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**How can the Sustainable Value Exchange Matrix (SVEM) contribute to  
sustainable business models innovation? A multiple case study**

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## RESUMO EXPANDIDO

**INTRODUÇÃO:** A busca dos consumidores por produtos e serviços sustentáveis já é uma realidade. Logo, a sustentabilidade em modelos de negócios se torna uma necessidade no meio de competitividade entre as empresas uma que a adoção de estratégias de sustentabilidade em modelos de negócios pode proporcionar uma vantagem competitiva concreta e mensurável (BOCKEN, N. M. P. et al., 2014) e também é fundamental para alcançar os Objetivos de Desenvolvimento Sustentável (ODS) propostos pelas Nações Unidas (ROSATI; FARIA, 2019). Entretanto, agregar valor aos clientes adotando atividades socioambientais e criar valor econômico para si ainda é um grande desafio para os modelos de negócios. (SCHALTEGGER; FREUND; HANSEN, 2012). Para isso, a literatura sugere diversos frameworks e ferramentas que auxiliam a tornar modelos de negócios sustentáveis. Dentre eles, o *Sustainable Exchange Value Matrix* (SVEM), proposto por Morioka, Bolis, & Carvalho, 2018, surge como um framework que permite a reflexão direcionada para criar modelos de negócios sustentáveis. Seguindo o convite dos autores, o presente trabalho surge com o objetivo de explorar a base teórica para frameworks de ferramentas de inovação de modelo de negócios; analisar modelos de negócios usando o SVEM; Identificar as limitações da aplicação SVEM; propor boas práticas para futuras aplicações do framework.

**MATERIAIS E MÉTODOS:** Este estudo segue as recomendações de Eisenhardt (1989) para um estudo de múltiplos casos. Primeiramente, foi realizada uma revisão bibliográfica de temas essenciais, como modelo de negócio, modelo de negócio sustentável e frameworks que apoiam a integração da sustentabilidade. Após isso, foi feita a seleção dos casos. Para isso, a aplicação se deu em workshops preenchendo a ferramenta com *post-it's* e seguindo os passos sugeridos pelos autores. O passo 1, a proposta de valor, visa provocar uma reflexão sobre a existência do negócio, neste ponto, há uma reflexão sobre o desafio sustentável, o propósito, a oferta e vantagem competitiva do modelo de negócio. O passo 2, sistema de criação e entrega de valor, pretende criar uma reflexão sobre as práticas, capacidades e recursos necessários para atingir o modelo de negócio proposto. Por fim, o passo 3 é direcionado a pensar no valor direto e em cascata por cada stakeholder.

**RESULTADOS:** Como resultado no caso A, o SVEM possibilitou uma visão holística dos modelos de negócios e viabilidade econômica), entretanto para os participantes houve dificuldade em alguns conceitos para criação da proposta de valor. Desta forma o passo 2 se mostrou mais efetivo do que os demais passos. Já no caso B, o SVEM possibilitou a descoberta de novos *Stakeholders* e fraquezas e fortalezas do modelo de negócio a partir disso. O passo 2 demonstrou pouca efetividade devido a maturidade do modelo de negócio enquanto o passo 1 teve um sutil contribuição na proposta

de valor dos modelos de negócios. No caso 3 SVEM foi avaliado positivamente ao final de sua aplicação, sendo observado maior benefício na etapa 3. Devido ao objetivo da aplicação (explorar novas ideias e estratégias para tornar o modelo de negócio mais sustentável), os conceitos de proposta de valor e o sistema de criação já estavam consolidados pela empresa, então essa etapa foi mais apenas para preencher do que para pensar de fato e fazer brainstorming. No entanto, no passo 3, referente à captura de valor, combinado com o conceito de valor em cascata, proporcionou um processo de brainstorming direcionado, resultando em três oportunidades possíveis para a inovação do modelo de negócios sustentável. Com base nos resultados este estudo identifica a efetividade do SVEM com base na maturidade dos negócios e propõe sugestões para as próximas aplicações: (1) Explicar o conceito vinculado à sustentabilidade antes dessa aplicação (2) Identificar o nível de maturidade do negócio e focar na etapa mais efetiva; (3) Provocar uma reflexão na proposta de valor sobre os desafios de mercado que o modelo de negócio encontra;(3) Provocar uma reflexão sobre o negócio concorrente.

**CONSIDERAÇÕES FINAIS:** O presente trabalho cumpre seu objetivo ao criar uma base teórica para frameworks de ferramentas de inovação de modelo de negócios; analisar modelos de negócios utilizando o SVEM e identificar as limitações da aplicação do SVEM, realizando um estudo múltiplo baseado em três casos. Como resultado prático, esta pesquisa explora as contribuições e limitações do SVEM. Conforme demonstrado, o SVEM provoca um impacto positivo para direcionar os modelos de negócios para a sustentabilidade e a aplicação pode ser mais benéfica para a compreensão da maturidade do modelo de negócios. Como limitações pode-se ressaltar o rápido crescimento da literatura e o grande número de publicações, além da amostra utilizada pelo estudo. Por fim futuros estudos são convidados a realizar a aplicação do SVEM considerando as sugestões propostas por este estudo e explorar a aplicação de outros frameworks e ferramentas

**PALAVRAS-CHAVE:** Negócios Sustentáveis, Inovação Empresarial Sustentável, Estrutura

## EXPANDED SUMMARY

**INTRODUCTION:** Consumers' search for sustainable products and services is already a reality. Therefore, sustainability in business models becomes a necessity in the midst of competitiveness between companies, since the adoption of sustainability strategies in business models can provide a concrete and measurable competitive advantage (BOCKEN, N. M. P. et al., 2014) and it is also essential to achieve the Sustainable Development Goals (SDGs) proposed by the United Nations (ROSATI; FARIA, 2019). However, adding value to customers by adopting socio-environmental activities and creating economic value for themselves is still a major challenge for business models. (SCHALTEGGER; FREUND; HANSEN, 2012). For this, the literature suggests several frameworks and tools that help make business models sustainable. Among them, the Sustainable Exchange Value Matrix (SVEM), proposed by Morioka, Bolis, & Carvalho, 2018, emerges as a framework that allows directed reflection to create sustainable business models. Following the authors' invitation, the present work aims to explore the theoretical basis for business model innovation tool frameworks; analyze business models using SVEM; Identify the limitations of the SVEM application; propose good practices for future applications of the framework.

