

TOWARDS A CONCEPTUAL FRAMEWORK OF BUSINESS MODELS FOR SUSTAINABILITY

Florian Lüdeke-Freund

Centre for Sustainability Management (CSM), Leuphana University of Lüneburg,
Scharnhorststraße 1, 21335 Lüneburg, Germany, +49 (0) 41 31 677 2522,
luedeke@uni.leuphana.de

Abstract

Theorists and practitioners highlight the importance of business for progress in sustainable consumption and production (SCP). In this context business models are discussed as meta factors that can support the adoption of cleaner products and processes, sustainable supply chains and further contributions towards SCP. The article is about business model innovation and the creation of private and public benefits. From a strategy perspective business model innovation is an approach to design, implement and change business models to create and secure competitive advantage. It is supposed that business models can also support eco-innovations. If companies subscribe to sustainability strategies, their business models can help bridging technological innovations, organizational aspects and market positions. Furthermore, the business model itself can become subject to eco-innovation and thus support the realization of business cases for sustainability. The article follows a theoretical, deductive approach. A conceptual framework is developed that combines sustainability strategies, eco-innovation, the role of business models and pivotal ideas about value creation with regard to private and public benefits. This approach is discussed as essential driver of eco-innovations. Starting with sufficiency, efficiency and consistency strategies helps identifying primary challenges and is assumed to be the obvious first step towards a broader research agenda on 'business models for sustainability'. The framework includes definitions such as 'business model eco-innovation' and 'extended customer value' and propositions about how these concepts interrelate. It allows for developing further theoretical and empirical research topics. The review shows that the state-of-the-art literature is far from offering such an agenda.

Keywords

sustainability strategy, business model, eco-innovation, sustainability management

1 Introduction

Different authors, theorists as well as practitioners, highlight the importance of business for progress in sustainable consumption and production (SCP) (e.g. Tukker & Tischner, 2006; Wells, 2008; Tukker et al., 2008; Johnson & Suskewicz, 2009). In this context, business models are discussed as ‘meta’ factors and strategic innovations that can support the adoption of cleaner products and processes, sustainable supply chains and further contributions to a transition towards SCP (Tukker et al., 2008). Wells concludes that “alternative business models are fundamental to the achievement of sustainable production and consumption” (Wells, 2008, 288), and Tukker et al. find that “[b]usiness is probably best placed to respond to sustainability challenges via radical innovative products and services and related new business models” (Tukker et al., 2008, 1220).

But when it comes to marketing eco-innovations, the so called double externality problem is a central barrier: “An important peculiarity of eco-innovations is that they produce positive spillovers in both the innovation and diffusion phase. Positive spillovers in the diffusion phase appear due to a smaller amount of external costs compared to competing goods and services on the market.” (Rennings, 2000, 325) For example, switching from conventional energy systems to renewable energy technologies leads to positive external effects (such as lowered greenhouse gas emissions and reduced dependence on imports; e.g. Dovì et al., 2009). But as long as these public benefits cannot be appropriated as private benefits for technology investors and customers and as long as negative externalities of incumbent systems are not fully internalized in market prices, eco-friendly alternatives automatically suffer from competitive disadvantages (e.g. Wüstenhagen & Boehnke, 2008). Here, business models can come into play (e.g. Schaltegger & Wagner, 2008).

From a strategy perspective business model management is an instrument to steer the design, implementation, change and control of a company’s business model in order to create and secure competitive advantage (Wirtz, 2010). It is supposed that business model management can support the implementation of eco-innovations. Furthermore, in some cases the business model itself may become subject to innovation. This theoretical position follows Zott and Amit (2007, 2008) who identified efficiency and novelty as business model ‘design themes’. The argument deduced from their work is that business models can be orientated towards any design theme – such as sustainability strategies. The business model’s job is to translate these strategies into business activities and to market eco-innovations competitively to create customer value and public benefits. With regard to Rennings’ (2000) classification of eco-innovation drivers, this approach can be interpreted as a market pull factor (*Figure 1*).

Since the business model gains increasing attention as unit of analysis, various agents of sustainability are starting to consider its role in their contexts, whereas a clear agenda is missing. Therefore, this article develops basic definitions and argumentation so as to propose a conceptual framework. Theoretical interrelations between the imperatives of ecological sustainability and business activities are worked out on the business model level. By doing so, this article builds ground for future research on business model innovation and sustainable business models. Since these are organizational innovations, this perspective may contribute to overcoming the technology and market biases in innovation discourses and thus support the argument that business has an essential stake in the transition towards SCP.

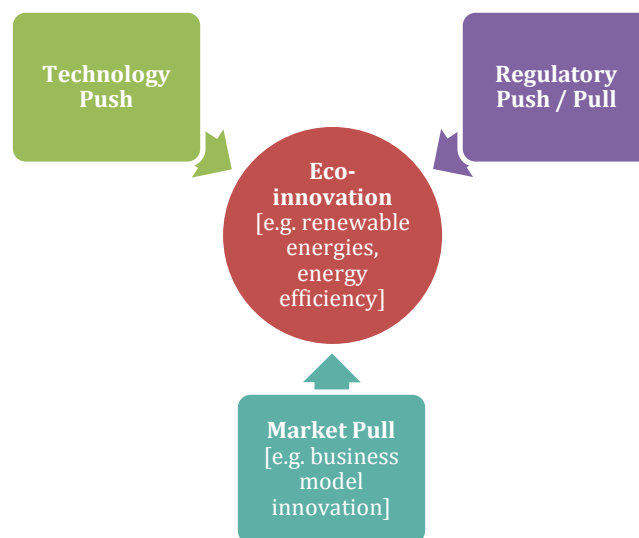


Figure 1: Eco-innovation drivers and positioning of business model innovation

Source: Rennings, 2000, 326 (modified)

This article is organized as follows: First, transformational strategies towards ecological sustainability are identified as innovation orientation (*Section 4.1*). Second, a generic business model concept is proposed as analytical perspective on company and market factors (*Section 4.2*). Therefore, many literates use (variations of) four pillars which constitute a business model: value proposition, customer interface, infrastructure and financial aspects. Based on this conceptual scope the framework is derived (*Section 5*). The final section summarizes central definitions, arguments and questions for future research (*Section 6*).

Before introducing the framework's conceptual scope an overview of related work is provided.

2 The Idea behind Business Models for Sustainability

Neither theoretical nor empirical research offers sufficient answers to the central question: What is a sustainable business model? This question poses several difficulties as in our context sustainable or sustainability-oriented business is interpreted as multidimensional and normative idea about social, ecological and economic concerns (e.g. Stead & Stead 2008). In this article sustainable business models are discussed as an approach to creating so called business cases for sustainability (e.g. Dyllick & Hockerts, 2002).

The business case for sustainability is about integrating societal and environmental matters into the core business of a firm (Schaltegger & Wagner, 2006): The main challenge is to improve competitiveness and business success through outstanding and voluntary social and ecological performance, whereas simply being in compliance with regulations or standards does neither always nor automatically bring about financial benefits. That is, business cases have to be created proactively (Schaltegger & Müller, 2008).

Thus, the following sections discuss an approach that has merely been recognized yet: *business model eco-innovation leading to sustainable business models* (cf. Schaltegger & Müller, 2008). This rather theoretical article contributes to an issue that might turn out to be one of the most relevant topics in the fields of sustainable entrepreneurship and corporate sustainability management in the next years: identifying, understanding and promoting business models for sustainability.

3 Summary and Shortcomings of Existing Theory

On the one side, the limited body of relevant literature can be described as ‘constraints literature’ which explains why sustainable business models are missing. The research of Birkin et al. (2009a, b) is an instance of this: “However, despite ... laudable achievements, questions remain as to whether ... even exemplar corporations that exhibit state-of-the-art environmental management and corporate social responsibility (CSR) may be unable to become sustainable.” (Birkin et al., 2009b, 278) On the other side, some authors offer positivist conceptualisations of what sustainable business models might be and how they could be developed (e.g. Stubbs & Cocklin, 2008).

