Article

The Business Model in Sustainability Transitions: A Conceptualization

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Abstract: Business models direct a firm's activity to move in coherence with the objectives of the business. Current literature suggests business models can act as vital forces to facilitate sustainability transitions and highlights the urgent research call to understand the role of business model innovations in stimulating sustainability transitions. This paper addresses this research need by investigating how firms create business model innovations for system-level transformation towards sustainability. Through a systematic literature review and deductive content analysis methodology, we identify and categorize different combinations of innovative activities in a firm's business model. Furthermore, two cases are illustrated to demonstrate the proposed conceptual model. The proposed conceptualization bridges a significant gap in the theme of sustainability and business and presents a defensible and researchable problem for transitions literature. Specifically, we find (1) shared vision and strategic dialogues among firms in different sectors as essential to develop value propositions and leverage business opportunities for sustainability in the long run; (2) companies ensure sustainable value creation and value delivery in the medium term through creation of an interdependent network of the green supply chain and collaboration with stakeholders; (3) in the short term, companies adopt sustainable practices, controlling daily operations, conducting awareness campaigns and experimenting with collaborations to deliver values based on sustainable practices.

Keywords: sustainable business models (SBM); activity-system approach; circular economy; sustainability transition; transition management; transitions studies

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1. Introduction

Increasing environmental concerns and associated stricter regulations have directed the attention of researchers and practitioners alike towards the potential role of multiple actors in a system to accelerate sustainability transitions [1,2]. Among them, the business model, as a tool to bring system-wide sustainability changes, has received increasing attention in the literature [3]. This study investigates the role of business models in sustainability transitions. Specifically, we ask the research question: what is the role of sustainable business models' activity system in sustainability transitions? Business models embrace a wide range of operational and strategic activities [4]. Wirtz et al. [5] described business models as representative of firm activities which help the business secure competitive advantage and involve all stakeholders of the firm, including customers and partners (see also [4,6,7]). In line with this, sustainable business models take into account ecological, social and financial concerns embedded into business activities, as well as interactions with a wide range of stakeholders to implement activities [8,9]. Sustainable business models differ from dominant unsustainable ones (e.g., the linear economy business model) by either incorporating concepts to pursue sustainability and integrating sustainability or

circularity into their value proposition, value creation and delivery activities, and/or value capture [7,10]. The literature describes circular business models as those that focus on “slowing resource loop”, i.e., extending the consecutive use of material or component in the product [11] and “closing resource loop”, i.e., capturing value from end-of-life material [12,13]. Geissdoerfer et al. [14], and Nosratabadi et al. [15] provide a detailed review of various types and definitions of sustainable business models. These reviews demonstrate the growing importance of sustainable business models’ role in achieving sustainable development goals over the past decade. A sustainable business model, therefore, can play a strong role in sustainability transition (a) as an intermediary for facilitating the commercialization or diffusion of sustainable technologies [16–18], and also (b) as a source of niche creation through promoting different non-technological innovations [19–21].

Table 1 categorizes and exemplifies the technological and non-technological niche innovations created at the micro level by firms, of which business model innovation presents an important non-technological innovation. While small firms bring innovations through sustainable entrepreneurship, large firms bring innovations through sustainable intrapreneurship, new business units and/or spin-offs [22]. To accelerate the transition towards sustainability there is an urgent need to understand how business activities embedded in sustainable business models trigger sustainability transitions [19]. The literature provides little evidence on how firms engage in developing and implementing sustainable business model (SBM) innovation as non-technological innovations to influence sustainability transitions [21,23,24].

Table 1. Niche innovations and niche actors.

Type of Niche	Examples of Niche Innovations	Niche Actors	References
Technological	Technology: product and process	SMEs, entrepreneurs, government agencies, large firms	[25,26]
Non-technological	Business model: service and organizational	Social entrepreneurs, SMEs, large firms	[21,22,27–29]

Current literature suggests firms and their business models act as vital forces to facilitate sustainability transitions [19,21,30]. Despite such a recognition, conceptual advances at the micro level, with niche innovations and niche actors (e.g., firm and partners) as foci to capture multiple dynamic (inter)organizational activities, remain limited [31–33]. In other words, the theory of the firm lacks the macro-perspective analysis of sustainability transitions [19]. Therefore, further research is required to investigate SBM innovations and their ecosystems for activities enabling sustainability transitions [34,35].

Parallel to this, we find sustainability transition theories comprising a rather wide range of conceptualizations [36]. These frameworks are generally criticized for lacking a firm-level perspective, which in turn causes limited understanding of how firms and associated business models influence system transformations [21,37]. On the other hand, the theory of the firm lacks the macro-perspective analysis of sustainability transitions [19].

This paper, therefore, investigates how firms with sustainable business model innovations contribute to the dynamic system-level transformation towards sustainability over time. We investigate the following question: what is the role of sustainable business models activity system in sustainability transitions?

To investigate this, we integrate the two concepts of the “sustainable business model” and “sustainability transition” to explain how business model innovations and activities at the firm or micro level influence changes at the system or macro level. We use transition management [38] as the main analytical framework to understand sustainability transitions from a macro perspective, and the theoretical lens of the business model activity system [39] to understand firm activities at the micro level. The outcome is a conceptualization of how firms help radical changes at the system level by working at the micro level. The proposed

conceptualization bridges a significant gap in the theme of sustainability and business, and presents a defensible and researchable problem for transitions literature.

The paper contributes to the literature in two ways. First, the analysis provides a new conceptual model demonstrating firm-level perspective of sustainability transitions through the theoretical integration of transitions and business model frameworks. The framework increases our understanding of a diverse set of activities related to a firm business model that support transitions from a governance perspective. Secondly, the paper also provides a set of challenges, guiding questions, and activities to guide practitioners and firms to move towards sustainability over time.

The paper is structured as follows: Section 2 outlines the theoretical background, followed by Section 3 which presents the methodology of data collection and analysis. Section 4 provides results in the form of the conceptualization of firms' activities for sustainability transitions along with the case illustration. Section 5 discusses the results and Section 6 concludes the paper.

