see table 1, no. 2, 3, and 4).

Proposition 2: The value creation and delivery of a BM that contributes to IS' dedication towards sustainability draws on unprecedented linkages within the IS that provide access to new material, technological, and intellectual resources to reach higher levels of sustainability. This way a firm can act upon the diffusion of alternative directions of search across the IS to reach a critical mass (Dosi II: search heuristics).

Value capture

The impact that modified value capture strategies of a firm have on the degree of dedication within an IS has not been studied much. As long as value is interpreted in purely monetary terms, strategies for its capture can be expected to be a barrier rather than a driver of BM innovation towards DIS. Bocken and Short (2016) present a few cases where firms accommodate their sustainability engagement by charging a premium price for a more durable product and/or a better after-purchase service. Such BM innovation, albeit not paradigm-breaking in itself, indeed has the potential

to instigate paradigmatic change in IS, for instance by introducing the sufficiency principle to the logic of innovation. This could also motivate other firms to shift towards the provision of robust and long-lasting products, taking advantage of and reinforcing consumers' preference for high-quality products or of the benefits of consuming a service instead of owning a product. At the same time, it would change the definition of innovation success, and of progress for that matter. An innovative product would feature, for instance, characteristics such as a prolonged lifetime, easier accessibility, and smart resource usage. Along these lines, the product service systems (PSS) hold some potential for dedicated BM innovation. A PSS has been defined as "a system of products, services, supporting networks and infrastructure designed to be competitive, satisfy customer needs and have lower environmental impact than traditional business models" (Mont, 2002: 239). The sustainable PSS concept offers an approach to value capture which takes account of the ability of producers to influence supply and/or consumption and thus altering innovation paradigms. By offering services in connection to products, firms have the chance to persistently alter producer and consumer practices in a way that reduces material input and increases utility (Mylan, 2015). Accordingly, value capture innovations effective on the IS level have generally been found to require the capacity to involve a broad array of stakeholders (Adams *et al.*, 2016; Laukkanen and Patala, 2014), to educate consumers and suppliers (Grin *et al.*, 2018), and thus create legitimacy and new markets (Grin *et al.*, 2018; Planko *et al.*, 2017) (see table 1, no. 5, 6, and 7).

Proposition 3: The value capture of a BM that contributes to IS' dedication towards sustainability nurtures changed demands of consumers and suppliers who acknowledge sustainability principles, such as the superiority of quality over quantity or utility over ownership. This way a firm can act upon the general perception of innovation success among IS subsystems (Dosi III: definition of success).

