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Identifying Systemic Leverage Points for Effective Sustainable Business Model Development

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Abstract

Purpose: This paper aims to apply a systems thinking perspective, specifically the system leverage point framework, to enhance the understanding for the effectiveness of sustainable business models in achieving systems change towards sustainability.

Design/Methodology/Approach: Conceptual paper, using an integrative research approach.

Findings: The conceptual analysis shows that the sustainable business model archetypes largely target shallow system leverage points, which are unlikely to achieve wide-ranging systems change. Therefore, a research agenda is developed around the deep leverage points for system change, to guide future research efforts in developing truly sustainable business models.

Practical Implications: The findings offer insights for both managers and policymakers on the effectiveness of different types of sustainable business models and how they can be improved to drive broader systems change.

Research Implications: The research agenda put forward focuses on the systemic root-causes of unsustainability and can guide scholarly efforts toward adopting a broader systems perspective on sustainable business model development as a potential solution.

Originality/Value: This paper provides insights into the ability of sustainable business models to generate sustainability outcomes through systems change, serving as a stepping stone for more effective sustainable business model development efforts.

Keywords Sustainable Business Models, System Leverage Points, Sustainability, Sustainable Business Model Development, Systems Thinking

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1. Introduction

With increasing recognition of humanity's infringement on planetary boundaries (Richardson et al., 2023) and rising social inequality (Chancel, Piketty, Saez, & Zucman, 2022) resulting from unsustainable production and consumption practices (Raworth, 2017), companies are embarking on a journey of change towards sustainability. Consequently, sustainable business models, sometimes referred to as business models for sustainability (Schaltegger, Lüdeke-Freund, & Hansen, 2016), has emerged as a an alternative to traditional business models. Sustainable business models goes beyond the consideration of mere economic factors, and aims to integrate social and environmental dimensions into the traditional business model perspective (Bocken, Short, Rana, & Evans, 2014). Hence, a sustainable business model aims to broaden the view of business and business models as integrated in a social context and immersed in the ecological environment (e.g. Stubbs & Cocklin, 2008). The sustainable business model concept has gained traction in both practice and across academic disciplines, aiming to provide a new framework for creating and delivering sustainable value to a broader range of stakeholders.

Sustainable Business Models typically draw on the triple-bottom-line logic of value creation, meaning that business should aim to simultaneously create social, environmental, and economic value (Bocken et al., 2014; Elkington, 1994). The triple-bottom-line win-win logic of simultaneous value creation has developed from being a component of sustainability reporting in sustainable business models (Stubbs & Cocklin, 2008), to being viewed as a defining characteristic of sustainability in sustainable business models (e.g. Boons & Lüdeke-Freund, 2013; Schaltegger et al., 2016). This is also reflected in most definitions of sustainable business models, such as the commonly used formal definition put forward by Schaltegger et al. (2016, p. 4):

"*A business model for sustainability helps describing, analyzing, managing, and communicating (i) a company's sustainable value proposition to its customers and all other stakeholders, (ii) how it creates and delivers this value, (iii) and how it captures economic value while maintaining or regenerating natural, social and economic capital beyond its organizational boundaries*."

Based on the definition, the distinguishing part between a traditional business model and a sustainable business model is the "sustainable value proposition and the "*maintaining or regenerating natural, social and economic capital beyond its organizational boundaries*" (Schaltegger et al., 2016, p. 4). Therefore, moving from a traditional business model to a sustainable business model requires a business model change that reduces or maintains negative social and environmental impact, or that generates positive impact for broader society or the environment (Boons & Lüdeke-Freund, 2013). The triple-bottom-line logic identifies the three value forms that ought to be balanced in a sustainable business model, and they are also used as the foundation for the sustainable business model archetypes, which represents solutions and mechanisms for sustainable business model development (Bocken et al., 2014).

However, research shows that simultaneous prioritization all three value-forms seems to be a challenge for companies (e.g. Evans et al., 2017). Fehrer and Wieland (2020) claim that a deep-rooted overemphasis on economic goals still trumps the prioritization of social and environmental value within businesses. Similarly, other studies show that the value created in sustainable business models tends to be skewed in one direction (Lüdeke-Freund, Carroux, Joyce, Massa, & Breuer, 2018), and fail to achieve a balanced prioritization of all three value forms (Alonso-Martinez, De Marchi, & Di Maria, 2021). Hence, supporting the claim that trade-offs, rather than win-win simultaneity, is more often the rule than the exception (Hahn, Figge, Pinkse, & Preuss, 2010). These findings demonstrate a disconnect between the theoretical foundation of sustainable business models that proclaim a simultaneous balancing of social, environmental and economic value creation, and the practical complexity of implementing such a practice.

In fact, little is known about the effectiveness of sustainable business models in achieving sustainability outcomes or driving the fundamental change needed to address sustainability challenges (Alonso-Martinez et al., 2021; Bocken et al., 2014). According to Lüdeke-Freund et al. (2018) sustainable business models predominantly hold hypothetical foundations, while Bocken and Short (2021) point out that they still lack demonstrated sustainability results. When Ritala, Huotari, Bocken, Albareda, and Puumalainen (2018) studied the presence of sustainable business models, specifically the sustainable business model archetypes, in S&P 500 firms, they found that they already were present in several of the companies on the list. However, the authors also remark that they seemed to mainly entail weak sustainability initiatives, such as efficiency improvements and picking low hanging fruit. Companies tend to prioritize efficiency initiatives as they align with the triple-bottom-line's win-win requirements, generating cost-savings while lowering environmental impact. However, their ability to lead to "true sustainability" has been questioned. For example, Ehrenfeld (2004) argues that win-win initiatives will, at best, slow down environmental degradation and social inequalities, making business less *un*sustainable, yet not sustainable by any definition of the term. Bocken et al. (2014) claim that such eco-efficiency initiatives have long been part of the industrial agenda without demonstrated results, and instead highlight a need for holistic changes to achieve long-term social and environmental sustainability. Thus, there is a need to better understand the actual sustainability implications of sustainable business models.

To develop such a holistic understanding of sustainable business models and their ability to achieve sustainability, systems thinking has been put forward as a potential avenue (e.g. Fehrer & Wieland, 2020; Ritala, Albareda, & Bocken, 2021; Waddock, 2020). The systemic view on business activities has been latently present in the business model literature since its beginning (Petrovic, Kittl, & Teksten, 2001). More recently, emphasis has been placed on the inherently systemic nature of the business model concept (e.g. Foss & Saebi, 2018; Massa, Gianluigi, & Tucci, 2018) and the potential contribution of systems thinking for sustainability perspectives on business models (Fehrer & Wieland, 2020). A system can be defined as a set of interrelated elements organized to serve a particular function or seek a particular goal, which gives rise to its own pattern of behavior over time (Meadows, 2008). The systems perspective allows for a broader perspective on value creation, beyond a focal company, to acknowledge the dynamic interactions between nested systems, such as a company and its environment. It, thereby, entails the

recognition of how a company or a business models is interdependent on other systems, including the impact generated on the environment and society writ large (Fehrer & Wieland, 2020). Hence, resonating with the definition of sustainable business models as creating impact beyond its organizational boundaries, i.e. for the broader system (Schaltegger et al., 2016).

However, despite the sporadic presence of a systems perspective in business model literature (Stubbs & Cocklin, 2008; Zott, Amit, & Massa, 2011), critical voices have been repeatedly raised regarding a lack of rigorous application of the foundational pillars of systems thinking as a school of thought (e.g. Dentoni, Pinkse, & Lubberink, 2021; Fehrer & Wieland, 2020). Therefore, this paper aims to address recent calls to develop a better understanding of the effectiveness of sustainable business models in achieving sustainability (e.g.Alonso-Martinez et al., 2021; Lüdeke-Freund et al., 2018) by applying a systems perspective, specifically the system leverage point framework (Meadows, 1999).

In systems thinking, the concept of systemic leverage points is used to understand effectiveness to trigger systemic change. In other words, system leverage points are used for identifying mechanisms and effective places to intervene in a system to create fundamental systems change (Meadows, 1999). The system leverage point framework has gain traction in recent literature as a tool for evaluating the viability of sustainability initiatives (e.g. Abson et al., 2017). Despite the growing recognition of the potential of applying a systems perspective and increasing calls for sustainability assessments of sustainable business models (Bhatnagar, Keskin, Kirkels, Romme, & Huijben, 2022; Fichter, Lüdeke-Freund, Schaltegger, & Schillebeeckx, 2022), the two streams of literature have yet to be systematically integrated to understand the potential of sustainable business models in delivering significant systems change for sustainability. Therefore, this article poses the following research question; What is the ability of sustainable business models to trigger systems change?