2. Theoretical Background

2.1. *Why the Activity System Perspective for SBMs*

Sustainable business models help zoom in on a spectrum of innovative activities that enable firms to propose, create and deliver, and capture sustainable value [15,40–42].

Previous studies have used the activity system to analyze SBM innovations. The conceptualization of business models from an activity perspective was developed by [23] Zott and Amit [39], who defined a business model as “a system of interdependent activities that transcends the focal firm and spans its boundaries”. Activities are described as commitments from different stakeholders (e.g., firms, customers, partners) to perform duties related to a purpose and the accomplishment of an overall goal [39]. The activity system offers a useful theoretical foundation and capacity to reflect on firm's activities [43]. Based on the activity system, a business model innovation happens by: adding new activities; linking activities in new ways; and/or changing one or more stakeholders to perform activities [44].

Moroz and Gamble [45] and Serhan and Yannou-Le [46] examined the relation between SBM activities and certifications. While Moroz and Gamble [45] provided insights into the management of tensions between SBM innovation and certifications, Serhan and Yannou-Le [46] discussed the evolution of innovative business model activity through implementing principles of quality management systems to accomplish environmental and social responsibilities. Breuer et al. [47] explored the differences within SBMs as planned (i.e., design) and realized (i.e., outcomes) activity systems. Lemus-Aguilar et al. [48] identified the key factors and activities in a sustainable business model that influence firm design. Jacob and Teuteberg [49] provided the taxonomy of the design of social networking technologies in sustainable business models. Inigo et al. [34] examined the capabilities related to transforming internal and external systems of activities within business model innovation.

Literature suggests large firms often focus on activities related to maximizing material efficiency, create value from waste, and substitute with renewable energy, which are linked to cost savings [3,41]. Smaller firms or SMEs actively adopt business model innovation for sustainability. However, they face difficulties in integrating sustainable-related activities while they strive for profits [50]. Drivers such as branding, marketing, and stakeholder involvement support the SMEs in implementing a network-level business model to increase sustainable value creation activities [51].

From the social enterprise point of view, business model innovation occurs by developing, discarding, and reconfiguring activities according to social and financial goals [52]. Previous research emphasizes sustainable-oriented activities as fundamental for sustainability transitions as well as for sustainable business model development [41,53]. In this paper, we address the research call to understand sustainable business model innovations and its activities that play a strong role in sustainability transitions [53–55].

2.2. Sustainability Transitions

A transition refers to a long-term process of change in a system's structures, culture, institutions, or networks [56]. Sustainability transitions, therefore, happen when change is directed from unsustainable to sustainable modes of production–consumption systems. The change entails switching technology, business, industries, value chain and distribution, user-practices, values, and culture [35,38,57]. Sustainability transitions refer to a complex and long-term process involving a web of multiple actors operating at various levels of a system [37,58].

Models and Frameworks of Sustainability Transitions

The complex process of transition is studied by investigating the socio-technical system at three broad levels, namely, niche, regime, and landscape. Niches are protected spaces such as markets, applications, or technologies where radical innovation brings about change by breaking lock-ins, path dependence, and stability. Regimes represent a set of dominant rules, regulation, infrastructure, practices, and cultures [56,57]. The landscape involves societal, cultural, or environmental values, and the environment [59]. These three levels form an analytical base of four popular conceptual frameworks, i.e., multilevel perspective [1,60], strategic niche management [61], transition management [38,62], and technological innovation system [63] perspective.

While the multilevel perspective, strategic niche management, and technological innovation system focus on innovation, the transition management perspective aims to analyze specific activities to govern sustainability transition at different levels. For our analysis, the transition management framework therefore forms the basis of the framework.

Transition management refers to an analytical and normative approach that derives theoretical insights from transition dynamics, complex systems thinking, resilience theory, and governance approaches [37,38]. The framework advocates for effective governance of a transition towards sustainability through four levels of activities, i.e., strategic, tactical, operational, and reflexive [64].

1. Strategic activities consider long time horizons, problem structuring, envision alternative futures, and discussions to create a shared understanding of reality (root causes of problems) [65]. Activities at this level require actors to embrace openness for change to achieve joint ambitions and open discussions to reflect on how innovation contributes to desired changes [38].
2. Tactical activities relate to agenda-building, negotiation, networking, lobbying, and coalitions to build new systems [55]. SBM activities at this level require alignment of medium-term activities and strategies with the long-term vision of the organization.
3. Operational activities, in contrast, involve experimenting, project building, and implementation to link everyday activities to the long- and medium-term visions and goals [65].
4. Reflexive activities involve monitoring and evaluation of activities at each of the three prior level steps to facilitate the revision of goals and visions whenever necessary [55].

Based on the transition management approach, we demonstrate how firms can move towards sustainability by directing and realigning their activities in the short, medium and long term through holistic change in their business models.

2.3. Interlinkage between Sustainability Transition and Sustainable Business Model Innovation

Debates on sustainability transitions bring forward multidisciplinary issues and complex problems [35]. The debate highlights a variety of solutions ranging from radical technological innovations to novel and creative non-technological solutions [56]. One such solution gaining the attention of policymakers, the scientific community, and firms is the idea of transitioning the production–consumption system from a linear to circular model where output of one subsystem becomes the input for another sub-system [66,67]. The circular economy involves the narrowing (using less material and energy), slowing (longer use), closing (reusing material), and regenerating (improving the natural environment) of

resource loops [53,68–70]. The circular economy emphasizes the creation of a closed-loop economic or production–consumption system to reduce waste and protect exhaustible natural resources [20]. This idea has not only accelerated new and radical technologies (i.e., reuse, recycle, and reduce technologies) but also galvanized the development of new and innovative business models helping firms to contribute to sustainability transition (e.g., SBMs that create value from waste, or that deliver functionalities rather than ownership) [71].

SBMs facilitate sustainable transition pathways, for example, through delivering functionality (through leasing or rental) rather than ownership, reduction in waste through buy-back schemes, and the use of renewable or recycled material in products and processes. SBMs, therefore, help in directing firms' activity to move in coherence with the idea of the circular economy [20]. Thereby, they have the potential to disrupt the entire industry by facilitating sustainable business offerings, processes, and operations [19,21,72]. Table 2 highlights the commonalities and differences between SBM and sustainability transitions in terms of their content, scope, focus, and key issues involved in the two streams.

