Systemic perspective in process models for sustainability-oriented business model innovation

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Abstract

Climate change and resource scarcity require companies and other stakeholders to operate more sustainably. The development of new sustainable business models can play a crucial role in achieving the necessary transformation. Business models for sustainability (BMfS) in general, and circular business models (CBM) in specific, generally describe the way in which companies create, deliver, and capture value within a broader system of stakeholders. Compared to traditional business models, BMfS and CBM are more interdependent and interconnected. This calls for a more systemic perspective in their development. In the literature, process models for business model innovation (BMI) have been discussed to describe the necessary steps from ideation to implementation of new business models. However, so far, no specific focus has been put on the consideration of systemic perspective in such process models. Therefore, we first conduct a systematic literature review to identify 27 existing process models for BMI in the context of sustainability. We then map the discussed process phases and synthesize them into a holistic process model for BMI for sustainability (BMIfS) consisting of 11 phases. Each phase is explained in detail by assigning relevant tasks and activities. Lastly, we identify activities relevant to the systemic perspective and discuss further potentials for a systemic perspective. The paper contributes to the growing literature on sustainability-oriented BMI, provides guidance for decision-makers, and offers a new research avenue by focusing on the systemic perspective of the underlying process.

Keywords

Business models for sustainability, circular business models, business model innovation, process model, systemic perspective, systems thinking, literature review

1. Introduction

Companies must operate more sustainably to face resource scarcity and to contribute to climate change mitigation. In this context, business models for sustainability (BMfS) and circular business models (CBM) can play a crucial role (Bocken et al. 2014; Stubbs & Cocklin 2008). Business Models (BM) describe a company's way of doing business based on value creation, proposition, delivery, and capture (Richardson 2008; Zott & Amit 2010). BMfS and CBM are characterized by an extended value understanding, incorporating environmental and societal factors (Bocken et al. 2014; Stubbs & Cocklin 2008).

The process of initiation, ideation, integration, and implementation of a BM is defined as business model innovation (BMI) (Abdelkafi et al. 2013; Amit & Zott 2012; Frankenberger 2013). Transferring BMI processes to be suitable for BMfS and CBM design requires a holistic approach (Lüdeke-Freund et al. 2016; Schaltegger et al. 2016). Guidance for decision-makers is needed to overcome hesitation (Evans et al. 2017).

Sustainability-oriented innovation is systemic by nature (Rohrbeck et al. 2013). Increased interdependency between BMfS and CBM compared to traditional BMs requires collaboration and the involvement of various stakeholders (Fehrer & Wieland 2021; Antikainen et al. 2016). A systemic perspective that spans beyond the focal company and considers the BM of other stakeholders to be as relevant as that of the focal company is needed (Adner 2016). BMfSI must adopt such a systemic perspective to take into account the interactions between the BM of the focal company and other stakeholders (Centobelli et al. 2020; Santa-Maria et al. 2022). This paper aims to answer two research questions.

R1: How and to what extent is a systemic perspective considered within existing process models for BMIfS?

R2: How must a holistic process model for BMIfS be designed and how can a systemic perspective be considered?

The remainder of this publication is as follows. We first describe the fundamentals of business model innovation in the context of BMfS and CBM, specifically pointing out the need for a systemic perspective. Next, we present findings from a systematic literature review on BMI process models in the context of sustainability. We then draw from the identified process models to synthesize a holistic sustainability-oriented BMI process model. Following the description of phase-specific tasks, we highlight points of interest for a systemic perspective along the process phases. We conclude with a need for future research on the embeddedness of the BMI process of the focal company into superordinate processes on the systems level.

2. Business model innovation and sustainability

2.1 Business models for sustainability and circular economy

In the literature, the concept of business models (BMs) has been discussed for over 20 years and has become a widely accepted unit of analysis in strategic management (Wirtz et al. 2016; Lüdeke-Freund & Dembek 2017). However, to this day, no single definition of BMs exists (Foss & Saebi 2018; Evans et al. 2017). They are generally seen as a company's way of doing business to realize its strategy (Zott & Amit 2010; Casadesus-Masanell & Ricart 2010). BMs describe the conversion of capabilities and resources into value (Teece 2010). The majority of scholars adopted a value-based framing of BMs following the three core elements value proposition, value creation and delivery, and value capture proposed by Richardson (Teece 2010; Evans et al. 2017; Richardson 2008).

By integrating sustainability and a broader set of stakeholders, extending the traditional value-understanding, business models for sustainability (BMfS) are derived from conventional BMs (Bocken et al. 2013; Stubbs & Cocklin 2008). It is assumed that intentional BM design can foster sustainable practices (Boons & Bocken 2018). Recent literature reviews show a broad range of definitions for BMfS (Geissdoerfer et al. 2018; Marczewska & Kostrzewski 2020). Different terms such as sustainability-oriented business models (e.g. Breuer et al. 2018), sustainable business models (e.g. Stubbs& Cocklin 2008, Bocken et al. 2014, Geissdoerfer et al. 2016), or business models for sustainability (e.g. Lüdeke-Freund et al. 2016, Schaltegger et al. 2016) are used by scholars to describe similar concepts. We adopt the latter, implying that no single BM can be sustainable but rather multiple BMfS jointly contribute to sustainability (Lozano 2018).

