

## Article

# Business Model Innovation for Sustainable Value Creation in Construction Companies

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**Abstract:** This paper aimed to analyze how innovations in the business model contribute to creating sustainable value in construction companies. The results revealed that analyzed companies implement practices that enhance their reputation and contribute to the environment while securing economic benefits. These practices include material reuse and replacing traditional processes with renewable ones (installing photovoltaic panels and rainwater harvesting). Companies also have tried to integrate with the community through sponsorships, primarily in sports and cultural events, and assistance to homes for the elderly and needy educational institutions. Companies need to implement processes that contribute to the rational use of water and waste reduction during construction projects despite the results. Furthermore, this study has the importance of identifying actions that are oriented towards generating benefits for society and the environment and analyzing them from the perspective of the creation of sustainable value from innovations in the business model.

**Keywords:** innovation; business model; sustainable value; sustainability; construction; technology; social; organizational; sustainable processes; sustainable business model



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## 1. Introduction

Construction companies have great relevance for the economy of any country, and they generate significant social effects due to the transformation they promote in cities and environmental impacts due to high demand for raw materials. Therefore, research clarifying how these companies can contribute to the premises of sustainability to enable social, environmental, and economic well-being is paramount. In companies, sustainability is commonly operationalized through the triple bottom line approach which contemplates three dimensions: the economic dimension (emphasizing profit), the environmental dimension (concerned with natural capital), and the social dimension (concerned with social welfare) [1].

Organizational activities previously seen as responsible for numerous social and environmental problems have begun to be considered important drivers of sustainability [2]. New organizational models have the challenge of co-creating economic profits through sustainable business [3]; that is, they must be able to generate economic value and contemplate social and environmental issues [4].

Economies of several emerging countries, such as Brazil, are transitioning towards the circular economy, with strategies to reduce and maximize the efficiency of their resources. Sustainable business models are useful tools for this change when the value proposition focuses on maximizing resources, reducing price, and appealing to socio-environmental products, creating and delivering value by developing new markets, and with reuse

and value capture systems, by reducing costs from the economy of previously wasted resources [5].

As a result of the relationship between sustainable development and the business model, concepts including the circular business model have emerged. This concept is based on a production and consumption model that promotes the reuse, repair, recycling, and reconditioning of materials and products to extend their life cycle as much as possible, thereby helping to minimize waste [6].

In this context, a highly sustainable business model creates ecological, social, and economic value [7]. Thus, sustainability should be placed at the center of the business model through innovations to create meaningful positive impacts and significantly reduce negative impacts to the environment and/or society through changes in value creation, delivery, and capture [2,8]. Several market sectors seek to adapt to this new scenario, including construction [9]. Construction projects typically involve numerous stakeholders (clients, contractors, and suppliers), have a series of stages (design, construction, operation, and maintenance), use a wide range of materials (concrete, cement, wood, and steel), and have intensive use of resources, producing large volumes of waste throughout the stages and for extended periods [10].

Given the scenario described herein, this manuscript aimed to analyze how innovations in the business model contribute to creating sustainable value in Brazilian companies in the construction sector while considering the archetypes proposed by Bocken et al. [8] and the creation of sustainable value from innovations according to the model of Hart; Milstein [4]. Construction companies were surveyed to investigate which innovations have already been implemented in the business model and how sustainable value is generated.

Given the importance of reconciling economic development with social gain or new generations, this investigation demonstrates how civil construction, specifically through environmental construction practices, innovates a business model to create value in all facets of sustainability. Hence, we intended to contribute to research that aligns with the construction industry and sustainability, since this relationship is important for the agenda of governments, the academic community, and practitioners, among others [11].

Furthermore, the aim was to disseminate actions that can favor society and the environment, as an aspect that can be seen as a barrier to applying environmental sustainability in construction logistics is the lack of knowledge about sustainable practices [12].

The results indicated that through innovations in the business model, construction companies have already incorporated sustainable practices into their operations and projects, although they prioritize creating sustainable value in dimensions with quick financial returns and that benefits their corporate image.

To present the results of this study, this manuscript is structured as follows: Section 2 provides a theoretical framework and assumptions, and the study method is described in Section 3 followed by the results in Section 4 and the discussion in Section 5. The conclusions are presented in Section 6.

## 2. Theoretical Framework

The theoretical framework of this study is structured in three sections: sustainability in construction followed by innovation in the business model, sustainable value creation, and lastly, the conceptual model and assumptions.