Table 2. Commonalities and differences between SBM and sustainability transition (adapted from [73]).

	SBM	Sustainability Transition
Concept	The SBM creates significant positive and/or significantly reduced negative impacts for the environment and/or society through changes in the way the company and its value network create and deliver value and capture value or change their value propositions [8]	Sustainability transitions are long-term, multidimensional, and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption [37]
Key issues	Sustainable vision of organizations and key stakeholders Innovation as a driver to improve business, society, and environment Positive impacts in internal and external organizational structures	Sustainable vision of organizations, societal actors, and stakeholders Innovation promotes sustainability transitions Positive impacts in societies and industries
Scope	Internal and external organizational structures	Industries and societies
Focus	To operate business with positive impact in societies, natural environment, and business	To solve societal needs through sustainable production and consumption
Dimension	Micro	Micro, meso, and macro

Current literature suggests firms and their business models act as vital forces to facilitate sustainability transitions [19,21,30]. However, the conceptual advances at the micro level with niche innovations and niche actors (e.g., firm and partners) as a foci to capture organizational activities influencing system changes is missing [31,32]. In this paper, we address the urgent research call to understand sustainable business model innovation and its implicated activities, which play a large role in sustainability transitions [53–55].

3. Materials and Methods

We conducted the research in three phases. In the first phase, we conducted a bibliometric search and literature review in two streams, business model and sustainability transitions, and identified the relevant articles from the two streams. In the second phase, we performed a content analysis to understand the integration of the business model activity system with the transition management perspective of sustainability. The third and final phase involved analyzing two illustrative short cases to demonstrate the practical application of our conceptualization and how such cases perform in practice.

3.1. Data Collection—Bibliometric Search and Identification of Relevant Articles

The bibliometric search was conducted on two streams, namely, business model and sustainability transitions, between August 2019 and June 2020.

3.1.1. Article Search Criteria

The key databases approached for the literature search are EBSCO, Web of Science (WoS), Science Direct (SD), and Scopus. The selected key terms were initially obtained from the keyword list of frequently cited publications, such as studies by [63,64], and [5]. Subsequently, we applied paired keywords using AND, OR operators to identify studies at the intersection of SBM and ST. Some examples of keywords and their paired search terms used during the extensive literature survey are: (“sustainable” OR “sustainab*”) AND (“business models”); (“circular economy” OR “circular business”), (“sustainability transition” AND “business model innovation”), (“transition” AND “sustainable business model”), (“transition management” AND “business model”), (“activity system approach” AND “sustainable business model”). The search scope was limited to academic literature of peer-reviewed articles and included scientific journals, conference proceedings, doctoral thesis, and books in the English language. Figure 1 describes the article search and selection criteria in detail.

Figure 1. Article selection process (Based on Hofmann (2019)).

3.1.2. Article Selection (Inclusion and Exclusion) Criteria

The initial search generated 1717 articles from the four databases (i.e., EBSCO = 282; Scopus = 1018, WoS = 269, and SD = 148). The article selection process took place in five systematic steps, adopted and modified from Hoffmann [20].

In the first step, we removed all duplicate results from the four databases, which left us with 632 articles from 1997–2020. This included articles on business models for sustainability (e.g., [24,74,75]), transition management for sustainability (e.g., [62,76]), and conceptualization of sustainability transition [37,77].

In the second step of the screening process, articles were screened based on their title, abstract, and relevance to the research topic. Only those studies were included that:

1. Provide a conceptual or theoretical framework or model of SBM or circular business model (CBM);
2. Discuss the activity system perspective of SBM;
3. Theoretically or empirically examine the role of SBM in bringing systematic change for sustainability.

Articles that did not meet these criteria and their research fields or objectives were not relevant or inconsistent with our study were removed in this stage. The deletion included articles focusing exclusively on “financial sustainability”, “healthcare sustainability”, “political dynamics for sustainability”, “human resource management”, and in fields such as poultry, medicine, nursing, sports, tourism, information system, forestry, and others. This process left 242 articles from 2004–2020.

In the third step, we conducted a bibliometric analysis of the publication and citation count of 237 articles to identify the relevant period during which the maximum number and highly cited papers were published. Figure 2 shows the year-wise growth of 237 articles in the field of SBM/CBM from 2004–2019 and their respective citation count, showing the relevance of these articles in SBM and sustainability fields. The first seminal paper in SBM (much more than a thousand citations) was published in 2008 by Stubbs and Cocklin [78]. Subsequently, Zott and Amit [39] introduced the concept of activity system perspective and emphasized system-level thinking for BMI. Thus, in this stage, inclusion criteria involved the citation analysis to include papers that have more than 25 citations in the study, which provided us 110 articles from 2004–2019.

Figure 2. Year-wise publication and citation count of CBM/SBM/ articles (2004–2019).

In the fourth and fifth stage of article selection, the remaining articles were screened based on the title and abstract and main text reading of papers. After in-depth analysis we divided the literature into three broad themes, circular economy, the sharing economy, and green supply chains, and we gave emphasis to environmental sustainability due to the climate change crisis. Detailed reading left us with 33 articles, published during 2008–2019, to be included in content analysis.

For the two illustrative cases, we collected secondary data such as articles, brochures, websites, and sustainability reports to review the two firms based on theoretical concepts from the literature associated with transition effects outside the firm boundaries.

3.2. Data Analysis—Content Analysis

A qualitative content analysis method was adopted to identify the relationship between the SBM activity system and transition management. Among the two qualitative methods, i.e., grounded theory and the content analysis approach, the grounded theory method was adopted when there were no theoretical foundations in the field (i.e., SBM and ST literature in the present case) and the objective of the study was to generate a new theory. However, when the theory exists, and the study aims to explore more unique relationships and explain the phenomenon, the content analysis method was considered appropriate [79]. The present study aims to determine the components (and thus the role) of the SBM activity system that can contribute towards sustainability transitions. Therefore, the content analysis method was adopted to explore such newer relationships between the two.