BMfS broaden the conventional purpose of BMs by employing a triple bottom-line approach (Bocken et al. 2014; Stubbs & Cocklin 2008). They focus on creating positive environmental and societal impact (Velter et al. 2019; Lüdeke-Freund 2019). The value proposition is extended to a measurable ecological and/or social impact (Boons & Lüdeke-Freund 2013). BMfS must be economically viable while delivering environmental and/or social value (Bocken et al. 2013; Lüdeke-Freund & Dembek 2017).

Circular business models (CBM) can be understood as a specific type of BMfS that aim at enabling a circular economy (Geissdoerfer et al. 2020). The goal of CBM is to reduce resource use, extend product life cycles, and enable closed material loops (Manninen et al. 2018). A CBM describes how companies create, deliver, and capture value in a value chain that is designed according to circular economy principles (Nußholz 2017; Urbanati et al. 2017). Thereby, the rationale of the business is realigned with relevant stakeholders (Lahti et al. 2018). By implementing circular strategies, CBM can contribute to sustainability (Barros et al. 2021). While BMfS may be focused on one or multiple of the sustainability dimensions, CBM target economic and environmental factors, in particular (Geissdoerfer et al. 2017; De Keyser & Mathijs 2023). However, not all CBMs are sustainable (Salvador et al. 2020).

2.2 Business model innovation for sustainability

Business model Innovation (BMI) generally describes the dynamic process of either creating a new BM or adapting an existing BM (Abdelkafi et al. 2013; Amit & Zott 2012). BMI aims at the creation and capture of value in novel ways to establish or maintain competitive advantage (Teece 2010). It is, therefore seen as critical for companies' success (Chesbrough 2010). Based on process theory, BMI is often represented as process models (Chesbrough & Rosenbloom 2002). At its core, BMI can be seen as a multi-stage process (Frankenberger et al. 2013).

Some scholars demarcate BMI for CBM and BMfS and place them in a niche next to BMI (e.g. Nußholz 2017, Pieroni et al. 2019). Given the nascency of the field, we acknowledge possible differences between them, however, in the following, we adopt the approach by Santa-Maria et al. by integrating the fields to avoid risks of fragmentation and enabling synergistic knowledge transfer (Santa-Maria et al. 2021).

BMI for sustainability (BMIfS) or sustainable BMI transfers the BMI process to BMfS (Lüdeke-Freund et al. 2016; Santa-Maria et al. 2021). It incorporates sustainable value into the conventional BMI process (Shakeel et al. 2020). The innovation is not restricted to a particular domain but rather must be seen as a holistic approach to create or modify BMs in such a way that BMfS emerge (Lüdeke-Freund et al. 2016; Geissdoerfer et al. 2018). The holistic nature of BMfS requires companies to assume a long-term perspective in BmfSI (Schaltegger et al. 2016).

BMfSI is a complex process possibly going against conventional paradigms (Bocken et al. 2019). Due to its scope and underlying uncertainties, companies may be hesitant to initiate the BMfSI process (Evans et al. 2017; Karlsson et al. 2018). Therefore, a deeper understanding of the process, tasks, and activities is needed (Yang & Evans 2019).

2.3 Need for a systemic perspective in the development of sustainable business models

Many authors acknowledge the need for a systemic perspective in the development of BMfS. Recently, the systemic perspective has especially found attention in the field of CBM. Researchers have identified several reasons for the need for a systemic perspective.

Innovation for sustainability is systemic by nature (Rohrbeck et al. 2013). The complexity of BMfS as well as the interdependencies between them are increased compared to traditional BMs (Batista et al. 2018: Fraccascia et al. 2019). The underlying sustainability-related issues cannot be solved by isolated companies but demand the interaction of numerous stakeholders (Fobbe & Hilletofth 2021; Orefice & Nyarko 2020). BMs are influenced directly and indirectly by the embedding system (Lau & Terzidis 2019). Collaboration is crucial for the success of BMfS (Boons & Lüdeke-Freund 2013; Cantele et al. 2020). Value is often co-created by multiple stakeholders (Berglund & Sandström 2013; Fehrer & Wieland 2021; Van Tulder et al. 2016). Stakeholders hereby encompass both the

core business network and a multitude of other societal actors such as public institutions, NGOs, customers, etc. (Lemus-Aguilar et al. 2019; Fraccascia et al. 2019; Bocken et al. 2015). CBM, in particular, are networked and require system-wide changes (Antikainen et al. 2016; Lieder & Rashid 2016; Centobelli et al. 2020). This in turn requires communication, collaboration, coordination, and governance (Antikainen et al. 2016; Nandi et al. 2020).

However, mostly, a focal company perspective is adopted in the literature on the development of BMfS and CBM following the traditional boundaries of a BM according to Teece (Zucchella & Previtali 2019; Gallo et al. 2018; Teece 2010). The systemic perspective is mostly neglected (Fraccascia et al. 2019). Company-centric approaches are insufficient in providing BMfS beyond the focal company (Cantele et al.2020; Pedersen & Clausen 2019).