**MATERIALS AND METHODS:** This study follows the recommendations of Eisenhardt (1989) for a multiple case study. First, a literature review was carried out on essential topics, such as the business model, sustainable business model and frameworks that support the integration of sustainability. After that, the selection of cases was made. For this, the application took place in workshops, filling the tool with post-it's and following the steps suggested by the authors. Step 1, the value proposition, aims to provoke a reflection on the existence of the business, at this point, there is a reflection on the sustainable challenge, purpose, offer and competitive advantage of the business model. Step 2, value creation and delivery system, aims to create a reflection on the practices, capabilities and resources needed to achieve the proposed business model. Finally, step 3 is aimed at thinking about direct and cascading value for each stakeholder.

**RESULTS:** As a result, in case A, SVEM enabled a holistic view of business models and economic viability), however, for the participants, there were difficulties in some concepts to create the value proposition. Thus, step 2 proved to be more effective than the other steps. In

case B, the SVEM enabled the discovery of new Stakeholders and weaknesses and strengths of the business model based on this. Step 2 showed little effectiveness due to the maturity of the business model while step 1 had a subtle contribution to the value proposition of the business models. In case 3 SVEM was positively evaluated at the end of its application, with a greater benefit being observed in step 3. Due to the purpose of the application (explore new ideas and strategies to make the business model more sustainable), the concepts of value proposition and the creation system were already consolidated by the company, so this step was more just to fill in than to actually think and brainstorm. However, in step 3, referring to value capture, combined with the waterfall value concept, provided a targeted brainstorming process, resulting in three possible opportunities for sustainable business model innovation. Based on the results, this study identifies the effectiveness of SVEM based on the maturity of the business and proposes suggestions for the next applications: (1) Explain the concept linked to sustainability before this application (2) Identify the maturity level of the business and focus on the most effective step; (3) Provoke a reflection in the value proposition on the market challenges that the business model encounters; (3) Provoke a reflection on the competing business.

**FINAL CONSIDERATIONS:** The present work fulfills its objective by creating a theoretical basis for business model innovation tool frameworks; analyze business models using SVEM and identify the limitations of the application of SVEM, performing a multiple study based on three cases. As a practical result, this research explores the contributions and limitations of SVEM. As demonstrated, SVEM has a positive impact on driving business models towards sustainability and application can be more beneficial for understanding the maturity of the business model. As limitations, the rapid growth of the literature and the large number of publications, in addition to the sample used by the study, can be highlighted. Finally, future studies are invited to carry out the application of the SVEM considering the suggestions proposed by this study and to explore the application of other frameworks.

**Keywords:** Sustainable Business, Sustainable Business Innovation, Framework

## ABSTRACT

Integrating sustainability into business strategies and business models design, besides being a key factor for sustainable development, can also provide competitive advantage. The literature brings many frameworks to support sustainable business models innovation. Therefore, the Sustainable Value Exchange Matrix (SVEM) emerges as a directed discussion visual framework to support the creation and innovation of sustainable business models. The purpose of this article is to test the SVEM and analyze the framework as it achieves its purpose to provoke reflection in sustainable business models innovation, highlighting limitations encountered. This research is based on the application of SVEM with groups in three workshops, crossing the perception of the groups within cases and with similar frameworks founded in literature. We conclude that SVEM can contribute with different aspects, depending on the level of maturity of the business model under development

**Keywords:** Sustainable Business, Sustainable Business Innovation, Framework

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## **LIST OF ABBREVIATIONS**

SBEM – Sustainable business model

SVEM – Sustainable Exchange Value Matrix

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# 1 INTRODUÇÃO

Adopting sustainability strategies into the core business can provide a concrete and measurable competitive advantage (BOCKEN, N. M. P. *et al.*, 2014) and it is also key to achieve the Sustainable Development Goals (SDGs) proposed by the United Nations (ROSATI; FARIA, 2019). According to Silvestre and Țircă (2019, p. 330), this "requires deep changes in organizations, supply chains, and communities, and this can only happen through learning and innovation". Notwithstanding its importance, there are challenges to integrate sustainability into business and sustainable business model's design.

The high growing demand for sustainable products and goods makes sustainable business models a crucial issue for the future and present generation (GARETTI; TAISCH, 2012). However, it is possible to identify some difficulties for designing sustainable business models. One key challenge for sustainable business models is to provide value to the costumers by adopting social and environmental activities, as it creates economic value for itself (SCHALTEGGER; FREUND; HANSEN, 2012). The literature presents various frameworks and tools that help designing sustainable business model (BOCKEN, N. M. P. *et al.*, 2014; FRANÇA *et al.*, 2017; MORIOKA; DE CARVALHO, 2016). This paper defines business tools and frameworks as a mechanism to "provide a consistent logical picture of the firm that helps to guide the myriad choices and actions involved in execution" (RICHARDSON, 2005, p. 135). Thus, a business framework or tool driven to sustainability is understood in this research as an instrument that gives an holistic view of a business to drive the actions into sustainability.