Content analysis is a widely used and acknowledged methodology to analyze textual data, that systematically and objectively analyze documents to enhance the understanding of a phenomenon (here, the role of SBM activity system in sustainability transition) and provide as an outcome a conceptual model or framework describing the phenomenon [80,81]. Among the qualitative and quantitative approach to content analysis, the quantitative content analysis method is criticized for its oversimplification and “distorted meaning as a result of breaking down text into quantifiable units in the analytic process” ([79], p. 3). Qualitative content analysis, on the other hand provides a more holistic, contextual meaning of the text using systematic categorization schemes. Since the present study is primarily based on textual data of peer-reviewed literature, qualitative content analysis was considered a suitable technique for the analysis.

A deductive approach, which means using existing theoretical concepts (in the SBM activity system and ST fields) for our categorization scheme was applied as the approach increases the reliability of the coding [82].

The data was coded in two stages: In the first stage, two main codes were created (“first level code”) for each of the two constructs, namely, transition management and business model activity system. Subsequently, six sub-codes (“second level codes”) were created, three for each first level code. Specifically, we had three codes for transition management activities (strategic, tactical, and operational) and three for business model activity system (content, structure, and governance).

In the second stage, multiple keywords were identified from the literature to identify, extract, and categorize relevant text from the business model activity system, and transition management activities literature. These keywords were useful to extract texts having arguments and evidence of discrete business-related activities and categorize them into each construct.

For extraction, in addition to relying on predetermined keywords from literature, we also introduced new keywords and extracted and categorized texts based on the contextual meaning during the process. For example, the keyword “collaboration” was identified during the process of extraction but was not pre-determined for tactical-level transition management. Similarly, text was extracted and categorized under “governance” category based on the key word “responsibilities” that was not predetermined but was selected due to contextual meaning. The classification was open for modification and performed

iteratively based on discussions during the data analysis and coding. Such discussions ensured the internal validity of the findings [83]. Figure 3 shows the coding structure and the literature-based list of keywords used for extracts and classification of each extract.

Figure 3. Identification of categories and sub-categories for content analysis.

Appendix A Table A1 shows some examples from the coding in which different extracts are related to different sub-codes, codes, and themes.

3.3. Illustrative Case Examples

After conceptualizing how a firm's SBM activities can contribute to sustainability transition at the societal, industry, sector, and company level, we present two illustrative case examples to understand the application of this concept in practice. The first example illustrates the case of the U.S. based firm Tesla. Tesla has pursued transforming the automobile industry with its value offer of electric vehicles (EVs). The second example illustrates the case of the Danish MNC Ørsted. Ørsted operates in the green energy sector, with the mission to combat climate change by supplying renewable energy (e.g., wind and solar).

4. Results

4.1. Conceptualizing Firm Activities for Sustainability Transitions

The content analysis revealed different combinations of non-technical, innovative, activities in the business models related to long-, medium-, and short-term goals. The combinations are categorized from a transitions perspective as strategic, tactical, and operational, and from the business model activity system as content, structure, and governance. Reflexive activities from the transitions perspective that involve continuous monitoring, joint reflection, and evaluation run parallel to strategic, tactical, and operational level activities. Figure 4 provides a visual representation of the conceptual framework, and following sub-sections discuss the framework in detail.

Figure 4. Business model activity system for sustainability transitions.

4.1.1. Sustainable Business Model Activities at the Strategic Long-Term Level

Investigations on the strategic long-term focus demonstrated two relevant SBM activities. These long-term strategic changes are (a) the development of sustainable value, which brings about product and service feature changes towards sustainability, and (b) leverage on sustainable business opportunities. Table 3 illustrates the strategic SBM activities.

Table 3. Activities of a sustainable business model at the strategic level.

Long-Term Strategic Level				
Focus on	Challenges	SBM Guiding Questions	SBM Activities	Changes
Achieve sustainable vision and purpose	Ability to influence change in dominant cultures	What unsustainable technologies are we substituting? How should we capture value and make sustainable technologies profitable for the business?	Offering sustainable product/service/technologies to substitute unsustainable ones Leveraging business opportunities for sustainability	Industry and society

Firms pursue sustainability by aligning their business strategies to benefit society and the environment. The starting point for adopting a SBM is the development of a viable vision and purpose [8,83]. A viable vision embeds a desired sustainable impact—for people, planet, and profit—to achieve in the long-term, and also a motivating force as inspiration to improve well-being and environment issues [84]. For example, when firms implement reduce or recycle plans in their business models, they set a vision to follow pathways to change from a linear to circular economy [85].

Furthermore, firms moving towards SBM partially or completely substitute existing unsustainable value propositions with sustainable products and services [37]. For example, firms in the mobility sector pursue product-service systems to create better sustainability outcomes by using more sustainable modes of transportation [21] and, e.g., substituting gasoline vehicles with electric ones, to contribute to mitigating the present carbon crisis [86]. However, sustainable products and services involve a balance (trade-offs) between profitability for firms and benefits for customers and society [87].

When firms implement circular business models—as drivers for sustainability—they leverage new business opportunities. Remanufacturing, refurbishment, reverse logistics, recycling, and waste management are examples of business opportunities that firms can leverage by adopting circular business models. For example, waste remains a worldwide issue. Waste mainly ends up in landfills or incinerated, releasing CO₂ emissions and toxins into groundwater [88]. Overall, firms, by implementing circular and sustainable business models, are able to offer sustainable products and services, which are profitable, and meet customer demands to replace conventional products in existing markets [89].

4.1.2. Sustainable Business Model Activities at the Tactical Level

Our analysis identified the following SBM activities at the tactical level: building and setting networks, and collaborations with various stakeholders. The identified collaborations are (a) customer engagement, (b) networking with the society and government, and (c) collaborative activities with the suppliers. Table 4 lists the tactical SBM activities in the medium-term.

Table 4. Activities of a sustainable business model at the tactical level.