By employing a systemic perspective, the BM of other relevant stakeholders is regarded as being as important as the one of the focal company (Adner 2016). The impacts of BMI are not limited to the focal company but affect the BMs of others (Parida et al. 2019; Collins & Saliba 2020) (Fiore et al. 2020). Consequently, positive and negative impacts among BMs must be considered (Galvão et al. 2020). To understand the necessary alignment processes a view from various system levels is necessary (Fehrer & Wieland 2021; Stubbs & Cocklin 2008). Therefore, multi-level approaches are needed that take into account the micro, meso, and macro level of the BMI while regarding the interplay between the BM of the focal company and its interactions on the systemic level (Rovanto & Bask 2021; Engwall et al. 2021).

BMfSI processes in particular must adopt a systemic perspective, incorporating life cycle thinking to identify opportunities and challenges (Centobelli et al. 2020; Santa-Maria et al. 2022).

3. Systematic Literature Review - Method

In January 2024, we conducted a systematic literature review in both Scopus and the core collection of Web of Science focusing on process models for BMI in the context of circular economy and sustainability. Given the similarities and despite noted differences between CBM and BMfS, we believe that drawing from both areas is beneficial for the definition of a general model. To enable future specific process models, the field of research is pointed out in the findings.

Forward and backward snowballing was carried out for the selected publications. The review process is shown in Figure 1. Only the document types of articles, review articles, and conference papers in English language were considered.

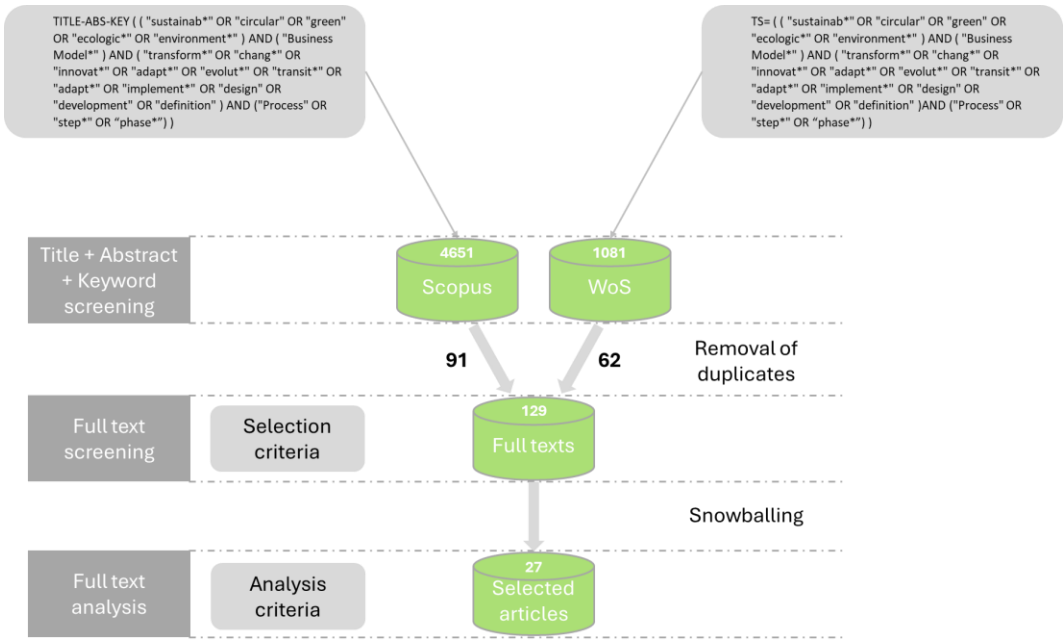


FIGURE 1 SYSTEMATIC LITERATURE REVIEW – PROCESS

The search strings combine synonyms for a) sustainability and circular economy, b) innovation, and c) process. The search yielded 4651 (Scopus) and 1081 (WoS) search results. In the first step, publications were screened based on title, abstract, and keywords. Only publications deemed potentially relevant concerning the selection criteria were considered for full-text screening. Given a large number of potential full hits, in the second step, a full-text screening was conducted for the 129 results after duplicate removal based on the following pre-defined selection criteria (SC):

SC1) BM: Focus must lay either on the BM or the business ecosystem based on either the component-based view or the value-based understanding of BMs.

SC2) Sustainability: Process models must focus on either CBMs, BMfS or provide relevant transferable phase descriptions.

SC3) Covered phases: Only process models covering multiple steps of the BMI process rather than fragmented individual phases.

SC4) General Approach: The approach must provide a process model of tasks to be carried out in the development of a new BM either industry-independent or applicable to multiple cases.

From the results selected for full-text review, 27 papers fulfilled the selection criteria and were further considered for the analysis and development of a process model for BMfSI.

The systemic perspective was not regarded for the selection of results but considered as part of the six analysis criteria (AC) as follows:

AC1) Perspective: Is the perspective of a focal company or a broader system assumed?

AC2) Type of BM: Is the BMI process described for BMfS, CBM, or general BMs?

AC3) Targeted users: Does the process focus on new ventures or established companies?

AC4) Approach: Does the process apply to BMs of individual companies or collaborative BMs?

AC5) Application: Is the process defined for a specific industry or industry-independent?

AC6) Systemic perspective: Are activities spanning the system boundaries of the focal company considered or not considered?

4. Findings

4.1 Classification of process models from the literature review

In total 27 process models were selected after full text analysis and classified according to the above AC as described in Table 1.