To answer the research question, an integrative research approach is used. The integrative research approach goes beyond the synthesizing objective of a literature review, and aims to bridge perspectives between research fields to further knowledge development (Snyder, 2019; Torraco, 2005). In an integrative research approach, the purpose is not to cover all research published on a topic, but rather to combine two theoretical perspectives (Snyder, 2019). The process is similar to what Jaakkola (2020) refers to as theory adaptation, where one literature stream is used to inform another, and the researchers' own discretion guides the literature selection rather than a more systematic approach (Snyder, 2019; Jaakkola, 2020). Lukka and Vinnari (2014) referrers to the informative literature stream as method theory, which furthers the development of a domain theory, in this case sustainable business models.

In this paper, the system leverage point framework developed by Meadows (1999) is used as the informative method theory to further the development of effective sustainable business models. To represent sustainable business model initiatives, the sustainable business model archetypes are used. The archetypes are a well disseminated aggregation of current sustainable business model solutions and mechanisms, derived from literature as well as practice (e.g. Bocken et al., 2014). The system leverage point framework (Meadows, 1999) is applied as a analytic lens to understand the potential leverage of each sustainable business model archetype in creating systems change, and

thereby effectively achieving sustainability outcomes. The conceptual analysis results in a research agenda that specifically targets the so-called “deep” leverage points for systems change (Meadows, 1999) to guide future research towards high-leverage sustainable business model development. The research agenda broadens the perspective on sustainable business models to situate them and their potential leverage in a wider societal context, beyond the business model of a single corporate actor.

The remainder of this paper proceeds as follows. First, a brief background is provided on sustainable business models and the sustainable business model archetypes. Second, the system leverage point framework is presented and contextualized in the broader systems thinking literature. Third, insights from the conceptual analysis are presented in terms of leverage points targeted by each sustainable business model archetype. Finally, future research areas are outlined centered around the “deep” leverage points for system change.

2. Sustainable Business Models

The business model concept is typically defined as depicting how a company creates, delivers, and captures value (Teece, 2010), or as consisting of three elements: a value proposition, value creation and delivery, and value capture (Bocken et al., 2014). Although the concept of business models is still considered to be equivocal, it can be understood as a formal, conceptual representation of how a business function (Massa, Tucci, & Afuah, 2017). More recently, the concept of sustainability has become a significant part of the discussion on business models, reflecting the growing challenges of climate change and the surpassing of other planetary boundaries (Lüdeke-Freund, Gold, & Bocken, 2018; Rockström et al., 2009). In contrast to traditional business models, where the focus is on how the value proposition can enable a company to capture economic value for its own gain, sustainable business models emphasize the simultaneous creation of social, environmental, and economic value for a broader range of stakeholders, including the ecological environment (Schaltegger et al., 2016).

Several efforts have been made to guide the development of sustainable business models. One of the most widely recognized is the categorization of sustainable business model solutions as archetypes (Bocken et al., 2014). Bocken et al. (2014) conducted a literature and a practice review that resulted in eight sustainable business model archetypes, which later became nine (Bocken, Weissbrod, & Tennant, 2016; Lüdeke-Freund, Massa, Bocken, Brent, & Musango, 2016). The nine archetypes represent mechanisms and solutions in sustainable business models, and are further grouped based on the type of major innovation it requires using a triple-bottom-line-based categorization: environmental, social, or economic innovation (Bocken et al., 2014; Lüdeke-Freund et al., 2016). The sustainable business model archetypes represent the shift required to achieve sustainability, and are described as portraying ideal types that can inspire companies to change their traditional business model towards a sustainable one. The archetypes are presented in Table 1 below.

Archetype	Examples	Type of Innovation
1. Maximize material and energy efficiency	Low-carbon solutions, lean manufacturing, dematerialization	Environmental
2. Create value from 'waste'	Circular economy, closing resource loops, recycle, reuse	
3. Substitute with renewables and natural processes	Renewable energy sources, slow manufacturing	
4. Deliver functionality, rather than ownership	Product-Service Systems (PSS)	Social
5. Adopt a stewardship role	Ethical trade, biodiversity protection, radical transparency	
6. Encourage sufficiency	Customer education, product longevity, slow fashion	
7. Repurpose the business for society/environment	Not for profit, hybrid businesses, alternative ownership	Economic
8. Inclusive value creation	Collaborative approaches, peer-to-peer sharing, inclusivity	
9. Develop scale-up solutions	Incubators, open innovation, impact investing, crowdfunding	

Table 1. The sustainable business model archetypes based on Bocken et al. (2014) and Lüdeke-Freund et al. (2016)

One of the follow-up studies conducted by Ritala et al. (2018) used the archetype framework to understand the prevalence of different types of sustainable business model innovation in S&P 500 companies. The authors conclude that a vast majority, more than three-quarters of the companies, engage in environmentally-oriented business model innovation, consistent of the three archetypes of maximizing material and energy efficiency, creating value from 'waste,' and substituting with renewables and natural processes. These types of innovations are all connected to the circular economy and circular business model, where the sustainability problem is seem as one of linearity, and the solution as narrowing, slowing, and closing resource loops (Bocken, De Pauw, Bakker, & Van Der Grinten, 2016). Yet, the effectiveness of these sustainable business model solutions in catalyzing widespread systems change towards sustainability remains uncertain.

3. Systems Thinking

Systems thinking has been put forward as a potential path for understanding the role and impact that companies have (e.g. Fehrer & Wieland, 2020; Meadows, 2008), by providing a broader and more dynamic perspective. Systems thinking is a transdisciplinary school of thought that allows for a "bigger-picture" understanding of a phenomenon, by focusing on the dynamic interrelationships between elements and the emergent properties it gives rise to (Abson et al., 2017). A system can be defined as a set of interrelated elements organized to serve a particular function or seek a particular goal, and which gives rise to its own pattern of behavior over time (Meadows, 2008). A systems perspective highlights the relationship between structure and behavior for a deeper understanding of the workings of a system, as well as the outcomes it generates. Although a system can be

driven by external forces, the response to these forces is determined by the systems' internal structure, which is characteristic for the system itself.

For sustainability issues, a systems perspective moves beyond the traditional reductionistic breakdown of a system into parts to be understood separately (Abson et al., 2017), towards a more interconnected and holistic view. In turn, it allows for a more complete understanding of a phenomena, particularly in the rapidly changing contexts of modern society (Meadows, 2008), providing the possibility to properly deal with the so-called "wicked problems" humanity is facing (Buchanan, 1992). Therefore, sustainability and systems thinking has had an intricate connection since the origins of sustainability science (Meadows, Randers, & Meadows, 2004). Using a systems perspective, Daly (1990) defines sustainability as an overextraction of resources beyond the levels of which they can regenerate, coupled with pollution-levels above the level of which they can be rendered harmless. These, in turn, make up the bulk of the identified environmental planetary boundaries, together with the vital role of biodiversity (Rockström et al., 2009). Environmental sustainability has also been intricately linked to the sustainability of social systems, recognizing the basic prerequisites of equality and human well-being (Broman & Robèrt, 2017; Raworth, 2017). As these are all macro-level phenomena, sustainability can only be properly assessed at a planetary whole-system level. Therefore, any micro- or meso-level understanding of sustainability, such as the sustainability of a company or a particular business model, must be assessed in terms of how it contributes to the macro-level sustainability boundaries, or be assessed in relation to the impact generated by another company or business models. What can also be assessed on a business model level is their ability to trigger to systemic change towards sustainability, which is precisely the aim of this paper. A framework used within systems thinking to assess the potentiality for systems change, is the systems leverage point framework.

3.1 System Leverage Points

Sustainable business models aim to provide solutions and tools for transitioning from unsustainable business models to, what is referred to as, sustainable business models (Bocken et al., 2014; Bocken & Short, 2021). Hence, some form of intervention is required to create change (Midgley, 2000). One way of approaching such interventions in systems thinking is by identifying and tapping into system leverage points. System leverage points are places in a complex system where a small change in one parameter can have significant effects on the system's outcome or behavior (Meadows, 2008). Leverage points are points of power, as identifying and shifting a leverage point yields significant changes in the system as a whole (Meadows, 1999). Although leverage points can be easily identifiable, they are not intuitive in the sense that they are often pushed in the wrong direction, worsening the problem that is trying to be solved (Meadows, 1999). Hence, the systems leverage points can inform and guide an intervention in a systems behavior, which is an important prerequisite for the design of high-leverage sustainable business models.

Meadows (1999) lists twelve leverage points as effective places to intervene in a system. Hence, they are classified based on their effectiveness in generating change in a systems behavior or outcome, where twelve is the least effective and one is the most effective. Besides effectiveness, the ease with which a lever can be changed is also taken into

consideration in the ranking. Abson et al. (2017) further categorized the leverage points based on their fundamental characteristics and the degree of change that they entail. The leverage points are presented in ascending order of effectiveness in Table 2, together with a brief description of each, as well as the categorization of characteristics made by Abson et al. (2017).