While there is a lot of rhetoric (e.g. Hart & Milstein, 1999; Elkington, 2004), relevant theory and robust empirical work on business models in sustainability contexts is rare. Some articles discuss company cases (e.g. Stubbs & Cocklin, 2008; Wells, 2008), some refer to whole countries or industries (e.g. Wells, 2008; Halme et al., 2008; Birkin et al., 2009a, 2009b; Schoettl & Lehmann-Ortega, 2010), and some offer more conceptual perspectives (e.g. Tukker & Tischner, 2006; Wüstenhagen & Boehnke, 2008). Topical articles can be

divided into three groups: (a) descriptive country, industry or company cases, (b) deductive theoretical and conceptual work, and (c) case-based inductive theory-building (*Table 1*).

Table 1: Examples of current business model research related to sustainability issues

Source: Own

Article and Topic	Theoretical perspective	Empirical perspective	Article type		
			(a)	(b)	(c)
Tukker & Tischner 2006 Product-service (PS) as specific value proposition of business models	Combining PS and business perspectives; referring to (sustainable) PS as value proposition and (sustainable) PS system as business model; latter consists of value network, value proposition, revenue model, technological infrastructure	Discussion of potential for product-services in different need areas: base materials, information and communication technology, offices, food, households; over 40 participants from industry, research and others contributed to the development of new PS	(X)	X	(X)
Halme et al. 2008 Business models for material efficiency services	Three generic models for material efficiency services; focus on financial aspects; business model concept includes competitive advantage, customer benefit, resources and capabilities, financing arrangement	Opportunities for material efficiency services in paper, food and different service industries; also focusing financial and regulatory mechanisms; based on a large sample of interviews with Finnish companies, data triangulation	X	(X)	
Stubbs & Cocklin 2008 Conceptualization of a sustainability business model	Business model ideal type is built on numerous structural and cultural attributes that either belong to socioeconomic environment or internal organizational capabilities	Ideal type development based on two in-depth case studies (carpet producer, bank); based on secondary data analyses and interviews			X
Wells 2008 Alternative business models for the automotive industry	Problem of business change is located in an industrial transformation context; strategic perspective on combinations of business structure, product-service offering, added value for customers; business model = value creation framework	Disruptive technologies in the automotive industry, innovative vs. traditional business models; four case studies of entrepreneurial and management approaches, focus on business model and technology combinations	X		

Table 1 continued

Article and Topic	Theoretical perspective	Empirical perspective	Article type		
			(a)	(b)	(c)
<p>Wüstenhagen & Boehnke 2008</p> <p>Business models for sustainable energy</p>	<p>Barriers to sustainable energy technologies can be overcome by innovative business models; business model concept includes value proposition, value creation configuration and revenue model</p>	<p>Reference to sustainable energy technologies such as solar cells, solar thermal collectors, micro-cogeneration plants, stirling engines or heat pumps</p>		X	
<p>Birkin et al. 2009a</p> <p>Identification of new sustainable business models in China</p>	<p>Process of integrating corporate sustainability into business model: investigating, internalizing, integrating and innovating capabilities, commitments and partnerships; business model concept is missing</p>	<p>Exploratory study on Chinese manufacturing companies (survey, interviews); focus: environmental awareness and performance, community matters, performance drivers and barriers, sustainability issues</p>	X		
<p>Birkin et al. 2009b</p> <p>Identification of a new business model for sustainable development Nordic countries</p>	<p>Four classes of information related to sustainable development necessary to represent and assess sustainable organizations: mass balances, life-cycle impacts, stakeholders, ecological resilience; business model concept is missing</p>	<p>Exploratory study on diverse Nordic firms using the management method of the 'theory of constraints' as analytical frame; focus on operations related to four information classes (see above)</p>	X		
<p>Johnson & Suskewicz 2009</p> <p>Innovative business models for a clean tech economy</p>	<p>Innovative and customized business models are crucial to clean tech success; business models consist of value proposition, profit formula, key resources and processes</p>	<p>Better Place (electric vehicles) and Masdar City (planned carbon-neutral city in the Abu Dhabi desert) as examples of radical business model innovation</p>	X		
<p>Schoettl & Lehmann-Ortega 2010</p> <p>Generic types of photovoltaic business models for utilities</p>	<p>Business model based on value proposition and value constellation, translated into profit equation; business models result from value chain deconstruction</p>	<p>Qualitative approach to photovoltaic business models' fit with utilities' core competencies; based on secondary data analyses and interviews</p>		X	(X)

The examples in *Table 1* were chosen to illustrate different approaches to directly linking business model perspectives to sustainability issues. They represent the limited body of literature which uses the business model as unit of analysis – and not as buzz word. Nevertheless, some examples focus on measures which mainly refer to general entrepreneurial and managerial activities (e.g. Birkin et al., 2009a, b), while the central components that constitute a business model are merely discussed. Exceptions are the articles of Halme et al. (2008), Wüstenhagen and Boehnke (2008) and Schoettl and Lehmann-Ortega (2010). They explicitly discuss business model concepts, but at the same time they are focused on single industries and their specific business cases. So far, only Tukker and Tischner (2006) offer a general framework for sustainability-oriented business model innovation. Their approach is based on the potential of product-services (value propositions) and product-service systems (business models) to create social and environmental benefits in a competitive manner. Since their work on ‘New Business for Old Europe’ is based on a broad EU research project (SusProNet), it integrates technical, sociological, business and policy perspectives and might be somehow cumbersome. Therefore, this article focuses on the essentials in this context: business can contribute to solving or at least moderating sustainability challenges through radically novel value propositions, and successfully marketing such value propositions requires adequately radical business model innovations.

An integrated body of literature dealing with these issues is missing. Therefore, the following sections develop a theoretical frame for a research agenda based on transformational strategies for ecological sustainability, business model concepts and the pivotal role of value creation.

4 Conceptual Scope: Transformational Strategies and Business Models

Advances in ecological sustainability through business activities are not only a matter of technological progress and political regulation. Market pull factors such as strategic sustainability management, eco-marketing and further innovative management concepts can be very effective (cf. Rennings, 2000) – but when discussing market transformations, such factors are often underestimated or even neglected in economic theory (e.g. Wells, 2008; Teece, 2010). To bring sustainability and business imperatives into line (*Figure 2*), the business model is proposed as an architectural template of corporate activities, resources and capabilities that can be shaped according to specific design themes and thus unfold transformational potential (Zott & Amit, 2007, 2010). That is, when orientated towards sustainability strategies, business models can lead to altered consumption patterns, efficiency gains and consistent system designs.

4.1 Sustainability Strategies

4.1.1 Imperatives of Ecological Sustainability

Leaving aside the intellectual roots and evolution of concepts such as sustainable development and sustainability, one can directly refer to central strategies of ecological sustainability which shall regulate economic development.¹ *Table 2* depicts five ecological sustainability imperatives stemming from the Brundtland report (WCED, 1987). They were compiled by Huber, who contributed seminal work on the discourses following the UN Earth Summit held in Rio de Janeiro in 1992 (e.g. Huber, 1995, 2000). These imperatives may be valuable normative guidelines, but at the same time they lack concrete practical applicability: “The rules ... are helpful *orientations*. It should be noticed, however, that they are *empirically empty* categorical imperatives.” (Huber 2000, 271; emphases added) Nevertheless, it is important to refer to these imperatives and their main concerns when dealing with sustainability-oriented business issues.

Table 2: Imperatives of ecological sustainability and economic development

Source: Huber, 2000, 271 (quotations in left column)

Normative rules of ecological sustainability	Main concerns
“Population development must be in keeping with the carrying capacity and productive forces of the ecosystem.”	Population; carrying and productive capacities of ecosystem
“Ambient concentrations of pollutants in environmental media and living creatures must not exceed their absorption and regeneration capacity.”	Concentration of pollutants; absorption and regeneration capacity of ecosystem
“The consumption rate of renewable matter and energy ... must not exceed their given rate of reproduction.”	Consumption and reproduction rate of renewable resources
“The consumption rate of exhaustible resources ... is to be minimized by (a) substituting renewable resources for exhaustible ones; (b) increasing material and energy efficiency; and (c) recycling to the extent that is ecologically reasonable and economically justifiable.”	Consumption rate of non-renewable resources; substitution, efficiency, recycling
“The development and introduction of ecologically benign, clean resources, technologies and new products is to be intensified.”	Ecologically benign resources, technologies, products

These imperatives cannot directly be translated into strategies for business management since economic markets are companies’ primary frames of reference. Thus, intersections of ecological sustainability and business imperatives have to be identified on more abstract level to avoid arbitrary rule setting (*Figure 2*). The result is a perspective that offers new

theoretical and practical search fields and widens the efficiency-centred business perspective (e.g. Schmidheiny, 1998; Holliday et al. 2002). Three strategies are inherent in *Table 2: sufficiency, efficiency and consistency*. These are introduced to elaborate on the idea that “[b]usiness management needs to build its own business strategies, based on these three types of strategy” (Schaltegger et al., 2003, 26).