TABLE 1 CLASSIFICATION OF SELECTED PUBLICATIONS

Paper	Criteria / Authors	AC1	AC2	AC3	AC4	AC5	AC6
P1	Antikainen et al. 2017	focal company	CBM	both	individual	independent	partly considered
P2	Ahmad & Sundaram 2012	focal company	BMfS	both	individual	independent	partly considered
P3	Batocchio et al. 2016	focal company	General	both	individual	independent	not considered
P4	Bocken et al. 2018	focal company	CBM	both	individual	independent	partly considered
P5	Bocken et al. 2019	focal company	BMfS	both	individual	independent	considered
P6	Bocken et al. 2017	focal company	CBM	both	individual	independent	partly considered
P7	Frishammar & Parida 2018	focal company	CBM	established	individual	independent	considered
P8	Geissdoerfer et al. 2017	focal company	BMfS	both	individual	independent	not considered
P9	Heyes et al. 2018	focal company	CBM	both	individual	specific	not considered
P10	Inigo et al. 2017 (evolutionary)	focal company	BMfS	both	individual	independent	not considered
P11	Inigio et al. 2017 (radical)	focal company	BMfS	both	individual	independent	considered
P12	Parida et al. 2019	broader system	CBM	both	collaborative	independent	considered
P13	Pieroni et al. 2021	focal company	CBM	both	individual	specific	partly considered
P14	Pollard et al. 2021	focal company	CBM	both	individual	specific	not considered
P15	Brown et al. 2021	both	CBM	both	collaborative	independent	considered
P16	Eurich et al. 2014	focal company	General	both	individual	independent	not considered
P17	Franzò et al. 2021	focal company	CBM	both	individual	independent	partly considered
P18	Girotra & Netessine	focal company	BMfS	both	individual	independent	not considered
P19	Santa-Maria et al. 2022	focal company	CBM	both	individual	independent	partly considered
P20	Leising et al. 2017	focal company	CBM	both	collaborative	independent	considered
P21	Mendoza et al. 2017	focal company	CBM	both	individual	independent	considered
P22	Yang et al. 2017	focal company	BMfS	both	individual	independent	partly considered
P23	Holgado et al. 2013	focal company	BMfS	both	individual	independent	partly considered
P24	Bachmann & Jodlbauer 2023	focal company	General	both	individual	independent	partly considered
P25	Bocken & Konietzko 2022	broader system	CBM	both	collaborative	independent	considered
P26	Ernst et al. 2023	focal company	BMfS	both	individual	independent	considered
P27	Nuerk & Dařena 2023	broader system	CBM	both	collaborative	independent	considered

The majority of process models focus on the perspective of the focal company while only three consider a broader system's perspective (i.e. Parida et al. 2019, Bocken & Konietzko 2022, Nuerk & Dařena 2023) or combine both perspectives (i.e. Brown et al. 2021). While three general process models for BMI innovation were included, the number of process models for CBMs is slightly higher than that for BMfS. Notably, only process models focusing on CBM follow a collaborative approach with the greater part targeting individual companies. Furthermore, the consideration of a systemic perspective is more prevalent among process models for CBM. Most process models are defined for both for adaptation of existing and the development of new BMfSI independent of a specific industry.

4.2 Extraction of phases from selected process models

The phases were extracted for each process model and are shown in Table 2, distinguished based on the underlying BM type. It can be seen that the number and granularity of process phases as well as the wording vary greatly. Also, the sequence of individual steps differs among the process models.