To evaluate a sustainable business framework, it is necessary to test it in real applications, but this literature still lacks studies that explores the impacts of these tools toward the conceptualization of sustainable business models (JOYCE; PAQUIN, 2016). This is the key to bring new discussions and provoke reflections. In this context, Morioka; Bolis and Carvalho (2018) emerge with a framework called the Sustainable Value Exchange Matrix (SVEM). This is a visual framework for sustainable business model to support directed reflections on business models towards sustainable development challenges. The authors invite futures studies to apply SVEM workshops as an opportunity of reflections. So, this research aims to understand: **how can the Sustainable Value Exchange Matrix (SVEM) contribute to sustainable business models innovation?**

## **1.1 OBJECTIVES**

Based on the context presented, the present research considers the objectives indicated below.

### **1.1.1 GENERAL OBJECTIVE**

The general research objective is to test and analyze the SVEM framework as it achieves its purpose to provoke reflection in sustainable business models innovation, highlighting limitations encountered.

### **1.1.2 SPECIFIC OBJECTIVE**

This specific research aims to reach the followings specifics objectives:

1. To explore the theoretical background for business model innovation tools frameworks;
2. To analyze business models using the SVEM
3. To identify the limitations of SVEM application;
4. To propose good practices for further applications of the framework;

### **1.1.3 RESEARCH GAPS**

The rapidly growth of articles and new frameworks driven to sustainable business models in the literature has been calling for new studies exploring these applications. Exploring the application of tool, “a range of new applications is identified which is expected to be of interest to business practitioners, policy makers and academic researchers” (BOCKEN, N. M. P.; RANA; SHORT, 2015). Studies driven to explore the application of frameworks and tools are relevant in the literature, as the results support the improvement of the framework or the tool in analyses and also support the creation of a new ones. This contributes to approach the real need of the companies with the new ideas in the literature.

Researches focused in the practical application has returned positives results. Kristensen and Remmen (2019) helped a business model to map their strengths and weaknesses in a system perspective that includes the economic, environmental and social value. The authors also point direction for the creation of new frameworks and tools. Gao & Li (2020) also highlight the impacts of a practical application and reinforces the need to innovate towards sustainability and to adapt the business models to the changes in the environment. Also, the application of a tool can inspire the creation of new sustainable business or inspire the business model to be more sustainable (GARCÍA-MUIÑA *et al.*, 2020)

Even so, there is a gap in the literature for practical applications due to the literature of creation is faster than the literature of application. This creates opportunities to contribute to the literature.

Thus, it is possible to observe the lack studies investigating opportunities and benefits for a practical application of a tool. To contribute to the literature and create new research opportunities, this study follows Morioka *et al.*, (2018), which invites to explore the application of Sustainable Value Exchange Matrix (SVEM) to provoke a focused reflection about business models and how to orient them to be more sustainable.

## **2 LITERATURE BACKGROUND**

The literature background for the present study is divided into two parts. The first brings the concept of business models, business model innovations, sustainable business models and sustainable business models innovation. Meanwhile, the second investigates the business model innovation tools and frameworks.

### **2.1 SUSTAINABLE BUSINESS MODELS INNOVATION AND BUSINESS MODEL INNOVATION TOOLS**

Business model is a concept vastly discussed in the literature. Timmers (1998) defines a business model as a combination of product, service, and information flows as it describes the roles and benefits of business agents. For Geissdoerfer et al. (2016), business model combines components and interactions to create, deliver, capture, and exchange value. Mitchell et al. (2004) adds to the concept the idea of “‘who”, ‘what’, ‘when’, ‘where’, ‘why’, ‘how”, and ‘how much’ an organization uses to provide its goods and services and develop resources to continue its efforts. Teece (2010) understands business model as a method of doing business to “develop propositions value, and generate viable cost and revenues”.

The business model innovation is seen a way to achieve new business opportunities and create competitive advantage (CARAYANNIS; SINDAKIS; WALTER, 2015). This innovation aiming social and environmental goals, besides economic ones can lead to the creation of the sustainable business model (SCHALTEGGER; FREUND; HANSEN, 2012). The business model analysis is the key to integrate sustainability into organizations, as it highlights the value creation logic of an organization and allows flexible ways of governance (SCHALTEGGER; HANSEN; LÜDEKE-FREUND, 2016) to improve their sustainability performance in a long-term strategic perspective (GEISSDOERFER; VLADIMIROVA; EVANS, 2018). The present study considers the following definitions sustainable business models, as:

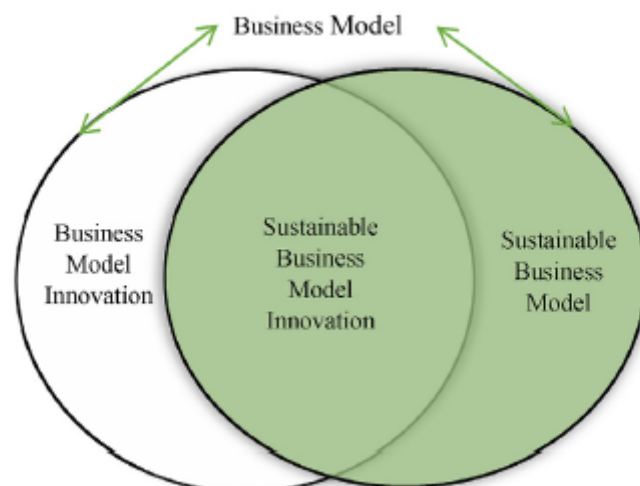
The extension of conventional business models (including value proposition and creation, value capture and delivery), including the environment and society as primary stakeholders (the result of value creation includes monetary and non-monetary value), the systematic self-learning mechanism for sustainable development

as primary characters, following an iterative rule and holding a long-term perspective. (HE; ORTIZ, 2021, p. 2)