4.1.2 Transformational Strategies: Sufficiency, Efficiency and Consistency

According to Huber, these ‘transformational strategies’ can be identified in UN documents and other literature concerned with sustainable development: “*sufficiency* with regard to population growth, as well as the level of affluence, life-style and consumption patterns; *efficiency* with regard to production processes and the use of products; and ecological *consistency* of production processes and products in order to achieve compatibility between the industrial and natural metabolism” (Huber, 2000, 275; orig. emphases).

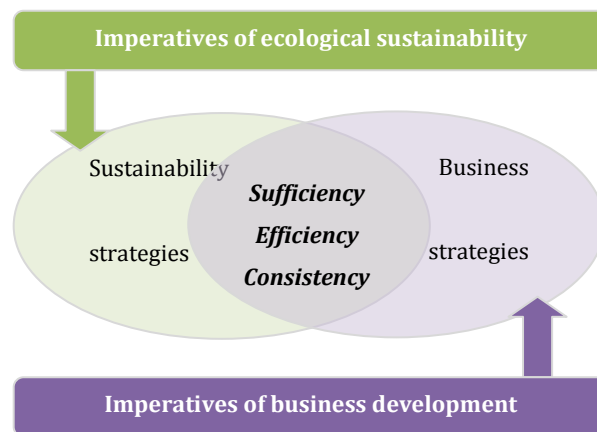


Figure 2: Theoretical intersections of ecological sustainability and business imperatives

Source: Own

Sufficiency: “Sufficiency means having enough.” (Schaltegger et al., 2003, 25) This strategy relates to ethical claims for modesty and renunciation which are expressed in phrases such as ‘How much is enough?’ or ‘Sufficiency means doing without’ (e.g. Huber, 2000; Linz, 2004). Sufficiency is about taking care for ecological carrying capacities and drawing conclusions for consumer behaviour and consumption patterns. This includes reduction of resource use and impacts on the natural environment, substitution of non-sustainable practices, re-design of consumption structures and stimulation of altered consumer buying habits (*Table 3*).

Realization of sufficiency faces several barriers: “[One] cannot know exactly the limits of carrying capacities, but that moderation, thus applying the *precautionary principle*, definitely

seems called for because things cannot continue the way they are now ..." (Huber, 2000, 275; emphasis added) Transferring the precautionary principle to the growth-driven business world seems hardly possible; it is inconvertible in its pure form as the "problem is that many aspects of business focus on having more rather than having enough" (Schaltegger et al., 2003, 25). To be effective, sufficiency-oriented business strategies and business models have to overcome further psychological barriers (Huber 1995, 2000): In the eyes of utilitarian consumers sufficiency threatens individual unfolding and, if imposed by force, destroys civil rights and liberties. Also misallocation of resources and obstruction of desirable economic development may result. Finally, freezing consumption on current levels, or even below, would not avoid ecological decline according to continuous population growth (cf. *ibid.*; Starke & Mastny, 2010).

Efficiency: "Strategies of efficiency aim to reduce the environmental damage associated with the production of each unit of output." (Schaltegger et al., 2003, 25) In the extreme, efficiency shall decouple wealth from resource use (cf. Bartelmus et al., 2004). Especially so called Factor X concepts are very popular, promising scenarios of economic prosperity while environmental impacts and resource use are reduced drastically through efficiency leaps in production and consumption (e.g. Factor 4 and Factor 5 (von Weizsäcker et al., 1998, 2009) or Factor 10 (Schmidt-Bleek, 2000)). Therefore, "[t]he efficiency strategy is the most applicable and appealing in the prevailing economic system" (Huber, 2000, 280). However, distinguishing between acceptance and application of efficiency concepts in management reveals that, for instance, eco-efficiency analyses are well known but merely applied in practice (e.g. Halme et al., 2008; Herzig & Schaltegger, 2009).

Huber argues that ecologically superior alternatives to dominating production and consumption structures are often perceived as threats to incumbents' existence (Huber 2000). Therefore, instead of developing and supporting alternative paths, the 'eco-efficiency revolution' (Bleischwitz, 2004) may also be used to legitimize traditional technologies and structures (e.g. more efficient brown coal combustion versus renewable energies). Hence, efficiency can help reduce environmental impacts and resource use and thus support competitiveness. But it may also lead to path-dependencies and even stimulate demand through reduced costs ('Jevon's paradox', also known as rebound effect; Tukker & Tischner, 2006; Polimeni et al., 2008; Birkin et al., 2009b).

Consistency: Consistency is a "transformational strategy for sustainable development going beyond sufficiency and efficiency ..., a strategy of *qualitative* change of the industrial metabolism ..., allowing for a permanent turnover of material flows on a large scale and in large volumes" (Huber, 2000, 280; orig. emphasis). Consistency fully subscribes to

integrated environmental protection as opposed to end-of-pipe or downstream measures. The aims are material and energy flow designs in either technological cycles separate from, or consonant with, natural settings. The philosophy of consistency is to re-integrate anthropogenic industrial metabolisms into natural metabolisms, i.e. to converge industrial with natural principles to avoid artificial (and possibly incorrect) limit setting (ibid.).

An example is organic farming, where increases in production and economic growth can lead to positive ecological effects since eco-farming can contribute to soil quality and biodiversity. Further examples are cold combustion in fuel cells or biotechnological instead of mechanical production processes in the chemical industry (ibid.).

Problems of this strategy are economic rather than physical limits to consistent procedures. Consistency innovations are of a basic or systemic type and thus conflict with existing dominant designs and the positions of incumbents which can lead to social and political conflicts. Moreover, mobilizing the necessary innovative and economic capacities requires multi-level efforts and support from industry, finance, research and political leadership and, as for sufficiency, societal acceptance.

Table 3: Overview of ecological sustainability strategies (non-exclusive list)

Source: Own; based on Bleischwitz & Hennicke, 2004; Huber, 1995, 2000; Linz, 2004; Schaltegger et al., 2003; Schmidt-Bleek, 2000; von Weizsäcker et al., 1998, 2009

Strategy (basic idea)	Objectives and approaches	Main barriers
<p>Sufficiency</p> <p>Change of consumption and production patterns through change of lifestyle; focus on conservation of nature</p>	<p><i>Psychological</i></p> <ul style="list-style-type: none"> • Definition of what is 'enough', 'doing without' • Modesty and renunciation based on discernment <p><i>Behavioural</i></p> <ul style="list-style-type: none"> • Change of consumer habits and consumption structures • Re-definition of which products to demand • Substitution of non-sustainable behaviour <p><i>Technological</i></p> <ul style="list-style-type: none"> • Change of technological basis of consumption structure • Reduction of impacts on the natural environment and resource use 	<ul style="list-style-type: none"> • Psychological and behavioural barriers of utilitarian consumers • Business is stuck in growth paradigm • Definition of limits: economically, morally?