Leverage Points	Characteristic	Description	Degree of Change
12. Parameters such as subsidies, taxes, standards etc.	Parameters – relatively mechanistic	Numbers and how quickly they can be changed, often in relation to a stock. For example, decreasing corporate spending to regulate the stock of profit.	SHALLOW LEVERAGE POINTS
11. The size of buffers stock, relative to their flow		The size of the stock in comparison to the in and out flows. A larger stock stabilizes the system but makes the system slow and inflexible—for example, inventory size.	
10. The structure of material stocks and flows		Relates to the physical structure of the system and the nodes of intersection and flows. For example, if the bathtub hose suddenly turns on with hard pressure, or if it just dripples.	
9. The length of delays relative to the rate of system change	Feedback - the interaction between elements of the system	The timeliness of feedback or information regarding the system's current state, or feedback in relation to some goal, where delays can cause oscillations. For example, the release of pollutants, where delays in their effects can make it difficult to adjust or predict acceptable levels.	
8. The strength of negative (or balancing) feedback loops		Countering the flow of something to slow it down or stabilize it. For example, how the air conditioning in an office first kick in once the temperature in the room exceeds the target temperature.	
7. The gain around driving positive (reinforcing) feedback loops		The foundation of "more begets more" or "success to the successful". One example is the spreading of a virus; the more people infected, the more can pass it on, and so forth. They are the source of growth and exponential curves. If left unchecked, they will ultimately destroy the system or meet resistance from a balancing feedback loop.	
6. The structure of information flow	Design – social structures and institutions that govern parameters and feedback	Access to information that creates a completely new feedback loop. Missing information is a common reason for system malfunction. Consider nudging, where the provision of new information about, for example, a household's energy consumption in relation to their neighbors can be enough to decrease the energy usage dramatically. This is also connected to accountability - for example, placing an actor's water intake pipe directly where the wastewater outflow pipe is located.	DEEP LEVERAGE POINTS
5. The rules of the system		Relating to incentive structures, constraints, and punishments, which sets system boundaries. For example, the rule of law or standards, but also informal social agreements and norms.	
4. The power to add, change, and self-organize the system's structure		Built in flexibility that allows for emergence and diversity (i.e. the opposite to control), having the power to change any of the lower leverage points. Complex patterns can emerge from the simplest of rules when self-organization is allowed.	
3. The goal of the system	Intent – goals, values, world views, and mental models underpinning the emerging system	What the system is striving for, its objective function. Typically, less obvious than what can be spotted at first glance. For example, a company's goal may appear to be making profits; however, its ultimate objective is to grow and to "engulf" as much market share as possible.	
2. The mindset from which the system arises		The mindset sets the stage for what we consider fair, just, and desirable, as well as our beliefs about how the world works. Typically, these are overlooked because they are taken for granted, yet they form the paradigm in which we operate.	
1. The ability to transcend paradigms		This goes beyond merely shifting from one paradigm to another; it involves a complete detachment from any single paradigm. Recognizing that no worldview is certain or persistent is both enlightening and empowering, vastly expanding the range of possibilities.	

Table 2. The twelve leverage points based on Meadows (1999; 2008) and Abson et al. (2017)

It is important to note that although the leverage points are categorized separately, they can be entwined and span these artificial categories, as with any dynamic system. Deeper leverage points are considered powerful because they often entail ripple effects of changes in the shallower leverage points as well, while the effectiveness of shallow leverage points can vary depending on the possibility and extent to which they can be changed (Meadows, 1999). In other words, the leverage points can be more or less effective in triggering system-level change depending on the specific system in question. However, targeting deeper leverage points is generally a better strategy than adjusting shallow leverage points, which is likely to lead to small-scale, incremental changes. Regarding sustainability-related challenges, it is essential with wide-ranging change where root causes of unsustainability are targeted, in order to fundamentally shift the system in question (Ehrenfeld, 2004).

4. System Leverage Points Targeted by the Sustainable Business Model Archetypes

The conceptual analysis of the systemic leverage points targeted by each sustainable business model archetype shows that the majority of the sustainable business model archetypes (see Table 1) aim to turn down parameters related to material flows. In fact, five out of the nine archetypes are explicitly focused on using fewer resources (archetypes 1-4 and 6), while the 9th archetype aims to scale up these solutions, placing it in the same category. The remaining three archetypes, 5, 7, and 8, generally target higher leverage points, but their potential leverage also depends on how they are implemented. In the following section all the archetypes and how they relate to specific leverage points are discussed. Consider reviewing Table 2 for a more in-depth description of each leverage point.

4.1 Adjusting Parameters

Archetype 1, “Maximize material and energy efficiency”, aims to reduce environmental impact by increasing production efficiencies and diminish overall material and energy throughput. From a system perspective, it entails slowing down the flow of material and energy that goes into a production process and, thereby, creating environmental gains by more slowly draining the material or energy stocks in question. Archetype 2, “Create value from ‘waste’”, has similar environmental advantages, achieved by creating new material or energy input for the production process based on what was previously considered useless waste. Consider tires in the car industry. Traditionally, it was more cost-effective to use virgin materials for creating new tires, and old tires were therefore considered waste. As environmental ambitions have grown within the industry, several manufacturers now use material from old tires as input in the production process, making old tires valuable again and decreasing the need for virgin material - i.e. reducing the outflow from related material stocks. Reusing material in this way is referred to as “closing resource loops” and is the main characteristic of circular business models (Lüdeke-Freund et al., 2018). Archetype 3, “Substitute with renewables and natural processes”, is also focused on reducing material and energy usage, but by changing the resource or energy stock that input is drawn from, from a nonrenewable to a renewable one. For example, wood has increased in demand as it is a renewable resource and

therefore considered more sustainable than, for example, plastics derived from fossil fuels. All these archetypes require business model innovation in the environmental dimension according to the literature (e.g. Bocken et al., 2014), as they are focused on slowing down or reducing material and energy usage through mixed approaches. Hence, they all target leverage point twelve “adjusting parameters”, by adjusting amounts in relation to a stock, in this case, material and energy stocks.

The 4th archetype, “Deliver functionality, rather than ownership”, is also focused on reducing material flows, targeting the 12th leverage point. However, in this case, it is focused on the user phase instead of production, through business models that encourage sharing of material resources instead of private ownership, making it a social innovation (Bocken et al., 2014). Similarly, the 6th archetype, “Encourage sufficiency”, is also a social innovation where a business model aims to encourage customers to keep a product for a longer period of time or in other ways decrease consumption (Bocken & Short, 2016). Hence, leading to less products having to be made and, thereby, decreasing resource flows. Staying with the tire example, it could entail the use of alternative material inputs in the production of tires to improve product longevity, or communicating with customers about practices that prolong tire lifecycles, supporting active demand-management. As the archetypes above all aim to reduce material or energy usage, the assertion is that the flow of overall resource throughput in the economy will slow down due to their implementation. Resource usage is a major sustainability problem that pushes human impact on biophysical systems far beyond several of the planetary boundaries (Rockström et al., 2009). Consumerism has created a massive problem of make-use-dispose, which, as previously mentioned, is the main argument for implementing circular business models to reduce material flows (Fehrer & Wieland, 2020). In systems terms, the archetypes aim to adjust the faucet, that is, lowering the pace of draining planetary resource stocks or slowing down pollution streams.

Finally, the 9th archetype, “Develop scale-up solutions”, concerns scaling up and assisting in the propagation of business models with sustainability solutions (Bocken et al., 2014). The archetype is built on the premise that although larger companies can drive sustainability on scale, start-ups can provide the more radical solutions that require an opportunity to scale. Giving smaller businesses the opportunity to grow and gain market shares is often considered a fundamental pillar of the capitalistic economy, as well as the process of creative destruction (Metcalfe, 2002). As previously discussed, sustainable business models are built on a triple-bottom-line logic of value creation where environmental and social benefit should go hand-in-hand with private economic benefit (e.g. Boons & Lüdeke-Freund, 2013; Schaltegger et al., 2016). However, research on scaling up startups shows that a paradox exists between sustainability performance and business performance (Leendertse, van Rijnsoever, & Eveleens, 2021). In other words, the predictors of strong climate performance usually entail a poorer predicted business performance, and vice versa. As the key criteria for investments in startups is typically the potential for return on investment i.e. business performance, this means that start-ups with a potential for strong business performance are favored over the ones with a strong climate or sustainability performance. Furthermore, since start-ups heavily depend on financial support and investments, they are incentivized to prioritize business performance at the expense of social and environmental impact (Lammers, Rashid, Kratzer, & Voinov, 2022), diminishing the potential sustainability impact of the business

model. This means that although archetype 9 aims to scale up sustainable business models to increase their sustainability impact, the actual scaling of a business model instead seems to result in a loss of sustainability impact. This is further supported the fact that the sustainable business model archetypes, in general, tend to yield low sustainability performance due to the prioritization of economic performance (Alonso-Martinez et al., 2021). Therefore, the 9th archetype is also likely to merely entail an adjustment of parameters (leverage point 12), as research show that it carries low potential for sustainability impact and systems change.