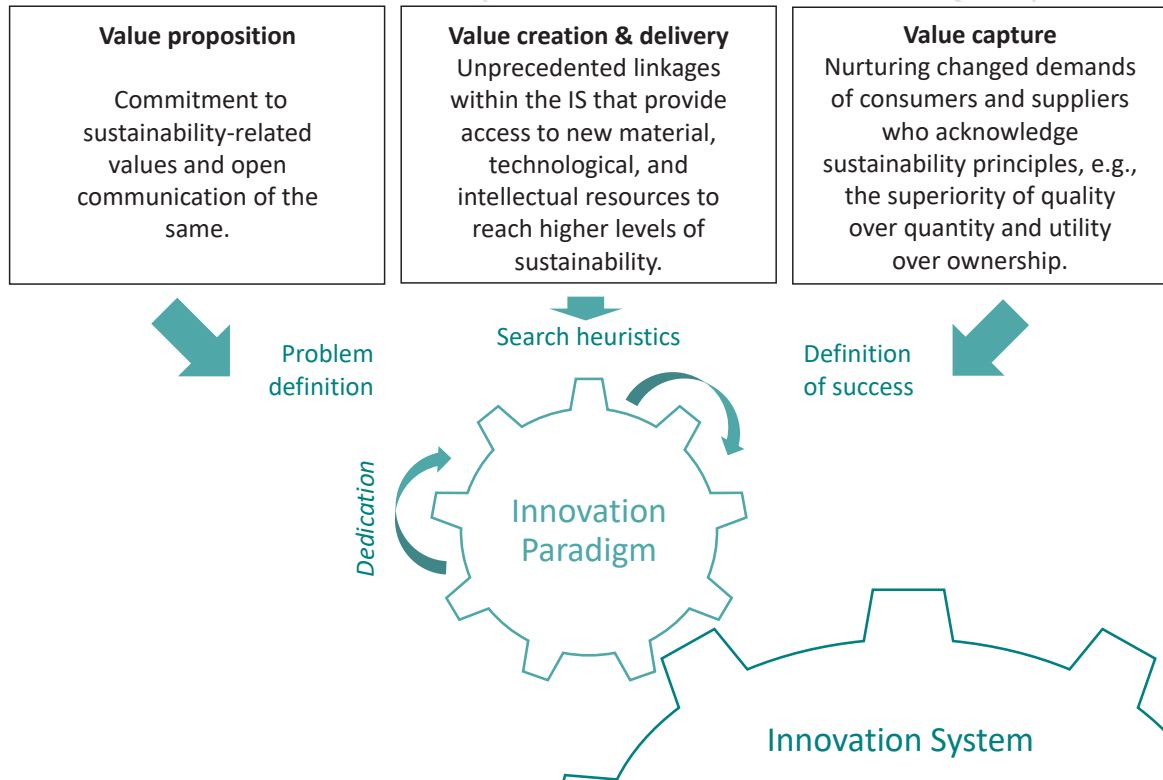


Figure 4 Overview of the elements of BM that potentially contribute to IS' dedication towards sustainability by changing the innovation paradigm.

Conclusion

It has been argued that enterprises can only be considered sustainable when the system of which they are part is sustainable (Jennings and Zandbergen, 1995). Following the arguments made in this article, however, this fact does not release incumbent firms from their responsibility to contribute to sustainability transformations. A systematic review of related literature together with a conflation of several strands of theory has revealed linkages between individual strategic decision-making (as expressed by BM) and the paradigmatic underpinnings of innovation across the entire IS. It has been shown that firms have the potential to contribute to the dedication of IS by (1) redefining the 'relevant' problems and acknowledging their role in them; (2) opening up their search heuristics to gain the knowledge claimed necessary to solve these problems; and (3) propagating a common understanding of what 'success' means in this context. Firms will however only be successful in collaboration with other IS actors (government, consumers, civil society, entrepreneurs, competitors, academia). This is how they will be

able to distribute the burden of risk, create legitimacy, and contribute to changing market paradigms. Combining the findings of this study with how Bocken and colleagues frame sustainable BM (Bocken *et al.*, 2014: 44), the following definition of a BM that contributes to the dedication of IS towards sustainability or *dedicated business model* is proposed: "A business model that significantly changes the innovation paradigm of the entire innovation system towards the principles of sustainability, through describing and disseminating the way the organization and its value-network define, create, deliver, and capture value."

The concept of dedicated BM originates from the idea that for deliberately transforming a system, a change in individual parameters (e.g., via the substitution of a certain production input) or isolated linkages (e.g., via direct marketing) offers a lower degree of leverage than changes in the logic or the paradigm according to which the system functions (e.g., via a redefinition of problems, solutions, and success factors across an entire system or sector). Much alike (and inspired by)

Donella Meadows' concept of *leverage points* (1999), such intentional paradigmatic changes are rare and far harder to implement than changes at lower levels of intervention. This is presumably why concrete empirical examples of dedicated BM are yet to be discovered.

The limitations of the study are twofold. Firstly, the line of argument is complemented by a relatively small sample of literature reviewed, which is owed to the fact that the mutual relation between BM and IS has not been researched much so far. The second limitation arises from a lack of explanatory power by a 'theory of the dedicated firm,' which neglects the incentives and barriers for firms to change their BM. Discussions of these issues with sustainability leaders of large incumbent enterprises reveal various ontological issues, such as the heterogeneity within corporate management, uncertainties regarding future sociopolitical developments, and the volatility of societal values (see also Garst *et al.*, 2019). These are some of the reasons why the paper comes up with rather generic implications that are not yet mature enough to guide dedicated management endeavors. Increasing the practical relevance and refining the conceptual base of BM innovation towards DIS will require further research, e.g., by testing the propositions posed above in empirical cases. Future conceptual research could inquire into the impact of BM on individual IS functions (building on Markard and Truffer, 2008) or explore the suitability of dedicated BM to complement Bocken and colleagues' SBM archetypes (2014). Moreover, empirical substantiation is required to test the concept against what is presently available and potentially feasible under real-world circumstances.

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