Medium-Term Tactical Level				
Focus on	Challenges	SBM Guiding Questions	SBM Activities	Changes
Set networks and collaborations towards sustainability	Ability to change the dominant operational structures for value creation	How do we partner with our customers to co-create sustainable value? How should we motivate societal stakeholders to move towards sustainable practices? What sustainable practices should we integrate into our supply chain to reduce its negative effects?	Creating and maintaining interdependencies with customer, suppliers and stakeholders including the government Configuring sustainability in operations and value chains	Value chains

Cooperative networks with one of the key stakeholders, the customer, form a critical tactical move for a sustainable business model. For instance, firms and customers share information and collaborate to optimize features of products and services [90]. Strong customer relationships lead to improved product performance, service delivery, and product development [91,92]. Other benefits seen with customer involvement include prolonged product life by maximizing the product use time [93,94], promotion of recyclability, and reuse or recycle of resources [87,88]. In manufacturing, firms design products that assure the reuse of parts after the end of the product lifetime. Either a local firm or the customers retain ownership of products; thus, take-back agreements ensure the collection of products for reuse [93].

Collaborations and networks with societal actors form another activity of a sustainable business model. In the energy and mobility sectors, for example, public and private organizations collaborate to develop sustainable solutions and address national policies related to sustainability, such as renewable energy and sustainable transportation [21]. For example, communication through workshops and conferences following sustainability frameworks, such as the Sustainable Development Goals (SDGs) or circular economy concepts, create value in a coordinated manner and [95] collaborative activities on reuse and recycling help recirculate materials across the supply chain [96]. Moreover, stakeholders also include research institutes and rural communities—as knowledge, knowhow, and materials to create sustainable products and services can originate from different stakeholders [97].

Furthermore, as firms outsource activities to suppliers, they may motivate the suppliers to adopt green practices [84]. For example, hotels have implemented sustainable solutions by joining efforts with their suppliers on reducing consumables and supplying organic food [98]. Integrating and configuring sustainable operations into key activities with the suppliers include reducing waste, reducing resource consumption and negative environmental impact throughout upgradability, product recycling with collecting points, and/or online waste management platforms across green supply chains [74,99].

4.1.3. Sustainable Business Model Activities at the Operational Level

The coding identifies relevant SBM activities at the operational level. These activities relate to (a) experimentation and co-experimentation, and (b) create value through implementing a shared vision. Table 5 lists the operational SBM activities in the short term.

Table 5. Activities of a sustainable business model at the operational level.

Short-Term Operational Level				
Focus on	Challenges	SBM Guiding Questions	SBM Activities	Changes
Establish a sustainable vision and purpose and start implementing sustainable-related practices	Ability to engage people and influence change in dominant practices	Which staff should we recruit and how do we train them for sustainability?	Adopting technologies and innovations to make operations more efficient and sustainable	Firms
		How can we make our day-today operations more efficient and less harmful to society and environment?	Experimenting and/or implementing campaigns to create awareness about sustainability	
		What experimentations should we undertake with technologies, initiatives, project and activities to capture sustainable business opportunities?	Experimenting within collaborations	
			Controlling daily operations and logistics	
			Rethinking the way to create value	

At the operational level, firms establish their sustainable vision by assembling different operational features needed to create value together. Experimenting with initiatives, technologies, projects and activities saves costs and demonstrates potential large-scale implementation to leverage on sustainable business opportunities [21,35]. Experimenting also verifies the alignment of the new project with the sustainable purpose so it does

not lead to an undesired outcome such as more use of resources [97]. In the mobility sector, we see examples of digital solutions and use of customer data to enable sustainable solutions [21]. In the hospitality sector, hotels implement daily control of the use of water and energy; water-saving showers and toilets and innovative cleaning procedures have helped reduce water consumption [98].

Collaborations for experimentation help firms develop consensus and clear out false assumptions. In the water sector, for example, different stakeholders (private and public organizations) have held sessions (as experiments) on a regular basis to discuss about water resilience in urban areas (ref: workshops held by World Resources Institute and World Environment Federation). Results from the sessions suggest stakeholders letting go of assumptions that impeded them to advance on the next step [97]. Frequent sessions among stakeholders thus help create awareness and engage the stakeholders in strategic discussions to collaborate and/or change modes of operations to tackle sustainability challenges [100].

In the circular economy, manufacturers and service providers rethink their operations to reduce waste, increase resource productivity, minimize extraction of virgin materials, and reduce output of waste [93,101]. Further, firms modify logistics systems to ensure proper channels (related to sustainability) to deliver and/or collect materials or products [91]. Communication channels are critical to create awareness and some firms are investing in communicating sustainability (for example, about circular economy) to businesses and helping them create business opportunities [20,102].

4.2. Illustrative Cases

In this section we present two case examples, namely, Tesla and Ørsted, to illustrate how such cases perform in practice according to the summary in Tables 6 and 7. The two illustrative cases demonstrate diverse activities and their functionalities implemented by the two companies in different industries towards transforming systems with a global sustainable impact.

4.2.1. Case 1: Tesla

Tesla, a company in the automobile industry, pursues transforming the automobile industry with its value offer of electric vehicles (EVs). Table 6 provides an overview of how Tesla's activities create radical changes in the automobile industry.

At the strategic level, through its mission, *"to accelerate the advent of sustainable transport by bringing compelling mass-market electric cars to market as soon as possible"* [103], the company envisions facilitating the world's transition to sustainable energy. Tesla intends to achieve this goal by positioning its electric motor technology favorably against the dominant internal combustion engine technology in the auto industry [104]. The initial challenge for the company focused on changing the consumer's attitude towards electric and private mobility consumption and to substitute the dominant logic of unsustainable mobility and energy solutions. The company started by offering a sustainable value proposition of eco-friendly, efficient, and zero-emission battery electric vehicles (BEVs), and lithium-ion battery packs to the market. The company later expanded this value proposition by offering clean energy solutions through solar-powered fast-charging infrastructure. Through competitive leadership and technological innovation for sustainability, the company leveraged various business growth opportunities. Starting with offering EV in the luxury sports car segment, the company has now expanded the value proposition to include multiple ranges of BEVs for different consumer segments. The company succeeded in achieving consistently growing revenue (more than 20 million USD in 2019) [105] and strengthened its position and reputation in the global market.