### 2.1. Sustainability in Construction

Sustainability is a challenge of grand proportions for construction throughout the world, including Brazil [13]. Brazilian civil construction has a substantial economic and social impact, given that it represents about 3.9% of the gross domestic product (GDP) and provides employment for up to 7.3% of the population [14]. Globally, the construction industry is responsible for roughly 10% of the global GDP and employs 100 million people [15].

Brazil has the characteristic of providing durable products with long-term environmental repercussions [16], although the impact extends from the extraction of raw materials to the end of the useful life of the products built and after with the reuse, recycling, or disposal of their parts [17].

Sustainable practices are already employed in the construction sector, such as reusing materials during the construction process, reusing and recycling materials, and water monitoring in construction sites and buildings [18–20]. In addition, other practices including incorporating environmentally friendly and more durable materials (e.g., tiles and coatings) that do not require frequent repainting have also proven to be of great value to the environment [21]. Energy optimization has also attracted substantial interest, considering that taking advantage of solar energy via photovoltaic panels produces benefits to residents and reduces energy bills [22].

Nonetheless, one major obstacle that must be overcome in the construction industry is the high waste generation since it involves planning, organization, and selecting recyclable materials from rubble [13], which can be mitigated by reusing leftover materials for other purposes and employing prefabricated solutions. This is a promising path to efficiency in construction sites that reduces construction time and improves financial and environmental performance by decreasing waste [23], representing a promise for the sustainable transformation of the construction industry [24].

Houssein et al. [25] reported that the use of sustainable and durable materials in construction, modular and prefabricated elements, and material reuse practices through waste plans and standards to ensure the quality, traceability of recycled materials, and the provision of guidelines and training for demolition companies, among other factors, are crucial for the construction industry to transition civil society into a circular economy. Nunes-Cacho et al. [26] added that this change is not just a matter of social responsibility but has also become a strategic factor that guarantees the future continuity of companies.

In addition, to enhance sustainable practices in the construction industry's supply chain, it is important to implement a selection of suppliers with verification from environmental licenses to good practices with employees [27,28].

In general, among the benefits of introducing sustainability in construction is natural resource conservation, environmentally sound construction and maintenance, improved building energy efficiency, lower total cost and waste of construction projects, better attributes and skills of the people involved, higher comfort and health levels of users, and greater employee satisfaction and productivity [29].

The construction sector is very important for the economy, so the sustainable approach results in several opportunities to improve the companies' performances.

## *2.2. Business Model Innovation and Sustainable Value Creation*

The business model provides the data and evidence that demonstrate how companies create and deliver value to customers, and describing the structure of revenues, costs, and profits, [30] reported that business model innovation is seen by most managers as risky behavior since it implies changes in existing management forms and tends to be costly and unpredictable in terms of outcome [31]. Meanwhile, Rumble and Minto [32] noted that many highly successful companies have managed to modify, create, and capture markets by learning about business models in other industries and adapting and applying them to their own.

While some companies have already developed management models that incorporate social and environmental aspects, others still hesitate to insert these variables into their decision-making processes [33], as most managers still consider sustainability a one-dimensional nuisance and not a business opportunity [4]. The current linear model of production and "consumption-disposal" demonstrates resource depletion and threatens the future. The change to a circular economy model more aligned with sustainability represents a need to make the functioning of organizations viable [34], modifying the structure and

form of business, especially considering the reuse for financial gains and contribution to future social and environmental benefits [35].

Sustainability-oriented business models help describe, analyze, manage, and communicate (1) a company's sustainable value proposition to customers and stakeholders; (2) how it creates and delivers such value; and (3) how it captures value while maintaining or regenerating natural and social capital across organizational boundaries [3].

Innovations are paramount to overcome the challenges of a sustainable future and changing the core of the business model to address unsustainability at its source and not just as an add-on to counter adverse business outcomes. Bocken et al. [8] described the three types of innovation (technological, organizational, and social) that should be applied in the business model through eight archetypes to make it sustainable, as listed in Table 1.