TABLE 2 STEPS OF IDENTIFIED PROCESS MODELS

	Step of the process model										
Paper	**Step 1**	**Step 2**	**Step 3**	**Step 4**	**Step 5**	**Step 6**	**Step 7**	**Step 8**	**Step 9**	**Step 10**	**Step 11**
P1	Understanding the future business environment and Its Impact to the BMI	Scenario Building Exercise to Understand Alternative circular economy Futures	Understanding the Future Customers Through Consumer Discussions and Online Discussions	Business Scenario Workshops to Seek New BMs	The Implementation of the Business Idea Through Rapid Experiment or More Complex Pilot						
P2	Discover and Learn	Strategize	Design	Transform	Monitor and Control						
P3	Team building for implementation process (people selection)	Training the team for the implementation process (knowledge leveling)	Training the team for the implementation process (knowledge leveling)	Team identify and/or select the KPI	Team assess the implementing process and return with feedback (process assessment)	Team re-adequate action plan (re-planning)	Team conclude implementation and make report (register and pattern)	Team develop an event and deliver a presentation (internal marketing)	Experience is placed on the company intranet for consultation by all users, i.e., the company's employees (knowledge base)		
P4	Purpose: Set and measure progress	Value proposition experiment	Value delivery experiment	value creation experiment	Value capture experiment	Field Experiment					
P5	BM (inital)	Analyse (Define sustainability aims)	Analyse (Identify dependencies)	Analyse (frame the nature of dependencies)	Experiment (cycle)	Design (Map Value)	New BM				
P6	Ideating (Ideas, Opportunities and Challenges)	Clustering (BMs Key learning based on opportunities/challenges)	Experimenting (Experiments, Hypotheses, Key Learnings, Run experiments, Gather data)	Refining (Analyse data, Refined BM + further research requirement)	Piloting (Detailed larger scale pilots, Key learning, Business Cases)	Rolling Out					
P7	Initiate CBM transformation (screening of environmental trends, understand ecosystem, czstiner analysis	Audit the current BM (map current BM, map shortcomings and opportunities, analyze scope for BM transformation)	Desing and develop a CBM (study benchmarks, achieve internal alignment, configure ecosystem partners, reach conceptuak agreement)	Scale-up the CBM (small scale pilot testing, large scale rollout and continuous adjustment)							
P8	Ideation	Concept design	Virtual prototyping	Experimenting	Detal design	Piloting	Launch	Adjustment and diversification			
P9	(Envisioning) Create an overarching vision	(Envisioning) analyse drivers and constraints	(Envisioning) add specifics to the vision	(Design) Characterise service portfolio	(Design) Service selection and evaluation	(Design) propose service design and supply chain alternatives	(Implementing) evaluate alternatives	(Implementing) devise scenarios and action plans	(Implementing) validate scenarios and action plans	(Implementing) implement and review	
P10	(Sensing) Hold stakeholder dialogues	(Sensing) Anticipate and respond to regulations	(Sensing) Create and network in sustainability-related associations	(Seizing) Integrate clean technologies and sustainability-oriented methodologies	(Seizing) Integrate knowledge from stakeholders with sustainability and disseminate it throughout the company	(Seizing) Partner with new organisations	(Reconfiguring) Build decentralised sustainability-oriented innovation teams	(Reconfiguring) Distribute knowledge management and governance	(Reconfiguring) Create trust and commitment among internal teams		
P11	(Sensing) Open dialogues with critical and disruptive social and environmental stakeholders	(Sensing) Focus attention on socio-technical system-based sustainability challenges, trends and collective solutions	(Sensing) Search new technologies to transform the markets for sustainable development	(Seizing) Adopt a system-based transformation approach to advanced sustainability-oriented innovation	(Seizing) Focus BMIS on sustainable development and customer goals	(Seizing) Implement inter-partner learning and co-creation	(Reconfiguring) Promote creative and disruptive sustainability-oriented innovation teams and even generating new spin-offs	(Reconfiguring) Develop an integrated approach to sustainable innovation and value-chain management	(Reconfiguring) Manage collective decision-making and governance		
P12	Stage I: Ecpsystem readiness assessment (External environmental assessment, BM assessment, ecosystem partner assessment)	Stage II: Ecosystem orchestration mechanisms (standardization mechanism, nurturing mechanism, negotiation mechanism)									

General	BMfS	CBM

TABLE 2 (CONT.) STEPS OF IDENTIFIED PROCESS MODELS

	Step of the process model										
Paper	**Step 1**	**Step 2**	**Step 3**	**Step 4**	**Step 5**	**Step 6**	**Step 7**	**Step 8**	**Step 9**	**Step 10**	**Step 11**
P13	Sense (Map circular economy characteristics)	Sense (analyse drivers for change)	Sense (create overview of opportunities)	Sense (prioritize CBM ideas)	Seize (Design value proposition)	Seize (configure complete CBM concepts)	Seize (Evaluate and optimise CBM concepts)	Transform (plan and execute CBM concepts)	Transform (Plan and manage organisational change)	Transform (Adjust, review and diversify CBM)	Decision and iterations
P14	Define CBM objectives and requirements, integrate in Business Strategy	Develop CBM Canvas and associate components to CBM sub-components	Identify CBM challenges	Assess CBM opportunitues	Identify relevant policies	Develop indicators to measure circularity	Associate the identified indicators to CBM sub-components				
P15	System context or linear failure drives decision to pursue CE	Identify circular proposition and articulate need and intent to collaborate	Identify and select partners with circular credibility	Align partners on common purpose	Develop a value capture model	Collaborative action					
P16	Determination of the mission and business environment	Analysis of interdependencies	Determination and analysis of design alternatives	Creation of BM design alternatives	Selection of one BM innovation	Test and realisation of the BM					
P17	(Idea Generation) Idea	(Idea Generation) Prelimanary Assessment	(Idea Generation) Concept	(Product Development) Development	(Product Development) Testing	(Product Development) Trial	Commercialization/ Launch				
P18	Idea Generation	Model articulation, Value creation analysis	Risk identification, task priorization	Experimantation							
P19	Preparation & Vision Development	Involve Market & Supply Chain	Process Design & Collaboration	BM & Implementation	Usage & Prepare for next use						
P20	Create an overarching circular economy vision	Analyze drivers and constraints	Add specifics to the circular economy vision	Characterize the product/service portfolio	Product/service selection and evaluation	Propose circular economy design and supply chain alternatives	Evaluate circular economy strategies	Devise circular economy scenarios and action plans	Validate circular economy scenarios and action plans	Implement and review	
P21	Current BM	Identify Value Uncatpured	Turn Value Uncaptured into value opportunities	Turn value oppportunities into value	New BM						
P22	Purpose of the business	Identify potential stakeholders and select sustainability factors	Develop the value proposition	Develop the value proposition, value creation and delivery system and the value capture mechanism							
P23	Initiation	Ideation	Life cycle analysis	Ccompetitor analysis	Integration	Roadmap					
P24	Vision	Sense	Seize	Transform							
P25	Initiation	Ideation	Integration	Implementation							
P26	Sensing and interacting	Learning	Innovationg and transforming	Alignment	Planning and optimizing	Value capture					
P27	Prepare	Inspire	Understanding the Future Customers Through Consumer Discussions and Online Discussions	Define	Ideate	Decide	Protype	Test	Present		

General	BMfS	CBM

4.3 Consideration of systemic perspective in selected process models

Different approaches to provide a more systemic perspective can be identified among the studied process models ranging from the definition of tasks considering stakeholders outside their own boundaries, integration of stakeholders in the BM design, collaborative approaches to develop BM with other stakeholders (specifically in the field of CBM) to using ecosystem approaches going beyond single companies.