The 12th leverage point, which all these archetypes target, is considered a "shallow" leverage point, likely to only bring about small-scale, incremental improvements. Although it is crucial to reduce the material and energy throughput, the 12th leverage point is the least effective leverage point, as directly targeting the reduction of material flows is unlikely to lead to vast system change (Meadows, 1999). Meadows (2008) describes how much of our attention typically goes to fiddling with parameters, but they are at the very end of the list of leverage points, as they typically involve only minor adjustments that rarely lead to change in the general system's behavior. Adjusting parameters can have a short-term effect, but they are usually designed to, or have evolved to, stay far out of the range of critical factors (Meadows, 1999).

From a sustainability perspective, the adjustment of parameters mainly concerns making efficiency improvements, also referred to as eco-efficiency. The fact that corporate sustainability initiatives are predominantly focused on eco-efficiency, meaning that companies aim to deliver more value to customers at a lower environmental cost, has long been maintained (e.g. Dyllick & Hockerts, 2002; Wells & Seitz, 2005). These technical improvements are particularly easy for companies to address, as they offer a mutually beneficial intervention. That is, it entails cost-savings for the company through more efficient use of resources and a reduced environmental impact due to a less resource-intensive production line. Hence, these are often referred to as win-win solutions. However, the promotion of win-win opportunities can fail to properly recognize and consider trade-offs (Hahn et al., 2010). Hahn et al. (2010) argue that trade-offs – i.e. situations where social, environmental, and economic value cannot be created simultaneously - are the rule rather than the exception in sustainability efforts within business. In this case, the win-win approach applied in sustainable business models, and particularly the efficiency-oriented archetypes, would entail an overarching risk of producing incremental improvements with weak sustainability outcomes. By simply focusing on sustainability issues that can be addressed in a win-win manner, companies will fail to implement solutions where trade-offs have to be made, and where financial gain must be compromised to create social or environmental value. Ultimately, leading to the picking of low-hanging fruit (Ritala et al., 2018) and the targeting of shallow leverage points for systems change.

An additional problem with the efficiency improvements, is the so-called rebound effect. The rebound effect shows that when a technological improvement reduces the resource intensity of production, it lowers production costs, which leads to a price reduction, which ultimately increases the consumption of the good (Binswanger, 2001). In other words, actors tend to offset the positive environmental effects by consuming more of that good (Binswanger, 2001), making the system-level environmental impact remain unchanged. This is not to argue that such technical improvements are not needed, but to

emphasize that the potential behavioral and systemic consequences of such improvements might be adverse. It further demonstrated how a systems perspective is a prerequisite to understand the broader ramifications of corporate sustainability initiatives.

4.2 Implementation Contingencies

The remaining three archetypes, namely archetypes 5, 7, and 8, do not strictly target one specific leverage point. Instead, their potential leverage depends on how they are implemented. For example, archetype 7, "Repurposing the business for society/environment", is described by Bocken et al. (2014) as shifting from shareholder value maximization through profit generation to a purpose focused on social and environmental benefits. As the archetype aims to repurpose business for society or the environment, it could be connected to changing the actual goal of the system (leverage point 3), which is considered a deep leverage point for systems change (Abson et al., 2017). Although it sounds promising, a repurposing of business for society and the environment is likely to experience implementation difficulties given how the profit-motive is connected to higher-level system objectives such as the growth imperative (Schneider, 2020). In other words, the incentive structure in which the company is embedded is built on the premise of profit-maximization, which was also demonstrated in the example of scaling up startups. Hence, the validity of a business model tend to be evaluated in terms of growth and profit, and the market rewards thereafter in terms of investment and scaling opportunities. In fact, Bocken et al. (2014) recognize that implementing this archetype in a non-profit corporate form may not be well-matched for long-term business operations – i.e. viability.

Several examples in practice can also be found of leaders and companies that has tried to a repurposing strategy and failed due to the dynamics described above. One such example is Patagonia, which has long taken sustainability seriously. The company tried to move away from the goal of profit-maximization and growth, but they had to abolish the endeavor due to their global presence and market constrains (Khmara & Kronenberg, 2018). Hence, the sustainable business model archetype of repurposing the business for society and the environment tends to take a narrower form, perhaps even merely changing the mission statement while leaving the realized goal of the company as a system unchanged. Therefore, despite its potential, archetype 7 mainly target leverage point 7 "the gain around driving positive (reinforcing) feedback loops". This means that, at best, it weakens the gains associated with a strong pursuit of profit as an end-goal, by hybrid or social enterprise models. In sum, the archetype carries higher leverage for systems change than the previous archetypes discussed, yet it is still a "shallow" leverage point for systems change (Meadows, 1999).

The two archetypes "adopting a stewardship role" (5) and "inclusive value creation" (8) both emphasize moral responsibility and diversity (Bocken et al., 2014), making them closely connected to corporate social responsibility (CSR) and a stakeholder view. Recognizing a company's impact on its broader network of stakeholders and incorporating their voices into business decision-making processes can enable fairer value creation for a wider range of stakeholders. However, it is unlikely to lead to any drastic system change as long as it is limited to voluntary action by companies (Schneider, 2020). As described by Schneider (2020), the use of CSR in a capitalistic

system will merely deepen the pathologies associated with the unsustainable predicament. Therefore, to have a real impact, the focus must lie on generating change on a systems-level. To enable a systems transition, archetype 5 and 7 must carry a significant leaver for change by, for example, allocating real decision-making power to the broader stakeholder network (Meadows, 2008). As long as decisions are made behind closed doors by a small group of corporate leaders, it will only lead to minor adjustments that are aligned with the traditionally dominant interests of corporate leaders and shareholders (Sjåfjell, Johnston, Anker-Sørensen, & Millon, 2015). The legitimization of focusing solely on a single top-tier stakeholder group have created game-theoretical traps that characterize the unsustainable predicament, where short-term competitive market dynamics constrain the consideration of the long-term interests of a broader stakeholder group (Bunzl, 2018). Until these skewed incentive structures in the macro-system are resolved, the two archetypes are unlikely to lead to significant changes to "business-as-usual", as they continue to rely on the benevolence of a small group of corporate leaders. Therefore, both archetypes target the 8th leverage point, "the strength of negative, or balancing, feedback loops," as they carry the potential to strengthen the balancing loop that counteracts harmful corporate outcomes. As a result, harmful corporate behavior might be diminished and balanced out by positive corporate initiatives (from archetype 5 "taking a stewardship role") or by including the voices of previously marginalized groups (from archetype 8 "inclusive value creation"). However, they remain low in leverage as they are unlikely to lead to any major systems change in the transition towards sustainability.

5. Developing Sustainable Business Models Targeting Deep Leverage Points: A Research Agenda

Understanding the ability of sustainable business models to trigger systems change is an essential step for the development of well-targeted business model solutions. Hence, the main contribution of the paper has been devoted towards this end. Nevertheless, the conceptual analysis highlighted a gap in the literature as the sustainable business model archetypes mainly target shallow leverage points, which are unlikely to lead to large-scale systems change. Hence, the final part of the paper will be dedicated to identifying future research areas aimed at addressing the gap. To further the development of high-leverage sustainable business models, the so-called "deep" leverage points for systems change are used to guide a research agenda. All six deep leverage points are discussed in ascending order of effectiveness. In conclusion, the research areas are summarized in a table along with related research questions to be addressed by future research.

5.1 The structure of information flow

The structure of information flow, leverage point 6, involves the addition of new feedback loops containing contextually vital information. Timely and accurate information is essential for decision making, and clear information regarding sustainability outcomes is essential for recognizing the wide-spanning impact of business activities (Meadows, 2008). As Meadows (2008, p. 157) puts it "missing information flows are one of the most common causes of system malfunction." To fully understand the significance of information flows, consider the example of electric versus combustion engine vehicles,

which has received much attention and divided conclusions. The apparent advantage with electric vehicles is that they do not run on non-renewable fossil fuels and, therefore, do not produce tailpipe emissions compared to combustion engine cars. However, an environmental concern arose in terms of the manufacturing of the batteries that powers the cars, and the mining of battery materials. Aside from often being nonrenewable and scare, these materials also carry the potential of supply-chain and end-of-life pollution, as well as social concerns regarding the mining process. To create clear and concise inform regarding the total impact generated, Carbon Brief conducted a study where electric vehicles were compared with traditional combustion-engine cars to determine the compiled environmental impact generated (Hausfather, 2019). The environmental impact of electric cars compared to combustion engine vehicles was found to depend largely on the sourcing of materials, as well as the energy used in the manufacturing process and when charging the car (Hausfather, 2019). However, the study concluded that all the electric vehicles fell below the environmental impact of traditional combustion engine cars, even those with the dirtiest manufacturing and charging processes (Hausfather, 2019). Their findings were further confirmed by Knobloch et al. (2020) who found that in at least 95% of the cases, electric vehicles entailed fewer carbon emissions.