Table 6. Overview of Tesla's business model and its contribution to transforming the industry.

Focus on	Challenges	SBM Guiding Questions	SBM Activities	Changes
<i>Long-term Strategic Level</i>				
Facilitating world's transition to sustainable energy by substituting unsustainable mobility and energy solutions	Overall consumer adaptation of EVs ability to influence consumption pattern of automobile	What unsustainable technologies are we substituting? How should we capture value and make sustainable technologies profitable for the business?	Offering long-distance and efficient EVs along with solar powered fast charging infrastructure, and advanced battery storage solutions for electrical grids Leveraging business growth opportunities through competitive leadership and technological innovation for sustainability	Automobile industry and consumer attitudes towards private transportation
<i>Medium-term Tactical Level</i>				
Set networks and collaborations to create and deliver high quality efficient EV models and energy solutions	Ability to influence change in hardware and system architecture by promoting incremental and transformative changes	Whom should we partner or work with to co-create sustainable value? What sustainable practices should we integrate into our supply chain to reduce its negative effects on environment and society? How should we motivate our stakeholders to move towards sustainable practices?	Collaborative and manufacturing partnerships for EV models with incumbents in same industry and different industry Collaboration with utility firm (Pacific Gas and Electric (PG&E)) for energy storage installation for Moss Landing project in California	Partners' or competitors' practices as part of the value chain
<i>Short-term Operational Level</i>				
Increase the number of EVs available to mainstream consumers by adopting sustainable and innovative practices	Ability to engage with hardware and software engineering team, design and production team, distributors and retailers	Which staff should we recruit and how are we train them for sustainability? How can we make our day-to-day operations more efficient and less harmful to society and environment? What experimentations should we undertake with technologies, initiatives, project and activities to capture sustainable business opportunities?	Experimenting with battery technologies, revisiting product design and engineering to reduce battery costs and increase vehicle efficiency and performance Implementation of smart communications, IoT in the vehicle and in electric charging infrastructure Experimenting with innovative sales and distribution model and innovative marketing strategies to educate and attract new customers	Tesla business operations

Table 7. Overview of Ørsted's business model and its contribution to transforming the industry.

Focus on	Challenges	SBM Guiding Questions	SBM Activities	Changes
<i>Long-term Strategic Level</i>				
Achieve Ørsted's vision of a world that runs entirely on green energy	Accelerating transition to clean energy by scaling up green power deployment and cutting emissions in half by 2030	What unsustainable technologies are we substituting? How should we capture value and make sustainable technologies profitable for the business?	Offering the global installed green power (wind, solar, bioenergy) to replace fossil fuels Going green is the competitive differentiator	Buy green power, choose sustainable products and services, invest in companies aligned with the 1.5 °C target, use sustainable modes of transportation Encourage other energy companies to transform their production from black to green energy
<i>Medium-term Tactical Level</i>				
Collaboration as a key factor to succeed with all stakeholders	Influence better functioning of global and European Internal Energy Market and suppliers to decarbonize	Whom should we partner to co-create sustainable value? What sustainable practices should we integrate into our supply chain? How should we motivate our stakeholders to move towards sustainable practices?	Program for suppliers to reduce supply chain emissions, encourage suppliers to disclose emissions and set science-based carbon-reduction targets Use 100% renewable electricity in the manufacturing of turbines, cables, substations etc.	Suppliers to decarbonize the offshore wind supply chain through Ørsted's new supply chain decarbonization program
<i>Short-term Operational Level</i>				
Established the vision of transforming its business from fossil fuels by adopting and producing green energy	Ability to engage with directors (38% female directors), and operations team improve Ørsted's sustainability credentials	Which staff should we recruit and how are we train them for sustainability? How can we make our day-today operations more efficient and less harmful to society and environment? What experimentations should we undertake with technologies, initiatives, project and activities to capture sustainable business opportunities?	Engage in early dialogue with workers through innovation programs to generate green solutions Develop offshore wind solutions from a niche paying fair tax, and promoting employee diversity Increase carbon productivity and water productivity by more than 50%.	Ørsted business

At the tactical level, the company develops networks and collaborations to create and deliver high-quality efficient EV models and energy solutions. The challenge for the company's SBM, therefore, revolves around the ability to influence change in hardware and system architecture by promoting incremental and transformative changes. To address this, the company entered into collaborative and manufacturing partnerships for EV models with incumbents in the same industry (i.e., alliances with other automakers—Daimler, Toyota, and Lotus Cars), and also in different or unrelated industries (i.e., an R&D alliance with an electronics firm—Panasonic) [106]. The alliance with Lotus Cars helped the company become more efficient during the initial stages of building a new sports car for the market. With Panasonic, the company entered into a supply and R&D agreement, first, for the supply of automotive-grade lithium-ion battery packs for Tesla Model S and subsequently for the joint-development of automotive-grade battery cells. The company has developed a direct relationship with the B2C customers, where, instead of selling cars through a franchised dealership, it sells directly to customers. Tesla established a direct connection with customers to give them a unique buying experience and constantly interacted with them to receive direct feedback regarding the vehicle performance. These collaborations helped the company influence the practice of its' partners and collaborators towards sustainability, and also modify the buying behavior and attitude of customers towards private consumption of EV.

At the operational level the company developed a system to monitor and control every aspect of design to deliver high-performance electric vehicles to the market. The company has made many iterative and transformative changes to the core hardware and system architecture by employing qualified engineering, design and production team to ensure efficiency and energy frugality [107]. The company increased the number of EV available to mainstream consumers by adopting sustainable and innovative practices. The challenge now was to develop an ability to engage with the hardware and software engineering team, design and production team, distributors, and retailers for focusing the business operations on sustainability. Key SBM activities at this level adopted by the company include: experimenting with battery technologies, revisiting product design and engineering to reduce battery costs and increase vehicle efficiency and performance, implementation of smart communications and IoT in the vehicle and electric charging infrastructure; experimenting with innovative sales and distribution models; and developing innovative marketing strategies to educate and attract new customers.