Tasks related to the systemic perspective can be found in the initiation of BMfSI, the analysis of the embedding system, the development of ideas and alignment with other BMs, piloting, and the implementation stage.

Ecosystem approaches are provided in the models by Brown et al. 2021, Parida et al. 2019, Bocken & Konietzko 2022, and Nuerk & Darena 2023 which specifically broaden the perspective to simultaneously consider the BMs of multiple stakeholders.

Positive and negative effects can result from interdependencies between BMs. While multiple approaches consider the implications of the embedding system on the design of the BM, only a few take the effects of BM changes on other stakeholders into account. Common approaches are the formulation of joint value propositions or BM alignment (e.g. Brown et al. 2021, Ernst et al. 2023).

The alignment process requires a multi-level approach. However, none of the process models adopts such a multi-level approach on the micro, meso, and macro level. Rather, either the micro or meso level are analyzed separately.

Despite the importance of systemic perspective in the development of BMfS and CBM as described in 2.3, existing process models put limited emphasis on the embedding system and interdependencies between BMs. Most approaches are company-centric and take the perspective of a focal company, focusing on the same's BM. Systemic factors are neglected or only partially considered in the form of gaining an understanding of the environment.

5. Holistic process model and systemic perspective for BMI for sustainability

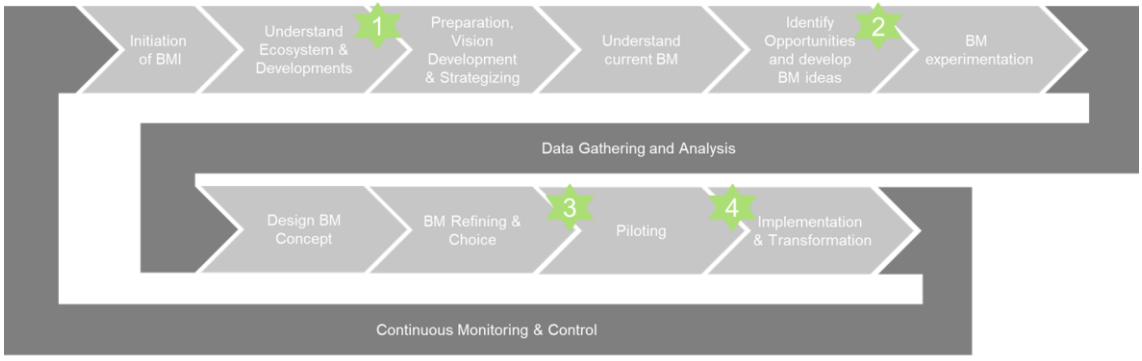
Based on the description of tasks and activities assigned to the extracted phases by the respective authors, a holistic process model consisting of 11 phases is synthesized. Figure 2 lists the defined phases and depicts the occurrence of different phases in the selected process models from the literature review, highlighting the respective type of BM. The order of process phases in the referenced literature varied (Table 2). The proposed sequence follows the majority of existing process models. While most phases are described by multiple authors, the first phase (initiation) is only pointed out by three publications. Notably, phases 2 and 9-11 are mostly present in process models for CBM. None of the identified processes covers all the identified phases of the process model BMfSI as proposed here.

Phase	Phase description	Process phase represented in publications
1	Initiation of BMI	P2, P15, P25
2	Understand Ecosystem and Developments	P1, P7, P10, P12, P13, P14, P16, P19, P23
3	Preparation, Vision Development and Strategizing	P2, P4, P5, P8, P9, P14, P16, P19, P20, P21, P23, P24, P26, P27
4	Understand current BM	P5, P7, P12, P13, P14, P16, P21, P22, P24, P26
5	Identify Opportunities and develop BM ideas	P1, P2, P5, P6, P7, P8, P13, P14, P17, P18, P21, P22, P24, P25, P27
6	BM Experimentation	P1, P4, P5, P6, P8, P18
7	Design BM Concept	P1, P2, P5, P6, P7, P8, P10, P13, P14, P16, P17, P18, P19, P21, P22, P23, P25, P27
8	BM Refining and Choice	P6, P7, P8, P13, P16, P21, P27
9	Piloting	P1, P4, P6, P7, P8, P13, P16, P17, P27
10	Implementation & Transformation	P1, P6, P7, P8, P13, P15, P16, P17, P19, P21, P24, P25, P26
11	Monitor & Continuous adjustment	P7, P8, P9, P13, P14, P21

* BM is used to describe both CBM and BMfS in the process model General BMfS CBM

FIGURE 2 SYNTHESIS OF PROCESS PHASES AND OCCURRENCE IN SELECTED PUBLICATIONS

Based on the identified phases, we define a cyclical BMIfS process model, highlighting points of interest for a systemic perspective as shown in Figure 3. We extend the eleven phases deducted from the literature review by introducing a data gathering and analysis phase. The latter and the Phase "monitor & continuous adjustment" are differentiated from the other phases as these are ongoing phases. Also, we believe them to be crucial to permit informed decision-making. Even though the process is shown as a sequential model for representation clarity purposes, companies may move back and reiterate phases.