Table 3 continued

Strategy (basic idea)	Objectives and approaches	Main barriers
<p>Efficiency</p> <p>Reduced environmental damage per unit of output; focus on improving technologies, organizations</p>	<p><i>Organizational</i></p> <ul style="list-style-type: none"> • Environmental management systems (EMS) for continuous improvements • New product-service-systems for consumers <p><i>Technological</i></p> <ul style="list-style-type: none"> • Optimization of input-output ratios of production and consumption • Reduction of material and energy inputs with constant or increasing productivity • Reuse and longevity of materials and products • Recycling and cascade reprocessing of materials 	<ul style="list-style-type: none"> • Lack of attention hindering innovations • Lack of knowledge about inefficiencies and improvements • Missing demand for efficient products and services • Uncertainties during transition phases
<p>Consistency</p> <p>Bringing industry in line with natural principles; focus on new technological paradigms</p>	<p><i>Paradigmatic</i></p> <ul style="list-style-type: none"> • Re-integrate industrial metabolism into natural metabolism ('industrial ecology') • 'Ecological modernization' through structural change • 'Circular economy' based on clean energy and pure, high quality materials • Avoidance of artificial and possibly incorrect limit setting <p><i>Technological</i></p> <ul style="list-style-type: none"> • Material and energy flows either in own, separate technological cycles, or consonant with their natural setting • Substitution of non-renewable resources and technologies 	<ul style="list-style-type: none"> • Limits to closed-loop procedures on large scale are imposed by economics rather than physics • Innovations are of basic or systemic type and conflict with given situation • Mobilization of necessary capacities requires multi-level efforts and support

Each of these strategies contributes to sustainable ecological development; but they are limited in their specific effects (e.g. Huber, 2000; Linz, 2004). Efficiency gains may be overcompensated by increasing demand and economic growth. That is, to be effective, efficiency could be combined with sufficiency: Processes and products become more efficient in terms of input-output ratios, while at the same time sufficient consumption patterns shift to dematerialized services (e.g. Tukker & Tischner 2006). But even efficient processes and products and sufficient lifestyles cause environmental impacts. Consistency goes beyond incremental improvements and can lead to radical changes and significant positive net effects. However, the strategies' specific strengths have to be combined as an integrative concept of ecological sustainability (cf. Linz, 2004).

Possible overlapping with business imperatives is thoroughly discussed with regard to efficiency (e.g. Bleischwitz & Hennicke, 2004), while sufficiency and consistency still seem to

be countercultural strategies (cf. Schaltegger et al., 2003). But how can sustainable entrepreneurs, sustainability managers and their eco-innovations contribute to the broader spectrum of ecological sustainability? It is argued that business models which are explicitly or implicitly orientated towards these transformational strategies can sometimes better contribute to solving problems of ecological sustainability than pure technological and regulatory push and pull factors.

4.2 The Business Model Perspective

Identifying business models at the intersections outlined in *Figure 2* requires a clear understanding of the unit of analysis. Regarding the above-discussed main barriers to ecological sustainability, the central question is: How can business models translate transformational sustainability strategies into business operations?

This perspective is chosen due to business models' undiscovered potential to radically change whole industries (e.g. Schweizer, 2005; Chesbrough, 2010). Eco-innovations are too often discussed with a bias towards technology and market regulation (e.g. Rennings, 2000; Johnson & Suskewicz, 2009). Moreover, Teece argues that in general some kind of market bias exists in economic theory – with consequences for business model research: “The absence of consideration of business models in economic theory probably stems from the ubiquity of theoretical constructs that have markets solving the problems that – in the real world – business models are created to solve.” (Teece, 2010, 175) Hence, besides technological progress and market regulation business models are introduced as third essential driver for eco-innovations (*Figure 1*).

4.2.1 Business Model Definition

Since a discipline of business model research is arising and the nature and relevance of business models are being discussed in length, different approaches to this topic can be identified.ⁱⁱ This article subscribes to the strategy stream of business model literature which can be differentiated from technology and organization streams (Wirtz, 2010). Strategy-related approaches have in common a general management perspective with a focus on competition and innovation, while often whole industries or company networks are discussed (e.g. Hamel, 2000; Magretta, 2002; Afuah, 2004).

Teece's current definition is chosen because it directly combines the business model, strategy and innovation, and even sheds some light on a particular externality problem related to innovation. In the following, his understanding of a business model will be applied: “*The essence of a business model is that it crystallizes customer needs and ability to pay, defines the manner by which the business enterprise responds to and delivers value to*

customers, entices customers to pay for value, and converts those payments to profit through the proper design and operation of the various elements of the value chain.” (Teece, 2010, 179)

This definition clearly articulates the common sense among most strategy-oriented business model authors: creating and delivering customer value is at the heart of any business model and, thus, its central element is its customer value proposition (e.g. Belz & Bieger, 2006; Osterwalder & Pigneur, 2009; Johnson, 2010). A business model must allow the company to capture part of the customer value and make a profit (e.g. Chesbrough & Rosenbloom, 2002; Zott & Amit 2007, 2008). Moreover, while creating and delivering customer value, the business model itself can become a source of competitive advantage – by means of business model innovation (e.g. Chesbrough, 2010; Johnson, 2010). The basic strategic elements that have to be considered in order to create *customer value* can be defined as an interdependent triad of a *value proposition* that requires a *value delivery configuration* and a *value creating logic* (cf. Wüstenhagen & Boehnke, 2008) (Figure 3).

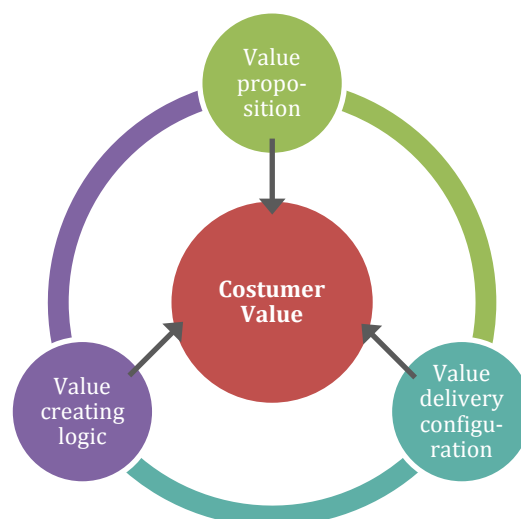


Figure 3: Strategic elements of a business model

Source: Own

A business model is a model insofar as it comprises hypotheses: “Put differently, a business model reflects management’s hypothesis about what customers want, how they want it and what they will pay, and how an enterprise can organize to best meet customer needs, and get paid well for doing so.” (Teece, 2010, 191) Furthermore, hypotheses about the behaviour of revenues and costs, changing customer needs and competitor responses are included in this model. Baden-Fuller and Morgan, who discuss different model functions of the business model, have “explored the analogy of models as recipes to understand the role of variation

and innovation within the constraints of ingredients and purposes, and their use by managers to motivate strategy changes, and to experiment with their organisations” (Baden-Fuller & Morgan, 2010, 168). In this sense, the business model may become an instrument of strategic variation and innovation for sustainable entrepreneurs and sustainability managers: “Put differently, a business model articulates the underlying business or ‘industrial logic’ of a firm’s go-to-market strategy. Once articulated, it is likely that the logic will have to be tested and retested, adjusted and tuned as the evidence with respect to provisional assumptions becomes clarified.” (Teece, 2010, 188)

4.2.2 Business Model Template

In addition to definitions and hypotheses a model can be expressed visually. It is proposed to add a graphic representation to have the business model concept based on verbal as well as visual components. Therefore, four central business model pillars can be identified when reviewing relevant literature (Ballon, 2007, 8; emphases added):

- “the products and services a firm offers, representing a substantial value to a target customer (*value proposition*), and for which he is willing to pay;
- the relationship the firm creates and maintains with the *customer*, in order to satisfy him and to generate sustainable revenues;
- the *infrastructure* and the network of partners that are necessary in order to create value and to maintain a good customer relationship; and
- the *financial aspects* that can be found throughout the three former components, such as cost and revenue structures.”

As literature suggests, Osterwalder’s business model concept was the first one including a robust definition *and* a representation based on these four pillars (Osterwalder, 2004; Osterwalder & Pigneur, 2009). He reasoned that value proposition, customer interface, infrastructure management and financial aspects are “the four main areas that constitute the essential business model issues of a company” (Osterwalder, 2004, 42). Meanwhile, variations of this four-pillar concept can be found throughout the present literature (e.g. Johnson et al., 2008; Johnson, 2010; Wirtz, 2010; Chesbrough, 2010). *Figure 4* introduces the corresponding business model template.