These studies provide clearer information showing that electric vehicles are *more* sustainable than combustion engine cars, as they generally have a smaller environmental impact. Yet, it does not necessarily mean that electric vehicles are *sustainable*, as it depends on what transportation option they are compared with and at what scale they are being manufactured. From a sustainable business model perspective, and based on the definition of sustainable business models provided by Schaltegger et al. (2016), electric vehicles would be considered as a sustainable business model. In fact, given the definition, the business model does not even have to *regenerate* or *reduce* its environmental or social impact; it would be enough to simply *maintain* it at the current level of harm. Nevertheless, the production and consumption of vehicles, electric or not, seems to already be outside the carrying capacity of our planet (Casals, García, Aguesse, & Iturrondobeitia, 2017; Rockström et al., 2009; Ziyadi, Ozer, Kang, & Al-Qadi, 2018). Hence, the framework used for the assessment of the sustainability of a business model is a fundamental prerequisite for clear information flows.

From a systems perspective, ecological sustainability can be evaluated by assessing whether the natural resources used are consumed at or below the regenerative rate for renewable resources, or at a rate that allows for the development of a renewable substitute for nonrenewable resources (Goodland & Daly, 1996). To be considered sustainable, pollutants such as carbon dioxide (C02) can only be emitted below the rate at which they can be absorbed or rendered harmless (Goodland & Daly, 1996). Although this definition might seem straightforward, and the planetary carrying capacity can be quantified in most cases (Steffen et al., 2015), the assessment becomes significantly more complex by the fact that the production and consumption of vehicles represent just one system, interconnected with, and nested within, several other systems. Not to mention the social boundaries that also has to be taken into consideration in relation to these ecological boundaries (e.g. Missimer, Robèrt, & Broman, 2017a, 2017b). Therefore, obtaining accurate information on whether a business model is sustainable or not in a

zero-or-one manner is very difficult, if not impossible, explaining the tendency to settle for proxies of reduced or even maintained environmental impact. However, if society writ large is to be truly sustainable, it must be ensured that the aggregated consumption and production systems lie within the planet's carrying capacity (Steffen et al., 2015). Therefore, clear information that show each business models' share of social and environmental impact is an essential prerequisite for such a macro-level overview.

One way to develop such an understanding in sustainable business model research could be by adopting a contingency approach (Gregory & Jackson, 1992; Lawrence & Lorsch, 1967). From a contingency perspective, focus would lie on assessing the sustainability level of a particular business models in a specific context. Thus, instead of evaluating the sustainability level of groupings of business models, such as the sustainable business model archetypes, the actual sustainability level can vary significantly within one single category and depending on contextual factors. By developing a transparent understanding of the current unsustainability problem of a particular business model, the focal company can begin to develop more effective and targeted solutions. Furthermore, public and private actors focused on holding companies accountable for their sustainability impact, could then more easily identify and target problematic business model outcomes. Some assessment frameworks have already been developed, such as the framework for strategic sustainable development (FSSD) developed by Broman and Robèrt (2017). However, more research and collaboration is needed to find congruence in a unified way of assessing sustainability to create clear and comparable information. Such efforts would enable an understanding of where the lines of sustainability can more accurately drawn.

Research area 1: Exploring ways of providing clear information on the unsustainability problem of individual business models as a prerequisite for comparability of sustainability outcomes between business models.

5.2 The rules of the game

The rules of the game refer primarily to the rule of law, but it can also include social rules and norms (Meadows, 1999). Thereby, they are similar to the pillars of institutional theory, and the impact that formal and informal social structures have on the emergence of socio-economic systems and the outcomes thereof (Scott, 2014). From a business model perspective, the rules of the game comprise the incentive structure for a company, and much of the external environment to which it seeks to adapt. The rules set the frame for what is allowed and not allowed, as well as what corporate actors are encouraged or disincentivized to do. Companies must conform to rules not only to survive, but also to gain legitimacy (Scott, 2014). From a sustainability perspective, the rules of the game are important because they set boundaries for a company's responsibility. For example, in conceptualizing sustainable business models, Stubbs and Cocklin (2008) emphasize the need to incentivize good corporate behavior and punish bad outcomes, such as harmful environmental or social impact. They go on to propose a change in the tax system to reward sustainable corporate behavior by enforcing a internalization of previously externalized environmental and social costs, to level the competitive playing field for companies endeavoring to adopt sustainable business models. For such a change to be a high-leverage point, it would have to move beyond a slight change in parameters, such as adding a CO2 tax. Instead, it would need to radically change the rules of the corporate

game and make it competitive to be sustainable, as it is currently not. Companies that take a strong sustainability approach usually either occupy a market niche (Bunzl, 2018) or sustainability is only considered when the market is good and profit margins are high (Wright & Nyberg, 2017). Otherwise, current sustainability efforts tend to be weak (Ritala et al., 2018) and sometimes merely greenwashing (Bowen & Aragon-Correa, 2014).

Policymakers are ultimately responsible for changing the rules of the game. Thus, the question arises as to why they have not already changed the rules of the game to incentivize sustainable business models over unsustainable business models. One of the potential reasons has been argued to be destructive global competition (Bunzl, 2018). As globalization has allowed capital to flow transnationally, companies within nations compete for investments and customers internationally. If governments were to tax companies on harmful environmental and social impacts, it would raise the costs for the nations' corporate actors, making them less competitive in a global market. Thus, governments are disincentivized from changing national rules of the game to benefit sustainable business models, as long as it carries the risk of increased costs and a loss of global competitiveness.

In fact, nations *de*regulate to stay internationally competitive, giving rise to a game-theoretical race to the bottom (Bunzl, 2018). Therefore, it has been argued that in order to change the rules of the game and make it competitive for companies to be sustainable, a transnational agreement must be in place to counterbalance these dynamics (Bunzl & Duffell, 2017). Whether or not this is the case, it demonstrates a need to understand the macro-level dynamics that currently drive and shape the rules of the game and, thereby, the incentive structure generating business model outcomes. For truly sustainable business model to succeed, it is essential to look beyond the focal company and consider the broader playing field that shapes incentive structures from a macro-level systems-perspective, as well as its role in driving sustainable or unsustainable business model outcomes.

Research area 2: Exploring how the rules of the game shape business model incentive structures at multiple levels of aggregations, and the consequences in terms of sustainability outcomes.

5.3 The power to add change and self-organize system structure

Self-organization entails less rigidity in a system, allowing it to adapt to changing conditions and create diversity subject to selection. The term is closely related to how complex patterns evolve out of simple rules, which can be observed in everything from biological evolution in natural ecosystems to technical innovation in the marketplace. The business model typically shapes the value creation processes, as well as a company's corporate structure. The dominant corporate form is the limited liability for-profit structure, where companies are typically organized in a hierarchical structure with shareholder ownership, a board of directors, and an executive management team. The limitations of this structure have become increasingly apparent as sustainability concerns have been raised. First, dependency on capital investments drive the maximization of shareholder value as the end goal (Hinton, 2020). Although it is typically not a legal obligation for companies to strictly maximize shareholder value (Sjåfjell et al., 2015), corporate leaders who do not do so, can be blamed for hindering further investments and going against the corporate core interests. For example, Emmanuel

Faber, the CEO and chairman of Danone, a big diary product retailer, led the company to take greater responsibility for its environmental and social impact – moving towards sustainability. In turn, the shareholders claimed that the initiatives implemented were at the expense of their financial interests and rights, and demanded that the CEO be fired, which he eventually was (Walt, 2021). The example illustrates how the limited liability for-profit structure concentrates ultimate decision-making power in the hands of shareholders, aligning the company's direction with their interests while neglecting other stakeholder groups. Thus, it is crucial to consider the path dependencies are created by different organizational structures.

As an alternative, Degrowth scholars have argued for a cooperative organizational structure, as it allows for more democratic decision-making (Parrique, 2019). Some countries, such as Germany, require regular workers to participate in board meetings to ensure their voices are represented at a higher corporate level (Davies, 2001). Furthermore, a new form of B-corporation (B-corps) has emerged, claiming to prioritize social and environmental objectives while generating most of their revenue from product or service sales, unlike nonprofits (Stubbs, 2017). The B-corps's pursuit of social and environmental objectives sometimes extends to their incorporation and organizational structure, unlike most hybrid organizations, which can have consequences for power structures, decision-making processes, stakeholder diversity, etc. Hence, the new forms of organization and incorporation illustrate how traditional structures might restrain sustainable business model development, through dictating how the company is run and in who's interests. By allowing for new organizational forms, diverse types of business models can evolve that better allow for self-organization towards new sustainable business models. The ways in which sustainable business model development might be constrained by organizational structure presents a potential avenue for research, along with how self-organization can be furthered and the resulting sustainability outcomes.

Research area 3: Exploring the potential business model path-dependencies created by organizational structure, the potentials of self-organization, and the implications for sustainability outcomes.

5.4 The goals of the system

Friedman (1970) famously proclaimed that business has only one single responsibility, which is to increase its profits while staying within the rules of the game. Taking a strong stance against the entire CSR movement, Friedman claimed that every action that goes beyond the maximization of profits for a return on shareholder value is the government's job. On the other hand, CSR supporters claimed that corporate actors had a responsibility beyond solely making a profit to financially reward shareholders, including ethical and philanthropic responsibilities (e.g. Carroll, 1991). The question is whether the responsibilities promoted by the CSR supporters contradict a company's purpose, and if the goal really is to maximize profits.