Consequently, a sustainable business model is composed by a customer-oriented value proposition, a value generation model and key processes and resources (JOHNSON, MARK; M.; HENNING, 2008), but it also requires a holistic view to understand their components and their value proposition (BOONS; LÜDEKE-FREUND, 2013). This can assist sustainable development and corporate innovation, being an important factor to achieve competitive advantage. (BOCKEN, N. M. P.; SHORT, 2016; MORIOKA; EVANS; CARVALHO, 2016).

The concept of sustainable business innovation as a way to support the business models as it ensures the sustainable development and adds, or updates, or reconfigures the business elements and resources (HE; ORTIZ, 2021). The theoretical background of sustainable business model innovation is based on the business model value creation logic, but incorporate sustainable value and value innovation. This proposition is based on the analogies between the sustainable business model and the business models innovation, that concern and change, the economic, social, and sustainable value. (SHAKEEL *et al.*, 2020)

**Figure 1** – Relationship between sustainable business model innovation



Source: Shakeel *et al.*, 2020.

The literature has approached the concept of sustainable business models as a modification of the conventional business model concept, with certain characteristics and objectives added to it, as: (a) the incorporation of concepts, principles or goals aimed at sustainability and/or (b) the integration of sustainability into their value propositions, value creation and delivery activities and/or value capture mechanisms (GEISSDOERFER, VLADIMIROVA, EVANS, 2018).

Improvements in sustainable performance in a long-term perspective have created a growing demand for more sustainable consumption and production solutions that stimulated the development of various models, structures and recommendations for companies to move towards sustainability (RAUTER; JONKER; BAUMGARTNER, 2017). Therefore, the literature has been researching the development of tools to help the sustainable business models innovation.

## **2.2 OVERVIEW OF SUSTAINABLE BUSINESS MODELS INOVATIONS FRAMEWORKS AND TOOLS**

As an attempt to design ways to integrate sustainability into the core business, researchers have been formulating tools and frameworks (e.g., KURUCZ *et al.*, 2017; MORIOKA; BOLIS; CARVALHO, 2018; MORIOKA; DE CARVALHO, 2016; SCHALTEGGER; CC; HANSEN, 2012). Table 1 summarizes the main frameworks found in the literature that support the innovation and creation of sustainable business models.

**Table 1** – Frameworks to support understanding sustainable business model

References	Propose/Objectives	Limitations
<b>Bocken <i>et al.</i> (2013)</b>	Value-mapping tool: based on identifying sustainable value captured, missed/destroyed, surplus/absence and opportunity, and developed to help companies create value propositions that are better suited to sustainability.	The tool does require some facilitation to get the best results
<b>Joyce; Paquin (2016)</b>	Triple layered business model Canvas: A tool for exploring sustainability-oriented business model innovation using three layers (economic, environmental and social ones) of the business model Canvas	Despite suggesting integration, it is based on a separated approach on the triple bottom line (TBL) pillars, without clear indication on how to integrate them. And also, It does not explores or evaluates the business model innovations
<b>Morioka; De Carvalho (2016)</b>	A conceptual framework for integrating sustainability performance into business.	Conceptual framework, without practical application
<b>Patala <i>et al.</i> (2016)</b>	A framework for building sustainable value propositions	Application in the manufacturing sector, without results in the service industry.
<b>França <i>et al.</i> (2017)</b>	FSSD (Framework for Strategic Sustainable Development): A unifying framework for sustainability analyses, planning, cross-disciplinary and cross-sector cooperation, and cohesive use of the myriad sustainability tools, methods and concepts	The framework has better results combined with other tools
<b>Yang, Miying; Vladimirova; Evans (2017)</b>	SVAT ( Sustainable Value Analysis Tool): to help companies recognize value uncaptured and turn it into opportunities	The tool is focused on the product life cycle may be not interesting for services
<b>Morioka; Bolis and Carvalho (2018)</b>	Sustainable Value Exchange Matrix (SVEM): to systematically integrate corporate sustainability principles (including economic, environmental and social goals; multi-stakeholder perspective and long-term outlook) into core business	It has greater potential with the presence of a moderator to conduct the sequence of the tool
<b>Kristensen; Remmen (2019)</b>	A framework for sustainable value propositions in PSS	Designed specifically for PSS

Source: the author.

Bocken *et al.* (2013) present the Value-Mapping Tool, a relatively simple design tool that can be the first step to drive business models into sustainability. It is only based on the concept of value creation and it requires a facilitator to help the understanding and reflections of this concepts. It instigates the identification of sustainable value opportunities by making explicit the sustainable value created and destroyed by the business model for each affected stakeholder. Joyce and Paquin (2016) expand the concepts of value, adding a triple bottom line perspective

to sustainability (economic, environmental and social), creating a holistic view of a business model based on the business model canvas. Patala *et al.* (2016) follows this idea to create a framework to design sustainable value propositions, but it is focused in a manufactured sector. Yang *et al.*, (2017) emerges in the literature with new perspectives to design sustainable business models. The authors, in the field of value proposition, brings the concept of value uncaptured to provoke a reflection of new sustainable value opportunities in new business models for the product life circle. The Sustainable Value Exchange Matrix (SVEM) designed by Morioka; et., al (2018), emerges with a new proposal from other tools and frameworks. SVEM is a practice-oriented framework to provoke a reflection to drive business model more sustainable.