This template follows a straightforward logic and thus supports ‘telling good stories’, which is, according to Magretta (2002), an important feature of business models: A business model focuses on the value created for customers (value proposition pillar in the middle); therefore, a company has to manage its partnerships, activities and resources to offer adequate value configurations for products and services, whereas activities and resources are both, company-owned and acquired from partners (infrastructure management pillar in the upper

left); to address customer segments, communication and distribution channels as well as diverse customer relationships have to be established (customer interface pillar in the upper right); finally, the bottom line literally refers to optimizing revenue streams and cost structures to appropriate economic value for the company (financial aspects pillar at the bottom).

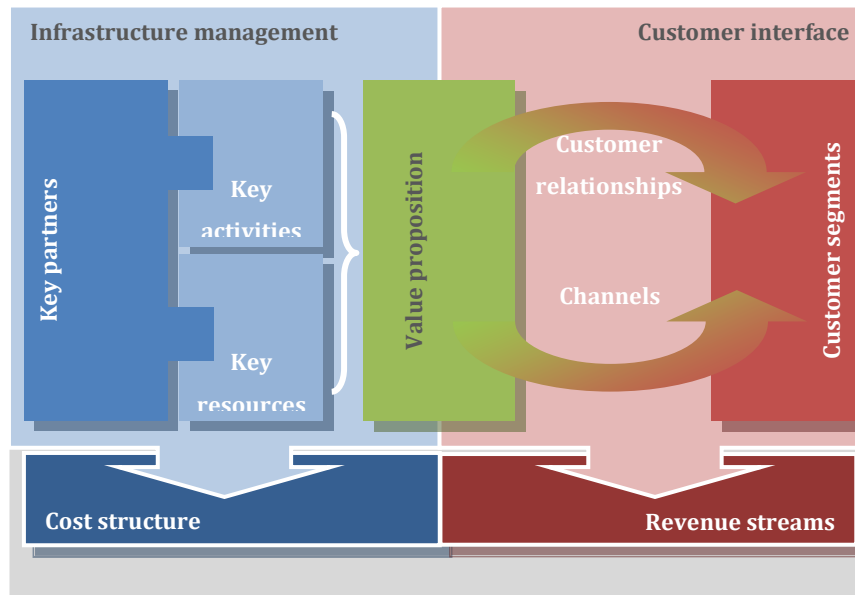


Figure 4: Visual representation – the business model template

Source: Osterwalder, 2004, 44; Osterwalder & Pigneur, 2009, 17 (modified)

In a nutshell, business model design is based on these four pillars and their nine building blocks which are named in *Figure 4*. The value proposition has evolved as both, a pillar and a building block.ⁱⁱⁱ This template defines the sphere of business model innovation which is a crucial task of business model management (cf. Chesbrough, 2010; Teece, 2010; Wirtz, 2010). When it comes to innovative designs, it is essential to understand if and how these pillars, building blocks and their relationships can translate sufficiency, efficiency and consistency strategies into business activities.

4.2.3 Business Model (Eco-)Innovation

Against the normative background of corporate sustainability, innovation is more than a means to create competitive advantage (cf. Schaltegger & Burritt, 2005). It is motivated by concern about direction and content of progress: “Thus, the additional attribute of innovations toward sustainability is that they reduce environmental burdens at least in one item and, thus, contribute to improving the situation in the problem areas [addressed in

sustainability concepts].” (Rennings, 2000, 322) Rennings distinguishes four categories of eco-innovations which can interact with and even be dependent on each other (Table 4).

Table 4: Classification of eco-innovations
Source: Rennings, 2000, 322-324 (examples added)

	Technological	Organizational	Social	Institutional
Approaches	Curative or preventive process and product innovations; prevention can be integrated or additive	Management systems, concepts and instruments at the firm level	Change of lifestyles, consumer behaviour and consumption patterns	Arrangements of networks, regimes of global governance; also including new assessments and public participation
Examples	3-liter-car; solar technologies; green walling in cities; efficient high-temperature processes	Eco-audits; eco-marketing; strategic environmental management; <i>focus: business model innovation</i>	Shift of modal split from car to bicycle; social media; green investment; micro-finance (e.g. Grameen Bank)	Networks of NGOs, scientists, firms, public authorities (e.g. BUILD UP for eco-efficient buildings in the EU)
<p style="text-align: center;"> </p>				

To study if and how business models drive eco-innovations, it is crucial to understand their interrelations with other innovation types (arrows and question marks in Table 4). Even though business model innovation is neither a new nor an isolated phenomenon (Chesbrough & Rosenbloom, 2002; Chesbrough, 2007, 2008; 2010 Mitchell & Coles 2003, 2004a, b), one central question has not been addressed yet: Can business models themselves become eco-innovations?

First, using Rennings’ classification, business model innovation can be characterized as organizational innovation. Second, since eco-innovations are different from their conventional counterparts in that they are normatively prescribed, an approach is needed that is open to normative prescriptions. Consequently, a business model becomes an organizational eco-innovation if it co-creates private and public benefits. Third, from a strategy perspective business model eco-innovation should create competitive advantage through superior customer value (strategic requirement) *and* contribute to a sustainable development of the company *and* society (normative requirement), where sufficiency, efficiency and consistency can be strategic and normative orientations for innovation. It

follows that business models, as organizational eco-innovations, can be crucial for creating business cases for sustainability (cf. Schaltegger & Wagner, 2006, 2008).

4.2.4 From Customer Value to Public Customer Value

The central barrier to business cases with eco-innovations relates to the co-creation of private benefits for companies and customers and positive contributions to society and environment – i.e. public benefits (cf. Schaltegger & Wagner, 2006, 2008). As companies are not compensated for reducing negative externalities or creating positive externalities per se, they try to avoid such activities unless agreements can be negotiated without additional costs or regulations are imposed (Coase, 1960). However, when public benefits from eco-innovations cannot be appropriated as private benefits, they will be created in too small amounts from a societal perspective.

One interpretation of private benefits from business activities is customer value. Commonly, customer value comprises customer equity for the company and customer value (in the narrow sense) for customers (Belz & Bieger, 2006). With regard to the above-stated problem this interpretation must be extended: To overcome the discrepancy between private and public benefits which occurs on imperfect markets, they must be co-created to generate threefold value: for the company, its customers and the public ('extended customer value'). Since customer value is the strategic nucleus of every business model (*Figure 3*), it is argued that business model eco-innovation is the obvious approach to creating extended customer value. Therefore, the power of business models (Shafer et al., 2005), i.e. the ability to develop radically different approaches to value creation and value capture (e.g. Chesbrough, 2010; Teece 2010), must be combined with sustainability-oriented business opportunities (cf. Schaltegger & Lüdeke-Freund, 2009). Public benefits, i.e. positive social and ecological externalities, being created according to the idea of extended customer value may be termed 'public customer value' (*Figure 5*).

Such value may result from what Meynhardt and Stock call public value propositions (Meynhardt & Stock, 2009). They argue that in the face of increasing awareness about business-society interrelations and moral and ethical concerns, marketing has to combine customer value and public value (Meynhardt, 2009). That is, to legitimize value propositions for customers (e.g. individual mobility) companies have to offer public value propositions (such as eco-friendly mobility concepts). When transferred to marketing and competition, business model eco-innovations subscribing to sufficiency, efficiency and consistency can be applied to create competitive advantage through extended customer value and in this way increase the amount of public benefits.

The concept of extended customer value distinguishes between four modes of value creation which are relevant for the direction and potential impact of business model innovation (see *Figure 5*):

- (1) Creating value for individual customers and the company.
- (2) Creating value for the public and the company.
- (3) Creating value for the public and individual customers.
- (4) Creating value for the public, individual customers and the company.