The pursuit of profits is part of the explanation for why some social and organizational archetypes can be more challenging for companies to implement, as some stand in direct conflict with the profit motive. For example, sufficiency-oriented business models require companies to shift focus from selling more products or services, to encouraging customers to buy less (Bocken & Short, 2016). If the profit motive is still seen as the dominant corporate purpose, and shareholder value maximization is the ultimate

priority, then reducing the number of product or services sold will be problematic without, for example, an accepted price increase to maintain the same revenue-level. Furthermore, many of the social and organizational archetypes prioritize other stakeholders, such as customers, employees, society, and the environment, sometimes at the expense of shareholder value maximization (Bocken et al., 2014; Ritala et al., 2018). The complexity of involving all these stakeholders and the potential conflict with the profit motive makes these archetypes practically inactionable for many companies.

Hinton (2020) has done recent work on the topic, using system dynamics (a sub-field of systems thinking) to causally map corporate dynamic and the sustainability effects generated. Hinton (2020) concludes that profit maximization at the company level is tightly coupled to the growth imperative at the national level, which in turn incentivizes an externalization of social and environmental costs. Thus, adverse feedback loops of political capture, inequality, and consumerism (fueled by planned obsolescence) emerge. When testing the hybrid organizational approach, Hinton (2020) finds that balancing loops will be added to the adverse reinforcing feedback loops, slowing down harmful sustainability outcomes. However, to have a significant impact, it is concluded that the corporate purpose of profit (i.e. the goal of the system) must change.

Meadows (1999) argues that although profit tends to be viewed as the corporate goal, the ultimate end goal is to *grow*, or to engulf everything, as the author puts it. Growth is a common goal of both natural and artificial systems. Meadows (1999) also highlight growth as the systemic goal to which the profit motive is tethered. At the national level, economic growth is viewed as the ultimate path to prosperity for all (Jackson, 2017), and GDP represents how well a nation is doing in this regard. Thus, abolishing the profit motive on a company level is unlikely to generate any significant change if the growth imperative remains the driving force in the marketplace, as those companies will likely be outcompeted. Yet, there is a need to understand how the dominant goals at various levels of aggregation impact business model outcomes in terms of sustainability. Furthermore, it could be explored how a alternative value-grounded systemic goal could impact sustainable business model outcomes. For example, some research has already indicated that value-based goals yield the highest service quality outcomes (Bushouse, 1999). In sum, research is needed to understand the corporate goal in relation to business model development, as well as how it is connected to other systemic goals and the resulting sustainability impacts.

Research area 4: Exploring how company and system goals impact sustainable business model outcomes, and the potential effects of sustainability-anchored goals.

5.5 The mindset and ability to transcend paradigms

All time periods are characterized by a paradigm, that is, a web of ideas, values, and assumptions that influence how and what people think and perceive, as well as how they make sense of and act in their surrounding world. Our assumptions about what is fair, desirable, and relevant are decided based on the paradigm's dominant mindset. If all the formal rules and regulations are removed, there still exists an idea about what a just punishment for a crime is, what a fair tax level is, or what the goal of a company should be (Meadows, 1999). All these are grounded in the dominant paradigm's value system. As discussed above, the sustainable business model archetype 6, encouraging sufficiency, creates conflicts with the idea of what the goal of a company should be, in relation to the

systemic objective of growth. These ideas are largely taken for granted, and have been derived from the current dominant paradigm. For a leverage point perspective, the dominant paradigm drives all the other leverage points. Hence, it is the root to all social systems, and how they are designed.

The currently dominant paradigm in western society is arguably free-market capitalism (Schneider, 2020). Free-market capitalism manifests itself not only through privatization of capital and deregulation of markets, but it is also dominant in shaping "the material, social and intellectual bases of social life" (Harvey, 2014, p. 7). Capitalism is considered the source of consumer culture or consumerism. As a central characteristic of modern society, consumerism derives meaning in social life from the continuous consumption of goods and services (Stearns, 1997). Furthermore, consumerism is anchored in the individualistic rationale of utility maximization: maximizing one's own benefit or satisfaction. The individualistic self-centered dogma permeates how social systems are organized through levels of aggregation; the utility maximization of individuals, the profit maximization of corporations, and the growth imperative of the nation state. Competition between a multiplicity of self-maximizing actors has become a fundamental principle in organizing social systems. In turn, this has had consequences in terms of generating the unsustainable predicament (Hagens, 2020). As long as taking responsibility for social and environmental costs is not in any actor's rational self-interest, such initiatives will remain dependent on a benevolent minority.

In an analysis conducted by Schneider (2020), CSR initiatives can never be effective in achieving sustainability for the very reason that it stands in stark contrast to the dominant capitalistic system. The ideologies are incompatible, making it unlikely for companies to move beyond shallow leverage points of win-win efficiency, as they are constrained by the self-benefit maximizing, free-market capitalistic paradigm.

At the same time, it is increasingly recognized how socially constructed realities hold back progress towards a sustainability. For example, Sjåfjell et al. (2015) claim that although shareholder primacy tend to be thought of as a legal obligation, it is merely a social norm. Hence, it lacks any real anchoring in the rule of law in most countries (Schrempf-Stirling, 2013). In fact, most of the constraints to the development of sustainable business models discussed in this paper are socially constructed, meaning that they can also be socially deconstructed. Meadows (1999) similarly claim that although it might appear difficult to change the paradigm due to its taken-for-granted and intangible nature, it holds no physical or financial costs to change. The mindset of an individual can be changed in milliseconds, which is part of the reason for why it is at the top of the list of leverage points. Therefore, social norms has been pointed out as key levers for creating large-scale behavioral change and solve collective action problems for sustainability (e.g. Nyborg et al., 2016).

Several scholars have already pushed in this direction. For example, well-known scholars like Porter and Kramer (2011) argue for the creation of shared value to reinvent capitalism, while Mintzberg, Simons, and Basu (2002) claim that there is a need to move beyond individualized selfishness as an institutionalized norm in business as well as in society writ large. In practice, the Business Roundtable - as the largest American association for CEOs - overthrew the traditional shareholder-oriented statement of purpose and declared that the CEOs and their respective companies should operate based on the consideration of *all* of their stakeholders (BusinessRoundtable, 2019). These initiatives

can be an indication of a changing value system. As awareness of emerging sustainability challenges grows, the old paradigm that caused them has become obsolete. However, for a paradigm shift to occur, it needs to happen not only at the company level, but also at the individual, national, and international levels. New ways of escribing meaning and value in society must be pursued, and new sustainable ways of thinking evolved.

For sustainable business model scholars, the mindset from which current business models arise must be recognized. For truly sustainable business models to emerge, the taken-for-granted values and norms must be challenged. New ways of thinking are needed to allow managers to move beyond the current paradigm and develop sustainable business models that are not constrained by the old paradigm. In terms of research, it would be beneficial to examine how prevailing values constrain or enable the development of new sustainable business models, and how they manifest in institutions and organizations. Additionally, scholars could examine how societal values impact whether sustainable business models are successfully propagated (relating to the 8th archetype on scale-up solutions). By understanding the paradigm in which sustainable business models are created, a transcendent process can begin to achieve the system transition necessary to create truly sustainable business models.

Research area 5: Exploring the impact of the prevailing paradigm on sustainable business model outcomes, and the implications for how a transition can occur, i.e., triggering a paradigm shift.

Leverage Points	Research Areas	Research Questions
The structure of information flow (6)	Exploring ways of providing clear information on the unsustainability problem of individual business models as a prerequisite for comparability of sustainability outcomes between business models.	- How can information be used to discriminate between sustainable versus unsustainable business models? - What information is essential for transparent business model impact assessment?
The rules of the game (5)	Exploring how the rules of the game shape the business model incentive structures at multiple levels of aggregations, and the consequences in terms of sustainability outcomes.	- How does the corporate incentive structure drive sustainable or unsustainable business model outcomes? - How can more sustainable business model outcomes be encouraged by changing the rules of the game?
The power to add change and self-organize system structure (4)	Exploring the potential path-dependencies created by organizational structure, *the potentials of self-organization,* and the implications for sustainability outcomes.	- What path-dependencies are created by organizational structure, and what sustainable business model outcomes does it lead to? - How does increased self-organization impact sustainable business model outcomes?
The goals of the system (3)	Exploring how company and system goals impact sustainable business model outcomes, and the potential effects of sustainability-anchored goals.	- How does different system goals impact sustainable business model outcomes? - How can sustainability-anchored goals be leveraged to drive sustainable business model development?
The mindset (2) and ability to transcend paradigms (1)	Exploring the impact of the prevailing paradigm on sustainable business model outcomes, and the implications for how a transition can occur, i.e., triggering a paradigm shift.	- How does the prevailing paradigm impact sustainable business model outcomes? - How can value systems and norms be used to trigger a shift towards a sustainable paradigm?