It is possible to observe the diversity of frameworks by its propose and also its limitations, but it is worth noting the need of a facilitator for the application of practical actions and to evaluate the results (e.g., MORIOKA; DE CARVALHO, 2016; BOCKEN; YANG *et al.*, 2017). But it is also possible to find a lack in examples of practical applications Bocken *et al.*, (2014) in the literature

### 3 RESEARCH METHOD

To reach the research objectives, we follow the recommendations of Eisenhardt (1989) to create the structure of this multiple cases study. According to Eisenhardt and Graebner (2007), the multiple cases study provides a more in-depth investigation of the research questions and are probable to result in better theoretical.

First, a literature review of essential themes was conducted, such as business model, sustainable business model, and frameworks that support to integrate sustainability. It aided the development of the research question, revealing opportunity for deeper discussions on frameworks to integrate sustainability into business and their application in practice. Main literature analysis was presented in Chapter 2.

The following step was to choose the cases. According to Eisenhardt (1989), the selection of the cases should not be random and enable research replicability.

The selection criteria included cases with explicit sustainability aim within the business model and that they were at different business model design phase. Thus, three SVEM workshops were conducted. For the sample, in case A, it included 4 groups composed of university students in production engineering who designed business models in the initial idea generation phase; in case B, the second included 4 groups composed of university students in production engineering who designed business models in the idea refinement phase; in case C, it included a member of the market intelligence area of a multinational company aimed at generating ideas to innovate one of the existing products.

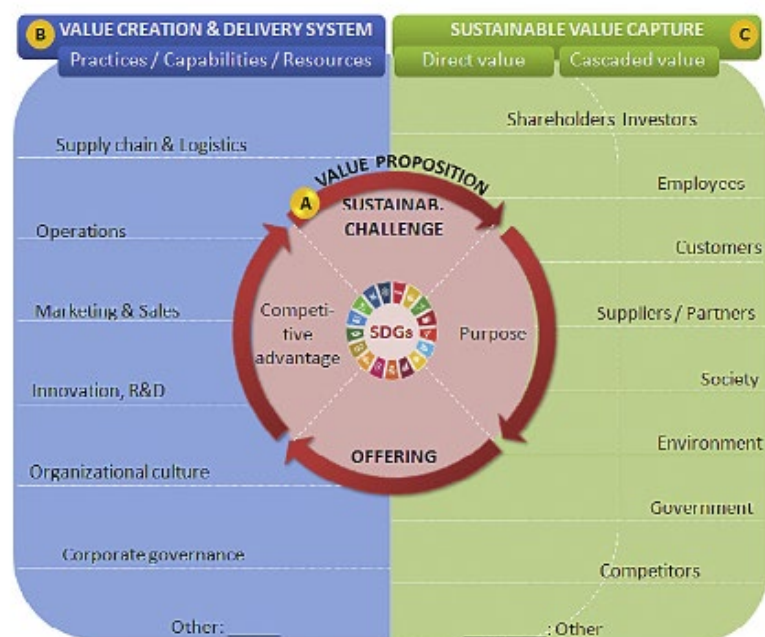
**Table 2** – Overview of business models

	<b>Business Model</b>
<b>Workshop A</b>	SBM_A1 - Sustainable food company SBM_A2 - Sustainable Bakery SBM_A3 - App to rent and share clothes SBM_A4 - Industry to produce sustainable toys
<b>Workshop B</b>	SBM_B5 - Solar energy company SBM_B6 - Sustainable food copany SBM_B7 - Professional training company SBM_B8 - Health care company
<b>Workshop C</b>	SBM_C9 - Beverage company

Source: Author

Data was collected in Brazil, during the period of April/2019 and April/2022, using the SVEM brainstorming sessions (workshops). The selected tool for the brainstorming sessions was the SVEM (Morioka, Bolis, & Carvalho, 2018), illustrated in Table 2. This research chose this framework due to its ease of application and the possibility to observe many elements of the business models. These sessions began with the explanation of key concepts, such as sustainable value, cascaded value, and sustainable business model. The tool application itself is encompassed by three elements: (1) Value proposition: A descriptive step to identify the context where the business model is inserted, the SDG's associated and the product and/or service offered. The (2) Value Creation & Delivery System: practices, capabilities, and resources required for the value proposition. (3) Sustainable Value Captured: analysis of the directed and cascaded sustainable value captured by each stakeholder.

**Figure 2 – Sustainable Value Matrix Exchange**



Source: Morioka, Bolis, & Carvalho, 2018

The value proposition (step 1), aims to provoke a reflection about the business existence, in this point, there is a reflection about the sustainable challenge, the purpose, the offering and competitive advantage of the business model. The value creation and delivery system (step 2)

intent to create a reflection about the practices, capabilities and resources necessary to reach the business model propose. The step (3) is directed to think about the direct and cascaded value by each stakeholder.

To drive the application for workshop (C) one moderator and for case (A) and (B) three moderators–researchers, familiar with the tool, applied each phase of the framework, using SVEM’s guide questions as reference. This sought to promote the discussion, and enable the brainstorming session.

Thus, our data sources include each group’s business model represented in their respective SVEM, spontaneous comments during the workshops and unstructured interviews about the conduction of the workshop itself. Based on these qualitative data, our data analysis includes within case, and cross case analysis, pointing out contrasts and similarities between this research and the perspective on literature.

## 4. RESULTS

The present section presents the results obtained through the application of the case study. The present points were based in comments and perceptions by the members in each workshop.