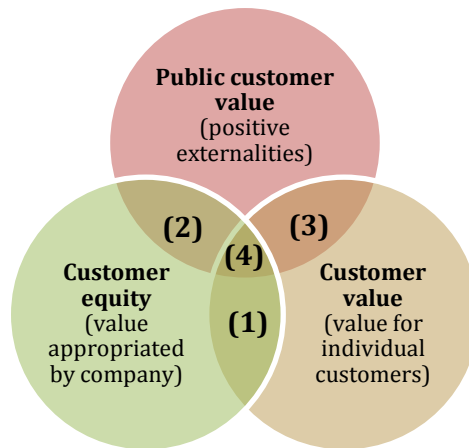


Figure 5: Concept of extended customer value

Source: Own

Case (1) refers to the conventional situation where companies offer products and services to their customers. The aim is to organize such transactions to create added value for both. Case (2) is more complicated since additional mechanisms (such as regulations and other incentives) are necessary to motivate companies to produce positive externalities or reduce negative effects. Intelligently designed business models can help creating business cases beyond compliance (e.g. appropriating value from reforestation and protecting biodiversity). Individual and public customer value (3) can be created, for instance, when forests and their biodiversity are protected for the sake of native inhabitants only. No doubt, such cases may also relate to Corporate Social Responsibility (CSR) activities that are not directly connected to the (core) business of a company; hence, it is questionable whether the term ‘customer’ should be used here. However, approaches to creating business cases through CSR are discussed for decades and from various perspectives (e.g. Bowman & Haire, 1975; Caroll & Shabana, 2010). Case (4) focuses on business cases for sustainability based on innovative mechanisms of value creation (which might also include CSR activities): For instance, a company of which core business depends on specific functions of eco-systems (e.g.

rainforests and their genetic diversity) may try to reap benefits from exploiting these ecosystems and their functions for transactions according to case (1) in *Figure 5*, while an approach according to (4) includes benefits for the public (e.g. through conservation and combined strategies of use and protection).

Such approaches require a completely different value creating logic to deal with the central challenge of business models for sustainability: Who will pay for extended customer value? With regard to Teece's definition (*Section 4.2.1*), this is a business model challenge. In consequence, this challenge comprises three tasks:

- (a) offer superior customer value to target groups;
- (b) create public customer value on a societal level; and
- (c) allow the company to appropriate value from (a) and (b).

While the idea of enhanced customer value is self-evident from a theoretical point of view, there is hardly any practical evidence: "Hence the question arises, what business models exist and can be developed with social benefits which can be partly appropriated?" (Schaltegger & Wagner, 2008, 39)

5 A Framework of Business Model Eco-Innovation

Figure 6 summarizes the conceptual scope discussed above and offers a theoretical frame of reference for research on business model eco-innovation. Therefore, the business model was introduced as third essential driver of transformational business activities: Business models can promote and capitalize on eco-innovations and they can themselves become organizational eco-innovations.

Developing marketable eco-innovations can be a means to realize transformational strategies of ecological sustainability (left part of *Figure 6*). Most of the literature discusses eco-technologies and then asks for eco-policies. Such discussions seldom leave the fields indicated in the left area of *Figure 6*. But to stimulate sufficient life-styles, efficient products and processes and to develop consistent systems of production and consumption, eco-innovations must be *marketed* successfully. The business model's job is to offer innovative value propositions based on eco-innovations and to overcome the main barriers of ecological sustainability strategies in a competitive way (middle part of *Figure 6*; see also *Table 3*). To tackle the double externality problem, i.e. the private/public benefit discrepancy that is inherent in any of the above-mentioned barriers, extended customer value must be created to unfold market pull effects (right part of *Figure 6*). The central challenge for strategic, sustainability-oriented business model management is to develop an alternative business logic that allows for creating public customer value and capturing part of this value either for the public and the company (direct value capture for the company, (2) in *Figure 5*),

or the public and the customer which might lead to higher willingness to pay or increases in demand (indirect value capture, (3) in *Figure 5*). Value creation according to (4) in *Figure 5* describes a perfect business case for sustainability, while (1) stands for conventional approaches limited to the company and its customers.

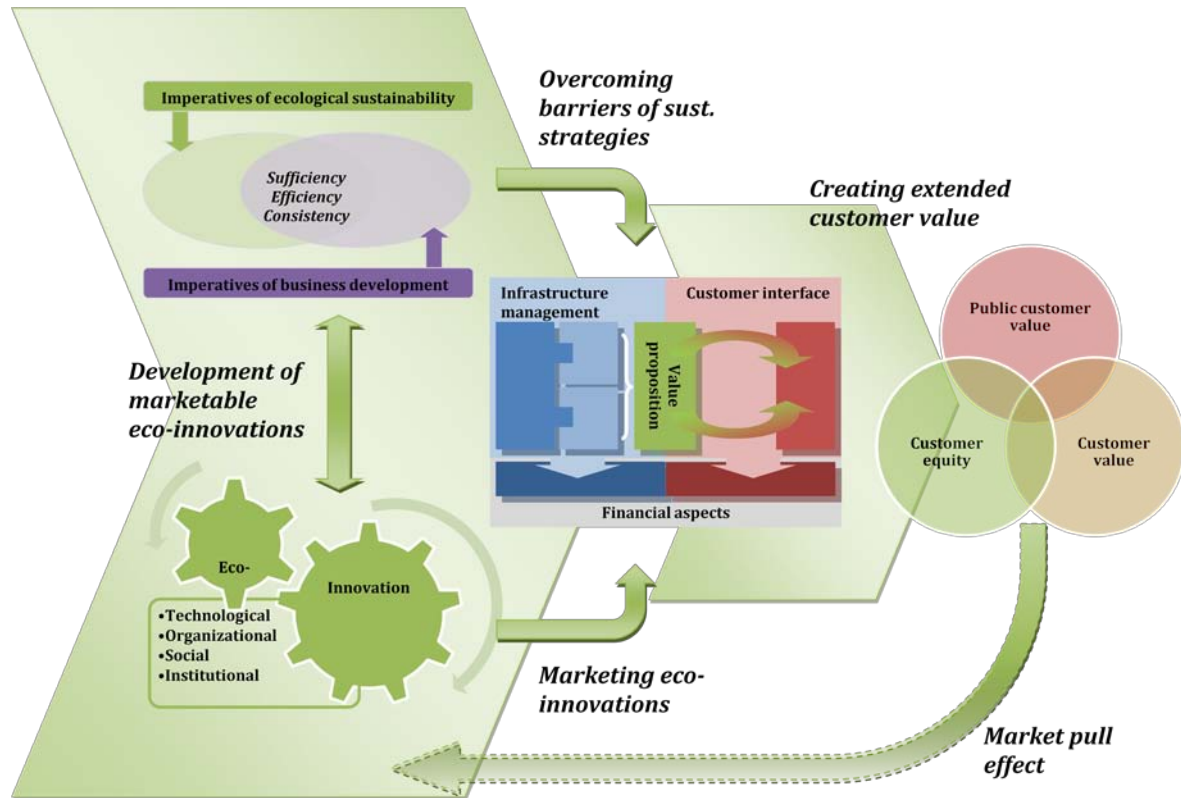


Figure 6: Conceptual framework of business model eco-innovation

Source: Own

According to this framework, research on business models for sustainability should at least work on the central questions that were raised in the preceding sections (see also *Table 5*):

- How can a business model ...
 - ... translate transformational sustainability strategies into business operations? (*Section 4.1*)
 - ... become a sustainability-oriented business model and thus an organizational eco-innovation? (*Section 4.2.3*)
 - ... offer competitive value propositions based on (combinations of) different classes of eco-innovations? (*Section 4.2.3* and *4.2.4*)
- What kinds of sustainable business models do exist in practice and (how) do they appropriate value from public benefits? (*Section 4.2.4*)

The main argument for such a research agenda is that it connects two young disciplines: business model research and strategic sustainability management (e.g. Carraher & Buckley, 2008; Parnell, 2008; Stead & Stead, 2000, 2004, 2008). Connecting these two fields in their early stages opens up mutual research and practice perspectives before thematic and methodological frictions can occur (as can be learned from the integration challenge of mainstream strategy and business model topics; e.g. Porter, 2001; Magretta, 2002; Wirtz 2010). Starting with sufficiency, efficiency and consistency design themes is thought to be an appropriate first step towards a research agenda for business models for sustainability (Lüdeke-Freund, 2009).