Table 3. A research agenda targeting deep leverage points for systems change

6. Conclusion

The conceptual analysis of the ability of sustainable business models to trigger systems change, based on an integrative research approach, shows that the sustainable business model archetypes tend to address shallow leverage points for systems change. Most of the sustainable business model archetypes fall on the lowest leverage point; adjusting parameters. Although such technical improvements that increase resource efficiency are necessary for the strive toward environmental sustainability, directly targeting these is not enough to move the current system into a sustainable realm. Hence, the sustainable business model archetypes are unlikely to trigger a fundamental change to the unsustainable trajectory humanity is on, or achieve truly sustainable business models. Instead, deep leverage points for system change must be targeted. Therefore, a research agenda has been developed to highlight potential areas for further research on sustainable business models in which deep leverage points are targeted. The research agenda cover the structure of information flows, the rules of the game, the ability for system self-organization, the goals of the system, and the mindset or ability to transcend paradigms, as the most likely points of leverage for systems change. By focusing on deep leverage points in the development of sustainable business models, root-causes of unsustainability are targeted, providing a better starting point towards a truly sustainable society.

References

Abson, D. J., Fischer, J., Leventon, J., Newig, J., Schomerus, T., Vilsmaier, U., . . . Lang, D. J. (2017). Leverage points for sustainability transformation. *Ambio, 46*(1), 30-39. doi:https://doi.org/10.1007/s13280-016-0800-y

Alonso-Martinez, D., De Marchi, V., & Di Maria, E. (2021). The sustainability performances of sustainable business models. *Journal of Cleaner Production, 323*, 129145. doi:https://doi.org/10.1016/j.jclepro.2021.129145

Bhatnagar, R., Keskin, D., Kirkels, A., Romme, A. G. L., & Huijben, J. (2022). Design principles for sustainability assessments in the business model innovation process. *Journal of Cleaner Production, 377*, 134313. doi:https://doi.org/10.1016/j.jclepro.2022.134313

Binswanger, M. (2001). Technological progress and sustainable development: what about the rebound effect? *Ecological economics, 36*(1), 119-132. doi:https://doi.org/10.1016/S0921-8009(00)00214-7

Bocken, N. M., De Pauw, I., Bakker, C., & Van Der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering, 33*(5), 308-320. doi:https://doi.org/10.1080/21681015.2016.1172124

Bocken, N. M., Short, S., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production, 65*, 42-56. doi:https://doi.org/10.1016/j.jclepro.2013.11.039

Bocken, N. M., & Short, S. W. (2016). Towards a sufficiency-driven business model: Experiences and opportunities. *Environmental Innovation and Societal Transitions, 18*, 41-61. doi:https://doi.org/10.1016/j.eist.2015.07.010

Bocken, N. M., & Short, S. W. (2021). Unsustainable business models–Recognising and resolving institutionalised social and environmental harm. *Journal of Cleaner Production*, 127828. doi:https://doi.org/10.1016/j.jclepro.2021.127828

Bocken, N. M., Weissbrod, I., & Tennant, M. (2016). Business model experimentation for sustainability. *International Conference on Sustainable Design and Manufacturing*, 297-306. doi:https://doi.org/10.1007/978-3-319-32098-4_26

Boons, F., & Lüdeke-Freund, F. (2013). Business models for sustainable innovation: state-of-the-art and steps towards a research agenda. *Journal of Cleaner Production, 45*, 9-19. doi:https://doi.org/10.1016/j.jclepro.2012.07.007

Bowen, F., & Aragon-Correa, J. A. (2014). Greenwashing in corporate environmentalism research and practice: The importance of what we say and do. doi:https://doi.org/10.1177/1086026614537078

Broman, G. I., & Robèrt, K.-H. (2017). A framework for strategic sustainable development. *Journal of Cleaner Production, 140*, 17-31. doi:https://doi.org/10.1016/j.jclepro.2015.10.121

Buchanan, R. (1992). Wicked problems in design thinking. *Design issues, 8*(2), 5-21. doi:https://doi.org/10.2307/1511637

Bunzl, J. (2018). International Competitiveness and its threat to Democracy and the Planet. *Cadmus*, 145.

Bunzl, J., & Duffell, N. (2017). *SIMPOL SOLUTION*: PETER OWEN.

Bushouse, B. K. (1999). *The mixed economy of child care: An institutional analysis of nonprofit, for-profit, and public enterprises*: Indiana University.

BusinessRoundtable. (2019). Statement on the Purpose of a Corporation. Retrieved from https://opportunity.businessroundtable.org/ourcommitment/

Carroll, A. B. (1991). The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. *Business horizons, 34*(4), 39-48. doi:https://doi.org/10.1016/0007-6813(91)90005-G

Casals, L. C., García, B. A., Aguesse, F., & Iturrondobeitia, A. (2017). Second life of electric vehicle batteries: relation between materials degradation and environmental impact. *The International Journal of Life Cycle Assessment, 22*(1), 82-93. doi:https://doi.org/10.1007/s11367-015-0918-3

Chancel, L., Piketty, T., Saez, E., & Zucman, G. (2022). *World inequality report 2022*: Harvard University Press.

Daly, H. E. (1990). Sustainable development: from concept and theory to operational principles. *Population and development review, 16*, 25-43. doi:https://doi.org/10.2307/2808061

Davies, P. L. (2001). Board structure in the UK and Germany: convergence or continuing divergence? *Available at SSRN 262959*. doi:https://dx.doi.org/10.2139/ssrn.262959

Dentoni, D., Pinkse, J., & Lubberink, R. (2021). Linking sustainable business models to socio-ecological resilience through cross-sector partnerships: A complex adaptive systems view. *Business & Society, 60*(5), 1216-1252. doi:https://doi.org/10.1177/0007650320935015

Dyllick, T., & Hockerts, K. (2002). Beyond the business case for corporate sustainability. *Business Strategy and the Environment, 11*(2), 130-141.

Ehrenfeld, J. (2004). Searching for sustainability: No quick fix. *Reflections, 5*(8), 1-13.

Elkington, J. (1994). Towards the sustainable corporation: win-win-win business strategies for sustainable development. *California Management Review, 36*, 90-100. doi:https://doi.org/10.2307/41165746

Evans, S., Vladimirova, D., Holgado, M., Van Fossen, K., Yang, M., Silva, E. A., & Barlow, C. Y. (2017). Business Model Innovation for Sustainability: Towards a Unified Perspective for Creation of Sustainable Business Models. *Business Strategy and the Environment, 26*(5), 597-608. doi:https://doi.org/10.1002/bse.1939

Fehrer, J. A., & Wieland, H. (2020). A systemic logic for circular business models. *Journal of Business Research*. doi:https://doi.org/10.1016/j.jbusres.2020.02.010

Fichter, K., Lüdeke-Freund, F., Schaltegger, S., & Schillebeeckx, S. J. (2022). Sustainability impact assessment of new ventures: An emerging field of research. *Journal of Cleaner Production*, 135452. doi:https://doi.org/10.1016/j.jclepro.2022.135452

Foss, N. J., & Saebi, T. (2018). Business models and business model innovation: Between wicked and paradigmatic problems. *Long Range Planning, 51*(1), 9-21. doi:https://doi.org/10.1016/j.lrp.2017.07.006

Friedman, M. (1970). The Social Responsibility of Business is to Increase its Profits. *The New York Times Magazine*.

Goodland, R., & Daly, H. (1996). Environmental sustainability: universal and non-negotiable. *Ecological applications, 6*(4), 1002-1017. doi:https://doi.org/10.2307/2269583

Gregory, A. J., & Jackson, M. C. (1992). Evaluating organizations: A systems and contingency approach. *Systems Practice, 5*, 37-60.

Hagens, N. J. (2020). Economics for the future–Beyond the superorganism. *Ecological economics, 169*, 106520.

Hahn, T., Figge, F., Pinkse, J., & Preuss, L. (2010). Trade-offs in corporate sustainability: You can't have your cake and eat it. *Business Strategy and the Environment, 19*(4), 217-229. doi:https://doi.org/10.1002/bse.674

Harvey, D. (2014). *Seventeen contradictions and the end of capitalism*: Oxford University Press, USA.

Hausfather, Z. (2019). Factcheck: How electric vehicles help to tackle climate change. *Carbon Brief, May, 13*.

Hinton, B. J. (2020). Fit for purpose? Clarifying the critical role of profit for sustainability. *Journal of Political Ecology, 27*(1). doi:https://doi.org/10.2458/v27i1.23502

Jaakkola, E. (2020). Designing conceptual articles: four approaches. *AMS review, 10*(1), 18-26. doi:https://doi.org/10.1007/s13162-020-00161-0

Jackson, T. (2017). *Prosperity without growth: foundations for the economy of tomorrow* (Second ed.): Taylor & Francis.