1
- Assessment of ecosystem partners and their role [P12]
- Identify interdependencies, and implications of BM change [P5] [P12]

2
- Identify and select partners with circular credibility [P15] [P20] [P23]
- Confirm key stakeholder interested in exchanging some format of value [P13]
- Align partners on common purpose [P15]
- Create trust via openess in ambitions [P23]
- Develop a value capture model [P15]
- Describe what would each key stakeholders get [P13]

3
- Configure ecosystem partners, negotiating to ensure alignment and avoid conflict of interest, reach conceptual agreement [P7] [P12]

4
- Building integrated modelling to allow tracking material value [P20]
- Standardization mechanism in discussions with partners/ecosystem to support implementation success [P12]
- Align countermeasures with ecosystem partners [P7]
- Nurturing mechanisms to ensure success of implementation and shift of Ecosystem towards CE [P12]
- Structural and procedural Ecosystem orchestration [P12] [P13] [P15] [P23]

FIGURE 3 HOLISTIC CYCLICAL PROCESS MODEL FOR BMIFS AND FOCAL POINTS FOR SYSTEMIC PERSPECTIVE

After the endogenous or exogenous initiation of the BMfSI, a detailed understanding of the ecosystem and its evolution must be developed. These findings are used in the stage of

preparation, vision development, and strategizing to embed the BMfSI process into the broader strategic complex of the company. Next, an analysis of the current BM must be carried out to understand its alignment with the previously determined vision and strategy. Knowledge from both the assessment of the current BM and the ecosystem can serve to identify opportunities and develop BM ideas. The latter can be tested using BM experimentation which must be assessed through data gathering and analysis. Based on the acquired information about the tested innovations, a detailed concept of the BM alternatives can be defined. After BM refinement and the choice of one alternative, the piloting phase can be initiated. Ultimately, the new BM must be implemented, or the current BM must be transformed. Continuous monitoring and control are necessary to ensure the suitability of the BM or else potentially initiate a new BMfSI cycle.

While a systemic perspective appears necessary in all phases, four points appear to be of particular relevance. I.e. 1) understanding the ecosystem and its developments, 2) transition between identifying opportunities & developing CBM/BMfS ideas and business model experimentation, 3) transition between CBM/BMfS refining & choice and piloting, and 4) transition between piloting and implementation & transformation. The respective tasks mentioned in the selected process models are assigned to the four points of special interest.

Manifold tasks and activities were described in the 27 process models. As stated, the synthesis of process phases is based on the defined tasks according to the referenced publications. Consequently, each phase described in Figure 3 can be defined in more detail by assigning these tasks and activities (Table 3). Where applicable, tasks are assigned to the process phase corresponding to the process models defined by the respective authors. However, in some cases, activities were reorganized to fit the proposed process model for BMIfS. The phase data gathering and analysis is not described in detail in other process models in terms of necessary tasks or the relevant data.

TABLE 3 TASKS AND ACTIVITIES IN PROCESS PHASES

Phase	Tasks and activities	Source
1	Learn about unsustainability in business through continuous monitoring	P2
	System context or linear failure drives the decision to pursue	P15
2	Form multi-disciplinary team	P25
	Screening of environmental trends, regulations, drivers, and sustainability Challenges	P7, P10, P12, P13, P16, P23, P24, P25
	Understanding the future business environment and its impact on the BMI (political, social, economic, technology, and legal)	P1, P12, P16, P24
	Assessment of the impact of policy changes on BM	P12, P14
	Scenario-building exercise to understand alternative futures	P1, P25
	Stakeholder system and value chain mapping	P19, P24
3	Purpose formulation and framing	P4, P8, P19, P23
	Create an overarching (joint) vision for the company or industry to achieve sustainability	P2, P8, P21, P25
	Define sustainability aims objectives and requirements	P5, P14
	Analyze scenarios and choose a strategy to achieve sustainability	P2, P14
	Determination of the mission	P16
	Show leadership	P20
	Create support in the organization	P20, P25
	Work from ambitions for the project and process	P20
4	Map current BM and understand value creation, delivery, and capture	P7, P12, P13, P21, P22
	Identify dependencies from others and their BMs, assessment of ecosystem partners, their role, and implications	P5, P12, P16
	Scan for linear and circular characteristics, identify uncaptured value	P13, P22
	Map shortcomings and opportunities as well as strengths and weaknesses	P7, P13
	Assess the implementation level of circular economy characteristics and estimate their representativeness	P13
	Identify and prioritize critical aspects to define the scope of BM transformation	P7, P13
	Identify uncaptured value	P22
5	Customer analysis	P7, P24, P25
	Identify BM challenges	P6, P14
	Opportunity identification and assessment	P1, P5, P6, P14
	Idea generation and value mapping (proposition, creation, delivery, capture) based on scenarios	P1, P8, P13, P17, P18, P22
	Stakeholder definition	P8, P24
	Consolidate synergistic ideas	P13
	Elaborate BM ideas	P13
	Consolidate potential benefits and values enabled by the BM ideas	P8, P13
	Propose circular design and supply chain alternatives	P21
	Confirm key stakeholders interested in exchanging some format of value	P13
	Describe what would these key stakeholders get	P13, P19
	Analyze future opportunities and threats, risk identification	P13, P19
	Detail key enablers	P13
	Prioritization and selection of ideas based on identified critical aspects	P8, P13
	Identify benefits, and distribute ideals along the timeframe according to expected strategic goals for a circular economy	P13
	Relate ideas to each other	P13
6	Assumptions mapping	P19, P25
	Implementation through rapid experimentation (value proposition, delivery, creation, capture) in real-life settings	P1, P4, P18, P25
	Formulate Hypotheses and key learnings, run experiments, and gather data	P6, P8
	Prototype building, evaluation, and selection	P8