**Table 1.** Innovations for a sustainable business model.

Innovation	Archetype	Definition
Technologies	Maximize energy and material efficiency	Do more with fewer resources, generating less waste, emissions, and pollution.
	Create value from waste	Eliminate the concept of "waste" by transforming existing waste streams into a useful and valuable contribution to other production processes and provide better utilization of underutilized capacity.
	Substitute with renewables and natural processes	Reduce environmental impacts and increase business resilience by identifying resource constraints associated with non-renewable resources and current production systems.
Social	Deliver functionality rather than ownership	Provide services that satisfy user needs without users having physical products.
	Adopt a stewardship role	Proactive engagement with stakeholders to ensure long-term health and well-being.
	Encourage sufficiency	Solutions that actively seek to reduce consumption and production.
Organizational	Adapt for society/environment	Prioritize the delivery of social and environmental benefits over the maximization of economic profit (i.e., shareholder value) through close integration between the company and local communities and other stakeholders.
	Develop scale-up solutions	Deliver sustainable solutions at a large scale to maximize benefits to society and the environment.

Source: Adapted from Bocken et al. [8] and Kneipp [36].

Hart and Milstein [4] reported that organizations could face the challenges associated with sustainability with strategies and practices that contribute to simultaneously generating economic value to shareholders, society, and the environment if they advance in this theme via four dimensions (Table 2).

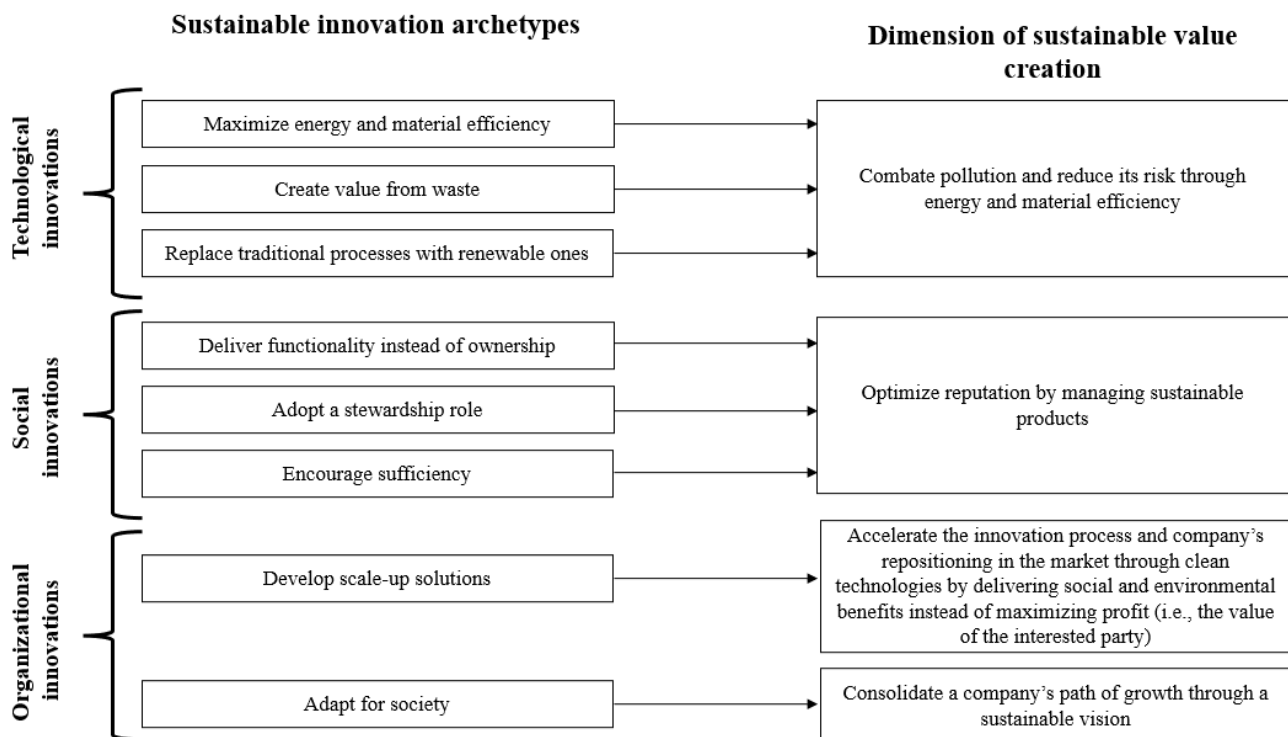
**Table 2.** Dimensions for sustainable value creation.