### 4.1. GENERAL OVERVIEW OF THE CASE A: DESCRIPTION OF THE SUSTAINABLE BUSINESS MODELS.

This section presents the business models proposed in each case, identified in this study as “SBM\_A1”, “SBM\_A2”, “SBM\_A3” and “SBM\_A4”, as described in table 3. In this case, the business models did not have had created their value proposition prior to the workshop and were invited to create it using the SVEM.

**Table 3** – Overview of business models presented in case A

	Sustainable value proposition	Sustainable value creation and delivery system	Sustainable value capture
SBM 1	Reduce waste of food by offering products near their expiration date for an affordable price	Supply chain and logistic; operations; Marketing and Sales; Organizational culture	Offer products near their expiration date for an affordable price for costumers and reducing waste and reduce economic loss to industry
SBM 2	Create a Sustainable bakery reducing the environmental impact	Inovation and P&D; operations; Marketing and Sales; Organizational culture	Reduce the waste of food and the negative impact on the environment
SBM 3	Reduce the consume of new clothes offering a platafform to share and rent clothes	Supply chain and logistic; Operations; Marketing and Sales; Organizational culture; Cooperative Governance	Reduce the environment impact and economic oportunit for people who wants to share and rent clothes
SBM 4	Produce sustainable toys ruding the environment impact	Inovation and P&D; operations; Marketing and Sales; Organizational culture	Offer opportunities of jobs to people who know how to work with green coconut fiber and reduce the impact on environment

Source: Author

It was possible to observe the positive changes on SBMs of the Workshop A, by the comments of the participants highlighting how the framework provides a holistic and systematic view of the business model. However, the value proposition was not so intuitive to SBMs at the concept design. To design and develop a value proposition, SVEM is shown to be more efficient with the step (2), given to the groups a holistic view of the SBM, allowing the groups to also have a view about the economic viability. The creation of a sustainable business model depends directly on their economic success through social and environmental activities, and if this does not happen, it is necessary to manage their sustainable activities to create an economic effect (SCHALTEGGER; FREUND; HANSEN, 2012). Besides, it was possible to observe a difficulty to generate a value proposition.

#### **4.2. GENERAL OVERVIEW OF THE CASE B: DESCRIPTION OF THE SUSTAINABLE BUSINESS MODELS**

This topic presents the value proposition, the sustainable value and creation system and the sustainable value capture of the sustainable business models identified in this study as “SBM\_B5”, “SBM\_B6”, “SBM\_B7” and “SBM\_B8”, described in table 4. Following, we indicate the perception and/or changes in the idea of SBM after applying SVEM, caught by spontaneous comments on the workshop.

**Table 4** – Overview of business models presented in case B

	<b>Sustainable value proposition</b>	<b>Sustainable value creation and delivery</b>	<b>Sustainable value capture</b>
<b>SBM 5</b>	To provide clean and sustainable energy to as many people as possible through the sale, installation and maintenance of solar panels.	Supply chain and logistic; operations; Marketing and Sales; Organizational culture	Provide a clean energy to the society and higher energetic security with economic and environment benefits to the government and environment
<b>SBM 6</b>	To promote a healthy lifestyle and develop small farmers through marketing and delivery of organic products.	Supply chain and logistic; operations; Marketing and Sales; Organizational culture	Develop the familiar agriculture and offer to the society a healthy lifestyle
<b>SBM 7</b>	To generate personal and professional growth through training and personalized mentoring	Innovation and P&D; operations; Marketing and Sales; Organizational culture	Provide more employability by developing people's skills
<b>SBM 8</b>	To offer health insurance plans that cover exams and appointments prepaid via mobile application.	Innovation and P&D; operations; Marketing and Sales; Organizational culture	Access to a private health care for economically vulnerable people providing a economic value to shareholders and the government

Source: Author

As a result, it was possible to identify that during the development of the groups' sustainable business models, and using the application of workshops and specific aspects of SVEM, this methodology resulted in relevant discussions about who were the affected stakeholders and how they affect their business. By exploring the value proposition and value captured by stakeholders with the direct and cascaded sustainable value, the group identified strengths and weaknesses of the business model, thereby providing new strategic directions for the business model. Evidence showed that from these reflections on the value captured by stakeholders, the groups were able to have a more comprehensive view of their models and the impacts generated by them. Besides, it was noted by the group that the framework provides a view of the business model from different perspectives than usual. A negative point raised by the participants was the difficulty in step B (value creation & delivery system) in a service company.

#### 4.3 GENERAL OVERVIEW OF THE CASE C: DESCRIPTION OF THE SUSTAINABLE BUSINESS MODELS.

This topic presents the value proposition, the sustainable value and creation system and the sustainable value capture of the sustainable business model, identified in this study as “SBM\_C9”, described in Table 5. Following, we indicate the perception and/or changes in the idea of SBM after applying SVEM, caught by spontaneous comments on the workshop.