Khmara, Y., & Kronenberg, J. (2018). Degrowth in business: An oxymoron or a viable business model for sustainability? *Journal of Cleaner Production, 177*, 721-731. doi:https://doi.org/10.1016/j.jclepro.2017.12.182

Knobloch, F., Hanssen, S. V., Lam, A., Pollitt, H., Salas, P., Chewpreecha, U., . . . Mercure, J.-F. (2020). Net emission reductions from electric cars and heat pumps in 59 world regions over time. *Nature sustainability, 3*(6), 437-447. doi:https://doi.org/10.1038/s41893-020-0488-7

Lammers, T., Rashid, L., Kratzer, J., & Voinov, A. (2022). An analysis of the sustainability goals of digital technology start-ups in Berlin. *Technological Forecasting and Social Change, 185*, 122096. doi:https://doi.org/10.1016/j.techfore.2022.122096

Lawrence, P. R., & Lorsch, J. W. (1967). Differentiation and integration in complex organizations. *Administrative science quarterly*, 1-47.

Leendertse, J., van Rijnsoever, F. J., & Eveleens, C. P. (2021). The sustainable start-up paradox: Predicting the business and climate performance of start-ups. *Business Strategy and the Environment, 30*(2), 1019-1036. doi:https://doi.org/10.1002/bse.2667

Lüdeke-Freund, F., Carroux, S., Joyce, A., Massa, L., & Breuer, H. (2018). The sustainable business model pattern taxonomy—45 patterns to support sustainability-oriented business model innovation. *Sustainable Production and Consumption, 15*, 145-162. doi:https://doi.org/10.1016/j.spc.2018.06.004

Lüdeke-Freund, F., Massa, L., Bocken, N., Brent, A., & Musango, J. (2016). *Business models for shared value*. Retrieved from https://nbs.net/primer-business-models-for-shared-value/

Lüdeke-Freund, F., Gold, S., & Bocken, N. M. P. (2018). A Review and Typology of Circular Economy Business Model Patterns. *Journal of Industrial Ecology, 23*(1), 36-61. doi:https://doi.org/10.1111/jiec.12763

Lukka, K., & Vinnari, E. (2014). Domain theory and method theory in management accounting research. *Accounting, Auditing & Accountability Journal*.

Massa, L., Gianluigi, V., & Tucci, C. L. (2018). Business Models and Complexity. *Journal of Business Models, 6*(1), 70-82. doi:https://doi.org/10.5278/ojs.jbm.v6i1.2579

Massa, L., Tucci, C. L., & Afuah, A. (2017). A Critical Assessment of Business Model Research. *Academy of Management Annals, 11*(1), 73-104. doi:https://doi.org/10.5465/annals.2014.0072

Meadows, D. (1999). Leverage Points: Places to Intervene in a System. *Whole Earth, 91*(1), 78-84.

Meadows, D. (2008). *Thinking in systems: A primer*. Canada: Chelsea Green Publishing.

Meadows, D., Randers, J., & Meadows, D. (2004). *Limits to growth: The 30-year update*: Chelsea Green Publishing.

Metcalfe, J. S. (2002). *Evolutionary economics and creative destruction*: Routledge.

Midgley, G. (2000). Systemic intervention. In *Systemic intervention* (pp. 113-133): Springer.

Mintzberg, H., Simons, R., & Basu, K. (2002). Beyond selfishness. *MIT Sloan Management Review, 44*(1), 67.

Missimer, M., Robèrt, K.-H., & Broman, G. (2017a). A strategic approach to social sustainability–Part 1: exploring the social system. *Journal of Cleaner Production, 140*, 32-41. doi:https://doi.org/10.1016/j.jclepro.2016.03.170

Missimer, M., Robèrt, K.-H., & Broman, G. (2017b). A strategic approach to social sustainability–Part 2: a principle-based definition. *Journal of Cleaner Production, 140*, 42-52. doi:https://doi.org/10.1016/j.jclepro.2016.04.059

Nyborg, K., Anderies, J. M., Dannenberg, A., Lindahl, T., Schill, C., Schlüter, M., . . . Carpenter, S. (2016). Social norms as solutions. *Science, 354*(6308), 42-43. doi:https://doi.org/10.1126/science.aaf8317

Parrique, T. (2019). *The political ecnonomy of degrowth*. Université Clermont Auvergne; Stockholms Universitet, (NNT : 2019CLFAD003)

Petrovic, O., Kittl, C., & Teksten, R. D. (2001). Developing business models for ebusiness. *Available at SSRN 1658505*. doi:https://dx.doi.org/10.2139/ssrn.1658505

Porter, M. E., & Kramer, M. R. (2011). Creating shared value: How to reinvent capitalism and unleash the wave of innovation and growth. *Harvard Business Review, 89*(1-2), 62-77. doi:https://doi.org/10.1007/978-94-024-1144-7_16

Raworth, K. (2017). *Doughnut economics: seven ways to think like a 21st-century economist*: Chelsea Green Publishing.

Richardson, K., Steffen, W., Lucht, W., Bendtsen, J., Cornell, S. E., Donges, J. F., . . . Von Bloh, W. (2023). Earth beyond six of nine planetary boundaries. *Science advances, 9*(37), eadh2458.

Ritala, P., Albareda, L., & Bocken, N. (2021). Value creation and appropriation in economic, social, and environmental domains: Recognizing and resolving the institutionalized asymmetries. *Journal of Cleaner Production, 290*, 125796. doi:https://doi.org/10.1016/j.jclepro.2021.125796

Ritala, P., Huotari, P., Bocken, N., Albareda, L., & Puumalainen, K. (2018). Sustainable business model adoption among S&P 500 firms: A longitudinal content analysis study. *Journal of Cleaner Production, 170*, 216-226. doi:https://doi.org/10.1016/j.jclepro.2017.09.159

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., . . . Schellnhuber, H. J. (2009). A safe operating space for humanity. *nature, 461*(7263), 472-475. doi:https://doi.org/10.1038/461472a

Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2016). Business Models for Sustainability: A Co-Evolutionary Analysis of Sustainable Entrepreneurship, Innovation, and Transformation. *Organization & Environment, 29*(3), 264-289. doi:https://doi.org/10.1177/1086026616633272

Schneider, A. (2020). Bound to fail? Exploring the systemic pathologies of CSR and their implications for CSR research. *Business & Society, 59*(7), 1303-1338. doi:https://doi.org/10.1177/0007650319856616

Schrempf-Stirling, J. (2013). The Shareholder Value Myth: How Putting Shareholders First Harms Investors, Corporations, and the Public, by Lynn A. Stout. *Business ethics quarterly, 23*(3), 486-489. doi:https://doi.org/10.5840/beq201323332

Scott, W. R. (2014). *Institutions and organizations: Ideas, interests, and identities* (4 ed.): Sage Publications, Inc.

Sjåfjell, B., Johnston, A., Anker-Sørensen, L., & Millon, D. (2015). Shareholder primacy: the main barrier to sustainable companies. Retrieved from https://ssrn.com/abstract=2664544

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research, 104*, 333-339. doi:https://doi.org/10.1016/j.jbusres.2019.07.039

Stearns, P. N. (1997). Stages of consumerism: recent work on the issues of periodization. *The Journal of Modern History, 69*(1), 102-117. doi:https://doi.org/10.1086/245442

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., . . . De Wit, C. A. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science, 347*(6223), 1259855. doi:https://doi.org/10.1126/science.1259855

Stubbs, W. (2017). Sustainable entrepreneurship and B corps. *Business Strategy and the Environment, 26*(3), 331-344. doi:https://doi.org/10.1002/bse.1920

Stubbs, W., & Cocklin, C. (2008). Conceptualizing a "sustainability business model". *Organization & Environment, 21*(2), 103-127. doi:https://doi.org/10.1177/1086026608318042

Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning, 43*(2-3), 172-194. doi:https://doi.org/10.1016/j.lrp.2009.07.003

Torraco, R. J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human resource development review, 4*(3), 356-367. doi:https://doi.org/10.1177/1534484305278283

Waddock, S. (2020). Achieving sustainability requires systemic business transformation. *Global Sustainability, 3*. doi:https://doi.org/10.1017/sus.2020.9

Walt, V. (2021, 21 November). A Top CEO Was Ousted After Making His Company More Environmentally Conscious. Now He's Speaking Out. *Time*. Retrieved from https://time.com/6121684/emmanuel-faber-danone-interview/

Wells, P., & Seitz, M. (2005). Business models and closed-loop supply chains: a typology. *Supply Chain Management: An International Journal*. doi:https://doi.org/10.1108/13598540510612712

Wright, C., & Nyberg, D. (2017). An inconvenient truth: How organizations translate climate change into business as usual. *Academy of management journal, 60*(5), 1633-1661. doi:https://doi.org/10.5465/amj.2015.0718

Ziyadi, M., Ozer, H., Kang, S., & Al-Qadi, I. L. (2018). Vehicle energy consumption and an environmental impact calculation model for the transportation infrastructure systems. *Journal of Cleaner Production, 174*, 424-436. doi:https://doi.org/10.1016/j.jclepro.2017.10.292

Zott, C., Amit, R., & Massa, L. (2011). The Business Model: Recent Developments and Future Research. *Journal of Management, 37*(4), 1019-1042. doi:https://doi.org/10.1177/0149206311406265