Aspect	Dimension
Environmental	Increase profits and reduce environmental risks by combating pollution.
	Accelerate the innovation process and the company's repositioning in the market through clean technologies.
Social	Optimize the reputation and legitimacy in society with sustainable product management.
	Consolidate a trajectory of organizational growth through a sustainable vision.

Source: Adapted from Hart and Milstein [4].

### 2.3. Conceptual Model and Assumptions

In order to better understand how business model innovations are capable of creating sustainable value, the conceptual model for this study was developed; it analyzed the business model innovation archetypes proposed by Bocken [8] and the sustainable value creation categories of Hart and Milstein [4], as shown in Figure 1.



**Figure 1.** Conceptual model of this study. Source: Prepared by the author according to Bocken et al. [8] and Hart and Milstein [4].

As demonstrated in Figure 1, the conceptual model of this study sought to relate the sustainable innovation archetypes with the dimensions of sustainable value creation to contribute to achieving the proposed objectives.

To fulfill the objective of analyzing how business model innovations create sustainable value, assumptions were formulated to serve as the basis for the analysis and discussion of the results. Notably, the propositions were formulated based on the literature review and the conceptual model.

### 2.3.1. Technological Innovations Reduce Environmental Risk and Combat Pollution

Hart and Milstein [4] argued that companies pursuing pollution prevention and waste reduction strategies reduce their costs and increase their profits. In other words, preventing pollution is a quick way to increase the economic value for owners and shareholders and profitability by using fewer materials, consequently improving environmental responsibility. Aguilera-Caracuel and Ortiz-de-Mandojana [37] argued that innovative organizations enhance their internal processes and consequently their products, thereby reducing their operating costs.

Exploring new resources and innovations in manufacturing processes also reduces costs and increases profits [38]. A lean approach reduces costs by decreasing demand for resources and waste [39], and increasing recycling and material reuse is of crucial importance to achieve this approach [40]. Nevertheless, replacing traditional processes with renewable ones also contributes to a better alignment of the customer's (and society's) needs with those of the manufacturer, breaking the traditional link between profit and volume of production (although probably not the volume of use), reduces resource consumption, and provides longer product durability as well as material reuse [8]. Thus, based on the above, the following assumption was made:

**Assumption 1.** Energy/material efficiency, value creation from waste, and replacing traditional processes with renewable ones increase profits and reduce environmental risks by combating pollution.

### 2.3.2. Social Innovations Improve Reputation and Legitimacy through the Proper Management of Sustainable Products

Sustainable competencies that emerge from the pursuit of clean technologies are critical for a firm to reposition its internal skills to develop and take advantage of future markets and reduce harmful impacts by using resources more efficiently [4,41]. Bocken et al. [8] believed that by offering a product-service system, it is possible to modify production systems by aligning them to better customer needs while also breaking the link between profit and production volume without impairing user usage. Curley and Salmelin [42] further added that this system represents a breakthrough for a more intelligent and sustainable lifestyle. This change may modify consumption patterns (lifestyles) and accelerate the transformation towards sustainable societal processes [43]; however, success depends on consumers' perception of being benefited by the replacement of ownership with the use of the service [44].

Bocken et al. [8] also advocated companies maximizing positive social and environmental impacts on society, ensuring stakeholders' long-term health and well-being (including society and the environment) when through their business models, they actively seek to contribute to sustaining and developing the well-being of their value networks. Lippe and Bäck-Wiklu [45] stated that one of today's most pressing challenges is to ensure that improvements in economic competitiveness are not achieved at the expense of quality of life or by increasing inequality among people. The awareness of creating mutual benefits between companies–stakeholders–society/environment is already present in organizations with the premise that their actions can contribute to the environment while developing a healthy and efficient business environment [46]. When companies encourage sufficiency, whether in their processes or products, they seek to reduce consumption by ensuring the durability and longevity of the product or service and its responsible provision [41]. Hence, the following assumption was made:

**Assumption 2.** *Delivering functionality rather than ownership, adopting a stewardship role, and encouraging sufficiency improve the company's reputation and legitimacy in the eyes of society.*

### 2.3.3. Organizational Innovations Accelerate the Process of Innovation and Market Repositioning and Consolidate a Growth Trajectory through a Sustainable Vision

Sustainable competencies that emerge from the pursuit of clean technologies are critical for a company to reposition its internal skills to develop and take advantage of future markets [4]. These competencies can also increase operational efficiency, resulting in higher revenues and increased sales, winning green markets, and marketing environmentally friendly goods and services [47]. A sustainable vision by organizations that facilitates creating a shared roadmap for tomorrow's business provides guidance to managers and employees in terms of organizational priorities, develops technologies, improves resource allocation, and helps design new business models [4]. In the current scenario of society's awareness, Porter and Kramer [48] stated that successful companies must be inserted into a healthy society, aligning its activities with the promotion of a mutually positive partnership among all stakeholders [18].