**Table 5** – Overview of business model presented in case C

	Sustainable value proposition	Sustainable value creation and delivery system	Sustainable value capture
SBM 9	To provide potable water to who can not access it	Supply chain and logistic; operations; Marketing and Sales; Organizational culture; Inovations and P&D; Cooperative Governance	Promote the aecess to potable water for the society, creating a felling of bellonging to the colaborators and encouraging sustainable initiatives

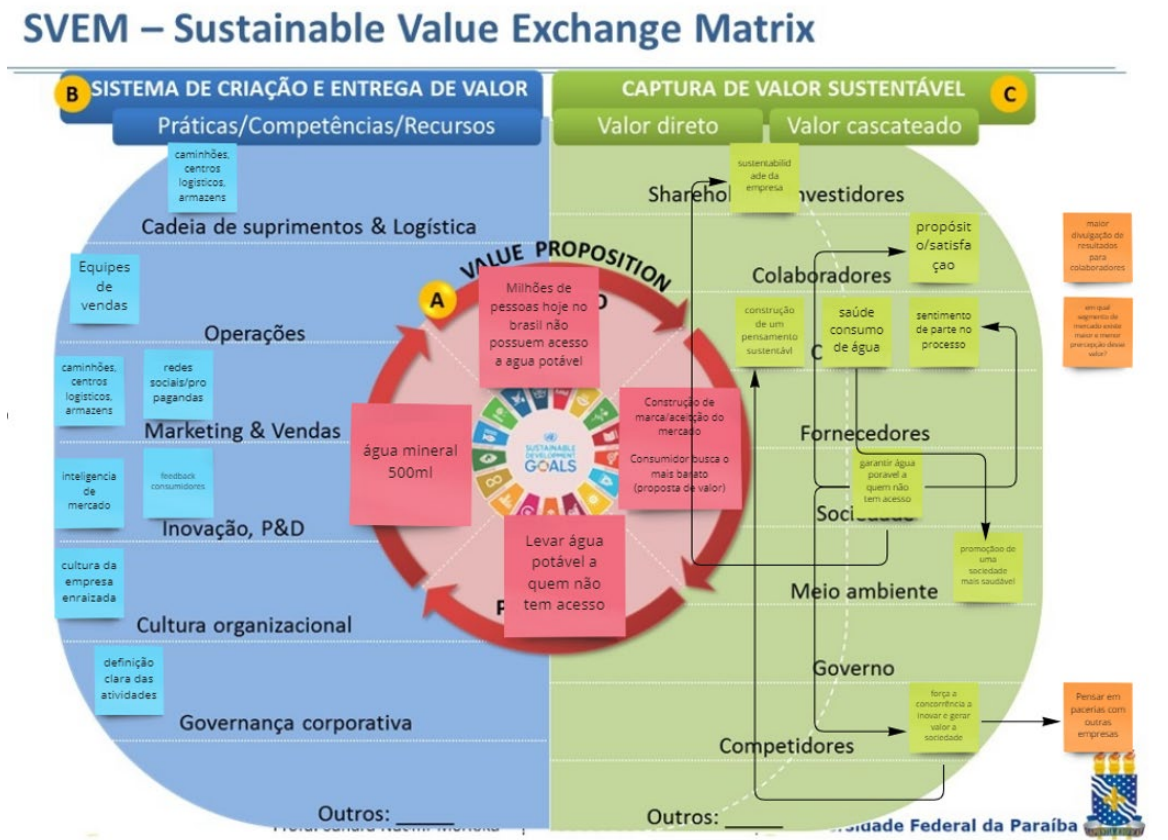
Source: Author

The SVEM was positively evaluated at the end of its application, and a greater benefit was observed in stage 3. Due to the objective of the application (to explore new ideas and strategies to make the business model more sustainable), the concepts of value proposition and creation system were already consolidated by the company, so this stage was more just for filling in than for actually thinking and brainstorming. However, in step 3, regarding the capture of value, combined with the concept of cascaded value provided a targeted brainstorming resulting in three possible sustainable business model innovation opportunities:

1. Identify the market segmentation where the product captures more value from the costumer;
2. Create a connection with the salesmen force and the propose of the product;
3. Search for partnerships with competing products.

These opportunities emerged after a reflection of the results obtained in step 3 of the SVEM. The idea of cascading value was essential to reach these, since the idea of "linking" values triggered business innovation opportunities. The figure 3 shows the SVEM filled in after application and it is possible to see the arrows linking the values and the insight taken.

Figure 3 – Sustainable Value Matrix Exchange after case C



Source: Morioka, Bolis, & Carvalho, 2018

Another interesting point in the application of SVEM was the value proposition. Due to the business model already having a value proposition created, SVEM was not so efficient. However, during the application, the point of listing the SDGs that the business model contributes was understood as the market challenges that the business model encounters. This insight can be interesting to contribute to the global view of the business model, since SVEM has nothing to do with the vision of competitors.

Some points were raised at the end of the application. For instance, it was suggested to apply again with a multidisciplinary team from the company (marketing, sales, logistics...), since different views would generate greater and better brainstorming, which would allow a more holistic debate to product and company respect. It was also pointed out that a previously knowledge about the company and products by the moderator facilitates the application and understanding.

## 5. DISCUSSION

The cross-case analysis of the present research is structured according to each stage of the SVEM workshop. Regarding step (1) from SVEM, the value proposition, the SVEM proposes a value creation by incorporating the analysis the propose, the offering, the sustainable development challenge and the competitive advantage associated to the business model, as a way to create a value proposition that combines the value economic, social and environmental and not a value proposition that understands those values as something segregate. Joyce and Paquin (2016) defend the idea that a value proposition should connect a vertical and horizontal coherence to understand the opportunities and integrate those opportunities in economic, social and environmental values. Patala *et al.* (2016) also proposes the construction of a value proposition based on the triple bottom line. Environment, social, and economic values must be considered as values together and not as something segregate. In practice, these indications from the literature are aligned with the present research. SVEM's stage (A) brought interesting contributions to Workshop A, proposing a reflection of the value proposition previously created, and even improved the value proposition towards including environment values. In contrast, the step (A) from the framework did not have the same performance on the Workshop B. The groups had some difficulties to create their value proposition. To understand the competitive advantage of a sustainable business model may not be easy at the concept design phase of a sustainable business model. The literature also brings frameworks targeted to specific types of sustainable business models. For instance, there are tools to support design of value proposition in product service systems ((KRISTENSEN; REMMEN, 2019); in circular business models (ANTIKAINEN; VALKOKARI, 2016), as a way to direct the most adaptable tool, to the specifications of the business model. As for the C workshop, the SVEM did not show such an effect due to the maturity of the company and its product.