4.2.2. Case 2: Ørsted

Ørsted operates in the green energy sector, with the mission to prevent climate change by supplying, e.g., wind, solar, and bioenergy. The company is committed to increasing the green power installed capacity to keep down global temperature rise. Table 7 shows an overview of Ørsted's activities in the green energy industry.

At the strategic level, the company envisions a world running entirely on green energy and has set its target to achieve a neutral carbon footprint by 2040 [108]. The challenge, therefore, is to scale up green power deployment to meet the world's energy demand while cutting emissions by half by 2030. The company is transitioning from being among the most coal-intensive companies in Europe to focusing entirely on renewables [108]. Ørsted thinks that its ability to transform from a company with coal, oil, and gas at its core to the world's most sustainable energy company within a decade would prove that profound change is possible. Replacing fossil fuels in the global energy system by increasing and offering global installed green power forms the company's main business model. The company realized that fossil fuels are neither environmentally nor financially sustainable, and shortly, green energy will be the key to stay in the business. The company started by offering a value proposition of offshore wind, onshore wind, solar energy, and storage solutions as these technologies are mature and cost-effective. Changes that are required at the society level are: demand policies to keep global warming below 1.5 °C; buying green power; choosing sustainable products and services; investing in companies and pension

funds that are aligned with the 1.5 °C targets; choosing sustainable modes of transportation; and ensuring homes are energy efficient. At the industry level, other energy companies should transform their production from black to green energy as Ørsted did by focusing its entire investment program on green energy.

At the tactical level, Ørsted acknowledges that collaboration forms the key to succeeding with stakeholders (authorities, suppliers, local communities, environmental NGOs, etc.) and to enable the co-existence of green energy (e.g., offshore wind farms). The challenge is to influence the creation of a well-functioning global market and the European Internal Energy Market for barrier-free trade of electricity across Europe. The company engaged with suppliers and encouraged them to set climate-science-based carbon emission reduction targets for themselves and run their operations on green energy [109]. The company works with strategic suppliers and runs a decarbonization program for the manufacturing and installation of offshore wind farm components. The strategic offshore wind suppliers that account for 50% of the total procurement are required to disclose their emissions and use 100% renewable electricity in the manufacturing of wind turbines, foundations, etc. and optimize their vessel fleet. Thus, through its new supply chain decarbonization program, the company makes changes at the sector level and encourages its suppliers to decarbonize the offshore wind supply chain.

At the operational level, Ørsted has implemented a sustainable growth program in its business strategy, which includes protecting biodiversity, paying fair taxes, and increasing employee diversity. Through continuous R&D, innovation and scale-up, the company is achieving economies of scale, simultaneously reducing the cost of its green energy. The structural activities of the company's SBM include increasing the number of female directors and continuous engagement with these directors and the operations teams for making Ørsted a green business. The company hired specialists to engage in an early dialogue and cooperation with workers to encourage them to come up with solutions on how to decarbonize. These SBM activities have radically changed the company's internal operations and contributed towards increased carbon productivity and water productivity by more than 50% due to cuts in absolute carbon emissions and lower water use during the company's transitions [109].

5. Discussion

This paper responds to the research calls to understand how business activities embedded in sustainable business models trigger sustainability transitions. Specifically, the paper addresses the following research question: What is the role of sustainable business models' activity systems in sustainability transitions?

This conceptual framework developed in Figure 4 contributes to: (a) the understanding of a diverse set of activities related to a firm business model that support transitions from a governance perspective and (b) challenges, guiding questions, and activities to guide practitioners and firms to move towards sustainability over time.

First, we find that several business model activities, being non-technical in nature, have the potential to create large systemic changes. For long-term strategic action, the vision/purpose help firms to strive for making a positive change. Some of these activities include: maintaining dialogues and strategic discussions to pursue a shared vision, leveraging business opportunities for sustainability, and offering and improving sustainable value propositions. With a change in vision, firms are able to change unsustainable dominant logics embedded in cultures and reflected in sectors and consumption systems. SBM guiding questions to be considered by firms at this level include:

- What unsustainable technologies are we substituting?
- How should we capture value and make sustainable technologies profitable for the business?

The challenge is to replace unsustainable systems by offering sustainable value propositions to stakeholders (mainly customers, firms, and nature). SBM activities include

offering sustainable products/services/technologies (value proposition) and leveraging business opportunities for sustainability (value capture).

Second, the medium-term stage is critical for companies to set sustainable organizational structures—i.e., networks and collaborations—through active reciprocal interactions. SBM guiding questions to be considered by firms at this level include:

- Whom should we partner or work with to co-create sustainable value?
- What sustainable practices should we integrate into our supply chain to reduce its negative effects on environment and society?

Networks can involve diverse stakeholders from different sectors and define their interdependencies and roles as well as agreements and terms of collaborations. Activities such as collecting feedback from customers, influencing customers through campaigns and services, developing, and maintaining interdependencies with suppliers and partners, and integrating and configuring sustainability in operations drive a change in creating and delivering value. How to create and deliver sustainable value is the challenge faced by firms in the medium-term stage. As suggested by Hofmann [20] and Sarasini and Linder [21], firms need to coordinate among themselves and find a common ground in adjusting the way they conduct business in a sustainable manner as interdependent and unified networks (including supply chains and collaborations) to address sustainability challenges. [110] confirmed the statement that internal and external organizational structures contribute to sustainability.

Finally, in the short term, firms start experimenting and implementing sustainable-related practices in line with the vision they have established.

SBM guiding questions to be considered by firms at this level include:

- Which staff should we recruit and how should we train them for sustainability?
- How can we make our day-to-day operations more efficient and less harmful to society and environment?
- What experimentations should we undertake with new business models, technologies, and new initiatives, to capture sustainable business opportunities?