Organizations must seek to abandon the current economic model that prioritizes consumption-disposal with a high environmental impact. A circular economy is an option that facilitates the reduction in consumption and reuse of resources, and the possibility of recycling [49].

Realigning businesses and society can lead to new opportunities where positive contributions from society and broader stakeholder concerns become part of the business model [7]. This is pivotal to broadening the audience and including various community members and stakeholders [50]. Organizations are increasingly concerned with strengthening and improving socio-environmental practices to improve a positive corporate image and minimize negative evaluations in an increasingly dynamic market [51]. Scale-up solutions refer to providing sustainable alternatives at a large scale to maximize benefits to the

environment and society. Innovations that contribute to this should include impact investment, slow capital, and collaborative and open innovation platforms [39]; the support and commitment of top management are essential for developing and properly implementing innovations with an environmental bias [37]. In this way, Lopes et al. [52] argued that open innovation should be widely used as a strategic and continuous process of research, development, and business innovation in companies that goes beyond their boundaries to suppliers, customers, and the community. Given the above, the following assumption was made:

**Assumption 3.** *Prioritizing delivery of socio-environmental benefits through close integration between the company and community and the availability of sustainable solutions at a large scale accelerates the process of innovation and market repositioning through clean technologies and consolidates a growth trajectory through a sustainable vision.*

The methodological procedures that guided the study are presented below.

### 3. Method

In this section, the methodological procedures of this study are presented.

#### 3.1. Study Characterization

This study had a qualitative approach and worked with non-numeric data with meanings and the relationship between them through structured or semi-structured methods [53]. The exploratory nature was chosen, through which the literature provided a basis for the concise definition of the problem statement, making discoveries and forming relationships between them [54].

#### 3.2. Data Collection

Data collection occurred through semi-structured interviews and counted on the participation of people in charge of construction companies in Santa Maria (Rio Grande do Sul State, Brazil). The collection instrument was composed of questions referring to innovations in the business model adapted by Bocken et al. [8] and Kneipp [36] and questions referring to sustainable value creation prepared using the model of Hart and Milstein [4]. The companies were selected considering their relevance in the regional context. They all have multiple projects and have annual profitability above BRL 5 million. Before application, the interview protocol was analyzed by three experts in the field of sustainability. The details of the data collection process are listed in Table 3.

**Table 3.** Survey data collection.

Construction Company	Interviewee	Instrument	Duration
Beta	Director	Interview	31 min
Delta	Director	Interview	32 min
Zeta	Responsible for work safety and environmental engineering	Interview	28 min
Omega	Technical director	Interview	39 min

Source: Research data.

To complement the data collection, documentary research was conducted in publicly accessible sources such as newspapers, institutional advertisements, social networks, and websites. This complementation provided materials that have not yet received analytical treatment but contributed to understanding the practices used by the surveyed companies [55].

### 3.3. Data Analysis

Data were analyzed using the content analysis technique, which allowed the systematic and objective description of the communication content [56]. The Nvivo software version 10 (© QSR International, Burlington, MA, USA) was used for analysis, in which corresponding categories were created for each category of business model innovation and sustainable value creation.

## 4. Presentation of the Data

Initially, a brief characterization of the companies studied is presented, followed by the main evidence obtained from the data collection.

### 4.1. Company Characterization

The Beta company was founded in 2003; it builds commercial and residential properties. In 2013, it obtained the ISO 9001 certification. Its values are the search for innovation and sustainable development. Its projects aim to reconcile urban growth and development in harmony with the environment, always through innovations in construction and emphasizing the rational use of water. Additionally, it has 42 direct employees distributed in the administrative and operational areas.

The Delta company started its activities in 1994, and its main product is residential commercial properties with one and two bedrooms. Since the beginning of its activities, the company has sought to innovate to stand out in the market. As of 2015, it modified its operations to achieve better performance in construction projects, including reducing resources through modern construction techniques. It has 111 direct employees distributed between the administrative and operational areas.