Table 5: Topics and questions for future research

Source: Own

<p>The next step should be to <i>combine theoretical perspectives with empirical research</i> that should help answering seminal questions:</p>
<p>How can contributions to sustainable development be defined and implemented by companies as they seek to develop new, more sustainable business models?</p> <p>What are the tasks of business model management in this context?</p> <p>...</p>
<p>Regarding the <i>redefinition of basic concepts such as value creation, competitive strategy and marketing</i>, central questions might be:</p>
<p>How to redefine the value creating logic and competitive advantage when competing on sustainable business models and business model eco-innovation?</p> <p>How to implement new interpretations of value and competitive advantage in practice?</p> <p>...</p>
<p>To <i>analyze individual cases</i> the research agenda has to include guiding questions which help focusing on individual features (cf. Halme et al., 2008):</p>
<p>What benefits can customers derive from value propositions, customer relationships and channels – added value for customers?</p> <p>What kind of competitive advantage does the business model offer to the focal firm?</p> <p>What partners, activities and further resources are needed to offer value propositions and create competitive advantage?</p> <p>How is the model financed?</p> <p>How do public benefits result from creating value for the company and its customers and vice versa?</p> <p>...</p>

6 Summary and Conclusion

This paper follows a theoretical, deductive approach towards business models in contexts of corporate sustainability with an emphasis on eco-innovation and value creation. A conceptual framework is developed that combines transformational sustainability strategies, eco-innovation, the role of business models and pivotal ideas about value creation with regard to discrepancies between private and public benefits from business activities. Business model innovation is discussed as third essential driver of eco-innovation besides technological progress and market regulation. Starting with sufficiency, efficiency and consistency strategies and barriers to their realization helps identifying primary challenges of business model management and is assumed to be the obvious first step towards a broader research agenda on business models for sustainability. The literature review shows that the state-of-the-art is far from offering such an agenda.

The framework includes definitions such as business model eco-innovation and extended customer value as well as propositions about how these concepts interrelate. Thus, it allows for developing further theoretical and empirical research questions. A business model that creates competitive advantage through superior customer value *and* contributes to a sustainable development of the company *and* society can be interpreted as a sustainable business model and an organizational eco-innovation. Since customer value is the strategic nexus of any business model, sustainable business models are crucial for creating extended customer value for individual customers and society, i.e. private and public benefits.

The title of this article mentions a framework *of* and not *for* business models for sustainability. For one reason: *Section 5* proposes a conceptual frame to identify main topics and questions for further inquiry, but not a 'one fits all approach' to designing sustainable business models. Like business strategies, business models cannot be bought off the peg. That is, whether a business model is sustainable or not will always depend on individual circumstances. Consequently, academic contributions are limited to developing theoretical ideas about what can be identified in literature or practical cases and what might be missing in general. The proposed framework addresses the latter case. It can be used to identify central issues of identifying, understanding and supporting sustainable business models. That is, the concepts discussed in *Sections 3 and 4* as well as the framework in *Section 5* are meant to be steps towards systematic research on business models and their contributions to the main challenge of sustainable entrepreneurs and sustainability managers, which is realizing business cases for sustainability.

References

Afuah, A. (2004). Business models. A strategic management approach. Boston: McGraw-Hill/Irwin.

- Baden-Fuller, C. & Morgan, M. (2010). Business models as models. *Long Range Planning*, 43(2/3), 156–171.
- Ballon, P. (2007). Business modelling revisited: the configuration of control and value. *The Journal of Policy, Regulation and Strategy for Telecommunications, Information and Media*, 9(5), 6–19.
- Bartelmus, P., Moll, S., Bringezu, S., Nowak, S. & Bleischwitz, R. (2004). Translating sustainable development into practice: a 'patchwork' of some new concepts and an introduction to material flows analysis. In R. Bleischwitz, P. Hennicke (Ed.), *Eco-efficiency, regulation and sustainable business* (pp. 1–38). Cheltenham: Edward Elgar.
- Belz, C. & Bieger, T. (2006). *Customer Value: Kundenvorteile schaffen Unternehmensvorteile [Customer value creates corporate value]*. 2nd edition. St. Gallen: Thexis.
- Birkin, F., Cashman, A., Koh, S. & Liu, Z. (2009a). New sustainable business models in China. *Business Strategy and the Environment*, 18(1), 64–77.
- Birkin, F., Polesie, T. & Lewis, L. (2009b). A new business model for sustainable development: an exploratory study using the theory of constraints in Nordic organizations. *Business Strategy and the Environment*, 18(5), 277–290.
- Bleischwitz, R. (2004). Towards a new kind of technological progress. In R. Bleischwitz, P. Hennicke (Ed.), *Eco-efficiency, regulation and sustainable business* (pp. 39–55). Cheltenham: Edward Elgar.
- Bowman, E. & Haire Mason (1975). A strategic posture toward corporate social responsibility. *California Management Review*, 18(2), 49–58.
- Caroll, A. & Shabana, K. (2010). The business case for corporate social responsibility: a review of concepts, research and practice. *International Journal of Management Reviews*, 12(1), 85–105.
- Carraher, S. & Buckley, M. (2008). Research challenges in sustainable strategic management: change and sustainability. *International Journal of Sustainable Strategic Management*, 1(1), 2–15.
- Chesbrough, H. (2007). Business model innovation: it's not just about technology anymore. *Strategy & Leadership*, 35(6), 12–17.
- Chesbrough, H. (2010). Business model innovation: opportunities and barriers. *Long Range Planning*, 43(2/3), 354–363.
- Chesbrough, H. & Rosenbloom, R. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial & Corporate Change*, 11(3), 529–555.
- Coase, R. (1960). The Problem of Social Cost. *Journal of Law and Economics*, 3(October), 1–44.
- Dovi, V., Friedler, F., Huisingh, D. & Jirí, J. (2009). Cleaner energy for sustainable future. *Journal of Cleaner Production*, 17(10), 889–895.
- Dyllick, T. & Hockerts, K. (2002). Beyond the Business Case for Corporate Sustainability. *Business Strategy and the Environment*, 11(2), 130–141.

- Elkington, J. (2004). Enter the triple bottom line. In A. Henriques, J. Richardson (Ed.), *The triple bottom line, does it all add up?* (pp. 1–16). London: Earthscan.
- Halme, M., Anttonen, M. & Kuisma, M. (2008). Exploration of business models for material efficiency services. In R. Wüstenhagen, J. Hamschmidt, S. Sharma, M. Starik (Ed.), *Sustainable innovation and entrepreneurship* (pp. 71–96). Cheltenham: Edward Elgar.
- Hamel, G. (2000). *Leading the Revolution*. Boston, MA: Harvard Business School Press.
- Hart, S. & Milstein, M. (1999). Global sustainability and the creative destruction of industries. *Sloan Management Review*, 41(1), 23–33.
- Herzig, C. & Schaltegger, S. (2009). *Wie managen deutsche Unternehmen Nachhaltigkeit? [How do German companies manage sustainability?]*. Lüneburg: Centre for Sustainability Management.
- Holliday, C., Schmidheiny, S. & Watts, P. (2002). *Walking the talk. The business case for sustainable development*. Sheffield: Greenleaf.
- Huber, J. (1995). Nachhaltige Entwicklung durch Suffizienz, Effizienz und Konsistenz [Sustainable development through sufficiency, efficiency and consistency]. In P. Fritz, J. Huber, H. Levi (Ed.), *Nachhaltigkeit in naturwissenschaftlicher und sozialwissenschaftlicher Perspektive [Sustainability from natural and social science perspectives]* (pp. 31–46). Stuttgart: S. Hirzel.
- Huber, J. (2000). Towards industrial ecology: sustainable development as a concept of ecological modernization. *Journal of Environmental Policy & Planning*, 2(4), 269–285.
- Johnson, M. (2010). *Seizing the white space. Business model innovation for growth and renewal*. Boston, MA: Harvard Business Press.
- Johnson, M. & Suskewicz, J. (2009). How to jump-start the clean tech economy. *Harvard Business Review*, 87(11), 52–60.
- Johnson, M., Christensen, C. & Kagermann, H. (2008). Reinventing your business model. *Harvard Business Review*, 86(12), 50–59.
- Linz, M. (2004). Weder Mangel noch Übermaß: Über Suffizienz und Suffizienzforschung [Neither scarcity nor affluence: on sufficiency and sufficiency research]. *Wuppertal Papers*, No.145. Wuppertal: Wuppertal Institut für Klima, Umwelt, Energie GmbH.
- Lüdeke-Freund, F. (2009). Business model concepts in corporate sustainability contexts. From rhetoric to a generic template for 'business models for sustainability'. Lüneburg: Centre for Sustainability Management.
- Magretta, J. (2002). Why Business Models Matter. *Harvard Business Review*, 80(5), 86–92.
- Meynhardt, T. (2009). Public value inside: what is public value creation? *International Journal of Public Administration*, 32(3/4), 192–219.
- Meynhardt, T. & Stock, R. (2009). Customer Value und Public Value. *Der Kundennutzen im Bauch der Gesellschaft [Customer value for the society]*. *Marketing Review* St. Gallen, (01-2009), 53–57.