Firms start developing technologies and product and process innovations to make operations more efficient and sustainable, while also challenging fundamental parts of their business models, such as how they sell their products and their value propositions. Additionally, they experiment with campaigns to create awareness about sustainability challenges. Investing in technologies, implementing initiatives and campaigns, experimenting within collaborations, and controlling their daily operations and logistics are part of rethinking the way to create and deliver, and capture value based on sustainability concepts. The focus of firms in the short-term is to make unsustainable practices more sustainable in a timescale of five years. During this timeframe, concrete sustainable projects are developed, as a focused firm is already aware of sustainability challenges that not only affect the context but also the firm operations in the long-term. Authors [97] highlighted the challenge of taking away false assumptions from external stakeholders, which are barriers to establish collaborations. Companies need to undertake continuous monitoring, evaluation and reflexive actions at each step to see whether it is making progress in the path of sustainability or not. Objectives, goals and needs are reassessed and re-evaluated while measuring progress towards sustainability.

6. Conclusions

The study conceptualizes how firms contribute to sustainability transitions through the theoretical integration of transitions and business model frameworks. It used transition management [38] as the main analytical framework to understand sustainability transitions from a macro perspective, and the theoretical lens of the business model activity system [39] to understand firm activities at the micro level. The outcome is a conceptualization of how firms enable radical changes at the system level by working at the micro level. The

proposed conceptualization bridges a significant gap in the theme of sustainability and business and presents a defensible and researchable problem for transitions literature.

Transformation to sustainable activities implicates a systemic process in adopting environmental practices [111], as well as taking away assumptions that delay or retain the advancement in the process towards sustainable businesses [112]. Business models form the core of the main operational and strategic vision of a firm and thereby reveal the activities that can advance sustainability transitions. In this paper we highlight how sustainable business models (SBMs) embed sustainable activities at the strategic, tactical and operational levels to support the global call for transitioning towards a more sustainable world. The activities include ecological, social and financial changes as well as collaboration with stakeholders to implement sustainable activities.

These non-technological business model changes, at the micro level of a firm, create multiple niche innovations that generate radical changes in the system. Hence, we argue that sustainability transitions and transition theories not only require studying the wide conceptualization of changes in societies but also capture the firm-level distinctions and nuances by investigating the strategic and operational activities of a firm. Lack of a firm-level perspective limits the understanding of the specific steps required for transition, of specific influences on system transitions, and the nuances of strategy and operations that lead to sustainability transitions.

This study shows that sustainable business models pursue sustainability either through value proposition, value creation or value capture. Business models act as intermediaries to facilitate the commercialization or diffusion of sustainable technologies as well as a source of niche creation through promoting different non-technological innovations. The conceptualization of business model from an activity perspective demonstrates interdependent activities transcending to include multiple perspectives; namely, including sustainability while trying to be financially viable. Business model innovations take place by adding new activities, modifying activities to incorporate new ways, linking activities towards sustainability, or even modifying one or more stakeholders' activities (for example, supplier activities) to move towards sustainability.

As a key contribution to theory, we conceptualize sustainability transitions from the firm- and activity-level perspective, involving concepts from the transition management [38] and business model activity system [39]. Our analysis highlights how firm activities contribute in sustainability transitions by starting with changes in firm's practices, going through internal and external organizational structures, and reaching industry and societal changes in systems in a timescale from short- to long-term respectively. This contribution increases the understanding of how a diverse set of activities related to a firm business model support transitions from a governance perspective [21,42].

As a key contribution to practice, we point out different challenges, guiding questions, and activities at different stages for guiding practitioners and managers to move towards sustainability over time. Our analysis highlights activities as being actively involved in a co-evolutionary process in which such a process may start from transformation of practices until making societal changes. However, stages at this process are interdependent, intertwined and overlapping; corroborating Gorinssen [113], who suggested activities follow an alternate rather than a linear process.

This study has the following limitations. First, we propose a conceptualization based on previous literature. The proposed conceptual framework deserves to be examined through empirical evidence and should dig into firm dynamics and contexts in which they operate. Second, there is still a limited understanding on the different internal and external factors contingent to sustainability transitions; for example, how leadership and group behavior can influence firms towards operating in a sustainable manner [114–116]. Although examples can be scarce in terms of achieving sustainability transitions at the system level, some firms are currently pushing themselves (and are being pushed) to drive wider systematic change, such as Tesla in the area of electric mobility, Fairphone

for transparent global value chains for smartphones, and Patagonia for environmental stewardship in the outdoor industry.

Future research may focus on the co-evolutionary process of firms involved in sustainability transitions through longitudinal data (see, e.g., [24] and [117]. Finally, although prior research suggests the relevance of national policies in pushing firms to adopt sustainability concepts through certifications [8,86], the dynamics of national policies, sustainable business models, and the co-evolutionary process in sustainability transitions, remain unclear. Our study intended to provide a theoretical understanding of sustainability transitions from a firm-level perspective, which needs more attention from scholars to support practitioners and policy makers in their role to support business in a sustainable trajectory and breakdown unsustainable business models, so that societies can flourish and the environment can be preserved in the long-term for future generations.

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Appendix A

Table A1. Examples of extracts and categorization of text during content analysis.

Theme	Code	Sub-Code (Keywords)	Extract	Source
Circular economy	Activities with benefits in the medium term	Tactical (collaboration) Structure (arrangement of business model activities to recirculate materials	"In a circular economy, manufacturers can recirculate materials by reusing, remanufacturing or recycling products or components and materials therein as part of a 'circular business model' In practice this implies radical changes to the way products are designed and to value networks, and manufacturers must adjust their business models". [p. 22]	[35]
Sharing economy	Activities with benefits in the short term	Operational (experimenting) Content (purpose to reduce consumption and more sustainable growth strategy	"In a value proposition experiment, the business model was changed to better meet the retailers' needs. After exploring the business case and analyzing these ideas on their impact, the business model idea was discontinued, as the idea counteracts with their purpose by stimulating sales of products. In fact, its purpose is to enhance the sharing economy by offering an alternative for excessive consumption". [p. 88]	[97]

Table A1. Cont.

Theme	Code	Sub-Code (Keywords)	Extract	Source
Green supply chains	Activities with benefits in the medium term	Tactical (collaboration) Governance (responsibilities in the sustainable procurement with suppliers)	“Collaboration is crucial to develop sustainable business models for supply chain management. They believe that collaboration between producers and suppliers in the procurement process mitigates the use of raw material and waste generation” [p. 16]	[15]

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