TABLE 3 (CONT.) TASKS AND ACTIVITIES IN PROCESS PHASES

Phase	Tasks and activities	Source
7	Study benchmarks	P7
	Integrate all BM elements to explain how the value proposition will be provided	P13
	Identify partners that could contribute to positive value and orchestrate collaborations	P5, P13
	Gather information to assess the sustainability of BMs	P6
	Identify possible variations in design options for the CEBM concept	P13, P16
	Achieve internal alignment	P7
	Create and test virtual prototypes	P13
8	Collect data from experimentation sustainable value analysis	P6, P8, P19
	Evaluate and confirm the economic and resource decoupling potential of the CEBM concepts	P7, P13
	Refine BMs	P6
	Select the most promising BM concepts	P13
	Prioritize and select the BM for implementation based on the overarching vision	P13, P16, P21
	Selection of one BMI	P16
9	Planning, implementation, analysis, adjustment, documentation and communication, identification pilot	P8
	Test assumptions and validate BM through a small-scale pilot in the field experiment	P1, P4, P6, P7, P16, P17, P25
10	Prioritize BMfSI pilots/projects and actions for implementation	P13
	Develop scenarios and action plans	P21
	Validate scenarios and action plans	P21
	Create structural, process, and attitudinal changes for BM implementation	P13, P25
	Create a project implementation plan with a phased approach to manage organizational transformation including piloting, launching, scale-up, roll-out	P8, P13, P24
	Finding an agreement among stakeholders about BM and aligning countermeasures with ecosystem partners	P7, P15
	Implementation, scale-up: large scale rollout	P7, P8, P16, P17, P20, P25
11	Establish a structure for monitoring the performance of implemented BM, with tailored key performance indicators (KPIs) to integrate goals	P13, P14
	Associate the identified indicators to BM sub-components	P14
	Monitoring of implemented CBMBM	P8, P13, P21
	Reflect BM and continuous adjustment	P7, P8, P13

In practical application, not all described phases of the BMIfS process model and assigned tasks respectively must be carried out by a company. Rather, they offer guidelines for steering the innovation process. In particular, some tasks may be more relevant for CBM than for BMfS. The list cannot be understood as exhaustive as additional tasks may occur.

6. Conclusion, limitations, and outlook

Derived from the need for a systemic perspective in the consideration of BMfS and CBM, we concluded that such a perspective is relevant for the process of BMIfS. We therefore analyzed existing process models for sustainability-oriented BMI. The analysis shows a limited but increasing awareness for a systemic perspective. The proposed cyclical process model for BMfSI is for the most part based on the synthesis of existing BMI processes. Points of interest and activities related to a systemic perspective are identified in the first step toward systemic thinking in BMfSI. Supported by the definition of associated tasks for each

phase, the process model guides practitioners and decision-makers specifically with respect to systemic issues.

We acknowledge that our research is not without limitations. Since a majority of the underlying models are defined as focusing on a focal company or the perspective of a focal company, the proposed process model for BMfSI is limited in terms of fully capturing the complexity and systemic nature of BMfS and CBM as outlined in 2.3. A fully systemic perspective requires multi-level thinking and collaboration to understand the interactions of BMs on the system level. (Fehrer & Wieland 2021) (Rovanto & Bask 2021) While systemic thinking is particularly found in the field of BMfS and CBM, additional research could aim at identifying relevant approaches from general BMI literature.

In the selection process, we required approaches to be general in order to be considered in the review. Among the 27 selected process models used in the development of the proposed model, 24 were defined industry-independent. This leads to a general approach and limits implications regarding different types of industries (e.g. manufacturing, construction, consumer goods), types of markets (business to business versus business to customer), and types of BMfS. Further research should focus on differences based on such factors to derive specific context-dependent process models and tasks assigned to the process phases.

Some of the identified process models embed the BMIfS process into the broader environment either through collaborative or ecosystem innovation approaches (see Table 1). We suggest that a better understanding of the embeddedness of the BMIfS process of a focal company into the development of collaborative BMs, supply chains, or value networks is needed. The introduced process model provides a starting point for future research and may be extended into a multi-level framework.

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