- Mitchell, D. & Coles, C. (2004a). Business model innovation breakthrough moves. *Journal of Business Strategy*, 25(1), 16–26.
- Mitchell, D. & Coles, C. (2004b). Establishing a continuing business model innovation process. *Journal of Business Strategy*, 25(3), 39–49.
- Mitchell, D. & Coles, C. (2003). The ultimate competitive advantage of continuing business model innovation. *Journal of Business Strategy*, 24(5), 15–21.
- Osterwalder, A. (2004). The business model ontology. A proposition in a design science approach. Dissertation. Lausanne: Universite de Lausanne.
- Osterwalder, A. & Pigneur, Y. (2009). Business model generation. A handbook for visionaries, game changers, and challengers. Amsterdam: Modderman Drukkerwerk.
- Parnell, J. (2008). Sustainable strategic management: construct, parameters, research directions. *International Journal of Sustainable Strategic Management*, 1(1), 35–45.
- Polimeni, J., Mayumi, K., Giampietro, M. & Alcott, B. (2008). Jevons' Paradox and the myth of resource efficiency improvements. London: Earthscan.
- Porter, M. (2001). Strategy and the Internet. *Harvard Business Review*, 79(3), 63–78.
- Rennings, K. (2000). Redefining innovation - eco-innovation research and the contribution from ecological economics. *Ecological Economics*, 32(2), 319–332.
- Schaltegger, S. & Burritt, R. (2005). Corporate Sustainability. In H. Folmer, T. Tietenberg (Ed.), *International Yearbook of Environmental and Resource Economics 2005/2006* (pp. 185–222). Cheltenham: Edward Elgar.
- Schaltegger, S., Burritt, R. & Petersen, H. (2003). An introduction to corporate environmental management. *Striving for sustainability*. Sheffield: Greenleaf.
- Schaltegger, S. & Lüdeke-Freund, F. (2009). Wie Nachhaltigkeit den Unternehmenserfolg steigert [How sustainability adds to business success]. *io new management* (09-2009), 12–15.
- Schaltegger, S. & Wagner, M. (2006). Managing and measuring the business case for sustainability. Capturing the relationship between sustainability performance, business competitiveness and economic performance. In S. Schaltegger, M. Wagner (Ed.), *Managing the business case for sustainability* (pp. 1–27). Sheffield: Greenleaf.
- Schaltegger, S. & Wagner, M. (2008). Types of sustainable entrepreneurship and the conditions for sustainability innovation. From the administration of technical challenge to the management of entrepreneurial opportunity. In R. Wüstenhagen, J. Hamschmidt, S. Sharma, M. Starik (Ed.), *Sustainable innovation and entrepreneurship* (pp. 27–48). Cheltenham: Edward Elgar.
- Schmidheiny, S. (1998). *Changing Course. A global business perspective on development and the environment*. 5th edition. Cambridge: MIT Press.
- Schmidt-Bleek, F. (2000). *Das MIPS-Konzept: Weniger Naturverbrauch, mehr Lebensqualität durch Faktor 10 [The MIPS concept - Factor 10]*. München: Knauer.

- Schoettl, J. & Lehmann-Ortega, L. (2010). Photovoltaic business models: threat or opportunity for utilities? In R. Wüstenhagen, R. Wuebker (Ed.), *Handbook of research on energy entrepreneurship* (forthcoming). Cheltenham: Edward Elgar Publishing Ltd.
- Shafer, S., Smith, H. & Linder, J. (2005). The power of business models. *Business Horizons*, 48(3), 199–207.
- Starke, L. & Mastny, L. (Ed.) (2010). *State of the world 2010: transforming cultures from consumerism to sustainability*. New York: Norton.
- Stead, J. & Stead, W. (2000). Eco-enterprise strategy: standing for sustainability. *Journal of Business Ethics*, 24(4), 313–329.
- Stead, J. & Stead, W. (2008). Sustainable strategic management: an evolutionary perspective. *International Journal of Sustainable Strategic Management*, 1(1), 62–81.
- Stead, W. & Stead, J. (2004). *Sustainable strategic management*. Armonk, NY: M.E. Sharpe Inc.
- Stubbs, W. & Cocklin, C. (2008). Conceptualizing a 'sustainability business model'. *Organization & Environment*, 21(2), 103–127.
- Schweizer, L. (2005). Concept and evolution of business models. *Journal of General Management*, 31(2), 37–56.
- Teece, D. (2010). Business models, business strategy and innovation. *Long Range Planning*, 43(2/3), 172–194.
- Tukker, A., Emmert, S., Charter, M., Vezzoli, C., Sto, E., Andersen, M., Geerken, T., Tischner, U. & Lahlou, S. (2008). Fostering change to sustainable consumption and production: an evidence based view. *Journal of Cleaner Production*, 16(11), 1218–1225.
- Tukker, A. & Tischner, U. (Ed.) (2006). *New business for old Europe. Product-service development, competitiveness and sustainability*. Sheffield: Greenleaf.
- Weizsäcker, E. von, Hargroves, K., Smith, M., Desha, C. & Stasinopoulos, P. (2009). *Factor five: transforming the global economy through 80% improvements in resource productivity*. London: Earthscan.
- Weizsäcker, E. von, Lovins, A. & Lovins, L. (1998). *Factor four: doubling wealth, halving resource use. A report to the Club of Rome*. London: Earthscan.
- Wells, P. (2008). Alternative business models for a sustainable automotive industry. In A. Tukker, M. Charter, C. Vezzoli, E. Stø, M. Andersen (Ed.), *Perspectives on radical changes to sustainable consumption and production*. Sheffield: Greenleaf.
- Wirtz, B. (2010). *Business Model Management. Design, Instrumente, Erfolgsfaktoren von Geschäftsmodellen [Design, instruments and success factors of business models]*. Wiesbaden: Gabler.
- World Commission on Environmental Development (WCED) (1987). *Our Common Future*. Oxford: Oxford University Press.

Wüstenhagen, R. & Boehnke, J. (2008). Business models for sustainable energy. In A. Tukker, M. Charter, C. Vezzoli, E. Stø, M. Andersen (Ed.), *Perspectives on radical changes to sustainable consumption and production* (pp. 70–79). Sheffield: Greenleaf.

Zott, C. & Amit, R. (2007). Business model design and the performance of entrepreneurial firms. *Organization Science*, 18(2), 181–199.

Zott, C. & Amit, R. (2008). The fit between product market strategy and business model: implications for firm performance. *Strategic Management Journal*, 29(1), 1–26.

Zott, C. & Amit, R. (2010). Business model design: an activity system perspective. *Long Range Planning*, 43(2/3), 216–226.

ⁱ The semantic differences between ‘imperative’, ‘principle’, ‘rule’ or ‘strategy’ are not discussed in this article. Instead, the term ‘sustainability strategy’ is used in the sense of a normative rule for decision making with regard to a normative objective such as ecological sustainability.

ⁱⁱ The currently most comprehensive and systematic overview is Wirtz’ book on business model management (Wirtz 2010). Moreover, Long Range Planning published a special issue on latest business model research topics (2010, Vol. 43, No. 2/3) and an HBR collection on business model innovation was released (Harvard Business Press 2010).

ⁱⁱⁱ In its earlier version the ‘product pillar’ was central, including the offering (products and services) and the value proposition (Osterwalder 2004). In its later version the value proposition became the central pillar (Osterwalder & Pigneur 2009). This seems reasonable since business models’ job is to offer value propositions, i.e., sources of utility for customers. Concrete offerings, such as products and services, are interpreted as means to this end (Chesbrough 2007; Johnson et al. 2008; Johnson 2010).