SVEM's stage (B), in which it is possible to analyze the capabilities, practices, and resources needed to create and deliver the value of the SBM, is one of the most significant differentials of SVEM. It is possible to find in the literature frameworks to support this analysis (e.g. (RICHARD, 1993)), but it is unusual to find studies that apply this concept to sustainability. In Workshop B, this stage helped one to note the economic non-viability of their SBM. It is a descriptive stage that gives one of the propositions of the framework: the holistic view.

In contrast, in Workshop A, SVEM helped the SBMs, especially with the analysis of the value captured by stakeholders (step C). This is crucial for new business models, as the integration of the stakeholders to the business models is linked to the economic performance (DANSO *et al.*, 2019). Between case A and B, it is possible to observe distinct results. The first workshop, with the value proposition already delineated, the groups could focus more on their stakeholders and think how they are included in the SBM. On the other hand, in the second workshop, where the groups were invited to create their value proposition, the step (B) was more explored, once the groups need to mature the idea and to understand more their needs.

To design and develop a value proposition, SVEM is shown to be more efficient with the step (B), given to the groups a holistic view of the SBM. In contrast, in case B, SVEM helped the SBMs, especially with the analysis of the value captured by stakeholders (step C). This is crucial for new business models, as the integration of the stakeholders to the business models is linked to the economic performance (DANSO *et al.*, 2019). Table 6 summarize the main contributions and limitations founded in each case of SVEM application.

**Table 6** – SVEM’s contributions and limitations

	<b>Contributions</b>	<b>Limitations</b>
<b>Case A</b>	It created a holistic of the sustainable business model in the creation and delivery system. It helped to evaluate the viability of the SBM	Difficults to create a sustainable value proposition
<b>Case B</b>	It identified strengths and weaknesses of the business model by the exploring the value capture system	The value & delivery system were not effective
<b>Case C</b>	It helped model innovation opportunities by analyzing cascading value provided	The value proposition and creation system were not effective

Source: Author

It is possible to observe distinct contributions and limitations in each case. In case A, SVEM provided to the SBMs an holistic view of the business that helped the identify its viability.

Besides, it was difficult to create a sustainable value proposition by the difficult to understand some concepts linked to sustainability. In other hand, SVEM also showed effective to create a holistic view that allowed to explore strengths and weakness, but unlike case A, it was possible by the analyses of stakeholders and value capture system in cases B and C. The value creation and delivery system did not show to be effective due the maturity of the business model. Table 7 explore by a matrix that relate the level of business model maturity and the effectiveness of each SVEM's step as 1 as low effectiveness, 2 neutral effectiveness and 3 high effectiveness.

**Table 7 – SVEM's step effectiveness per level of business maturity**

		SVEM's step		
		Value Proposition	Value Creation and delivery system	Sustainable Value Capture
Level of business model maturity	High	1	1	3
	Medium	2	1	3
	Low	1	3	2

Source: Author

One strength observed during SVEM workshops was the sustainable value capture (step 3). In medium and high maturity business models this step (3), provoked positive results, creating insights and opportunities. In low maturity business models, the, this step presented a neutral effectiveness due the low understating of the business model.

The step (2) showed more effectiveness only in low maturity business models. It helped to create a holistic view of practices, competences and resources necessities to create the sustainable business model. For high and medium low maturity business models, these aspects are already consolidated and it is not so effective. Lastly, the step (1) was not so effective in all cases. In the case A, the difficulty was by the distance of the business models to the concepts

of sustainability. In the case B and C, the already created sustainable value proposition removed the effectiveness of the step, but it is possible to map an opportunity to propose new reflections on this step.

Thus, it is possible to point suggestions to SVEM and further applications:

1. Explain the concept linked to sustainability before that application;
2. Identify the level of business maturity and focus in the most effective step;
3. Provoke a reflection in the value proposition about the market challenges that the business model encounters;
4. Provoke a reflection about the business competitor.

Also, it is important to highlight that there are frameworks directed to specific types of sustainable business models (e.g. (KRISTENSEN; REMMEN, 2019); (ANTIKAINEN; VALKOKARI, 2016)). However, this study indicated that the kind and moment of the sustainable model is also the key to select the best framework.

## **6. CONCLUSION**

The present research reaches its purpose to create a theoretical background for business model innovation tools frameworks; to analyze business models using the SVEM and to identify the limitations of SVEM application, conducting a multiple study based on three cases. As a practical outcome, this research explores the contributions and limitations of SVEM to design sustainable business models. It was possible to observe how the framework performance with heterogeneous sustainable business models, different scenarios and business models at different times of their creation. This allowed a broader view of the analysis of the tool and propose recommendations for further applications. As demonstrated SVEM provokes a positive impact to drive business models into sustainability and the application can be more beneficial understanding the business model maturity.

In a general perspective, this research contributes to the literature by exploring a practical case of sustainable business framework. Also, this paper contributes to the literature bringing the literature background of sustainable business models innovation and business model innovation tools and an exploratory mapping of the main tools and frameworks. It can be helpful in further applications and researches. The rapidly growing numbers of publications limited the sample of articles in this research. The choice of the sample in the cases is also a limitation in this research. Thus, future studies are invited to explore other frameworks and tools.

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