The construction company Zeta began its activities in 2007, and its main product is residential and commercial properties. Its purpose is to develop the local economy by providing investors with quality of life and return on investment. It has 14 direct employees and 58 in outsourced activities.

The company Omega was founded in 2011 and builds residential buildings with the concept of “living well,” which seeks to improve residents’ quality of life. In 2017, the philosophy of sustainable development began, where all projects, in addition to being designed with sustainable techniques, also incorporate sustainable aspects into the buildings. It has certificates issued by the Brazilian government and financing banks for its practices. It has 123 employees distributed between the administrative and operational areas.

The data obtained in the study considering each premise in Section 2 are presented below.

### 4.2. Evidence Obtained from the Study Data

Regarding Assumption 1—energy/material efficiency, value creation from waste, and replacing traditional processes with renewable ones increase profit and reduce environmental risk by combating pollution—it became evident that the technological innovations adopted by the construction companies (Beta, Delta, and Omega) have introduced reusable forms and metal struts for concrete reinforcement, reducing the use of wood for this purpose and minimizing the environmental cost of deforestation while increasing their profit for the economy in the purchase of these inputs.

The generation of value from waste in civil construction refers to the use of waste. The analyzed construction companies use it for soil preparation and landfills, seeking savings with the transport and proper destination of these materials. Regarding replacing renewable processes, the construction companies Beta, Delta, and Omega implemented sustainable innovations such as installing photovoltaic panels in buildings, capturing rainwater for reuse, and treating contaminating waste (cooking oil) before being released in the sewer network. These technological innovations aim to minimize the environmental impact of construction throughout the useful life of the buildings; the increase in profit is related to the savings provided from the implementations, both during the construction process and after.



The primary evidence of the innovations introduced by the analyzed companies and the creation of value is listed in Table 4.

**Table 4.** The main evidence of Assumption 1.

	<b>Main Innovations in the Business Model</b>	<b>Increase Profit and Reduce Environmental Risk by Combating Pollution</b>
Energy and material efficiency	<ul style="list-style-type: none"> <li>• Plastic formwork</li> <li>• Reusable metal struts</li> <li>• Construction techniques designed for less use of concrete</li> </ul>	Decreased environmental impact on buildings during their construction in their lifetime and improved economic performance by saving costs during the construction process and with subsequent maintenance
Generation from waste	<ul style="list-style-type: none"> <li>• Reuse of waste for landfills</li> </ul>	
Replacement of traditional processes with renewable ones	<ul style="list-style-type: none"> <li>• Introduction of renewable energy (photovoltaic panels) in buildings</li> <li>• Rainwater harvesting</li> <li>• Collection of polluting waste for sewers</li> </ul>	

Source: Prepared by the authors from interviews and secondary data.

The social innovations implemented varied according to the individual management style, meaning there is no standard on how each organization improves its reputation and legitimacy.

Regarding replacing the property with functionality, there was resistance from managers, who consider them risky in the face of the strong perception of the need for property in the consumer market. However, providing a central gas system in buildings is a cultural change in Brazilian households that do not have piped gas tradition. The construction company Delta designs its projects with the option of having a rotating parking system since residents do not always choose to buy a parking space along with the property, thereby allowing them to rent according to their future necessities.

The stewardship role, which seeks to expand social responsibility practices, depended on the management style and variables experienced by each company. The company Beta prioritizes the quality of life of its employees, above all in matters of health, dentistry, and sex education. The Delta company does not have a defined policy, although it seeks to value its employees and has a pedagogical monitoring program guided by education professionals, which aims to help the employees' dependents during the school period.

Zeta's musical incentive program is linked to a charitable, religious association for underprivileged children. Omega does not have a specific benefit structure; it analyzes the needs individually, and when it has the appropriate conditions, it helps its employees. A point to be improved by the analyzed companies is the responsibility for socio-environmental practices throughout the supply chain.

According to the manager of the Delta company, the impossibility of carrying out such an inspection is a factor to be explored since the requirement for certifications or correct practices could encourage the expansion of sustainability in the sector.

The incentive of the role of sufficiency was present in the companies Beta, Delta, and Omega that have already implemented innovations in buildings. In this archetype, the company Omega stood out. It has the "Blue Seal" certification granted by the largest Brazilian public housing investment bank to companies with sustainable practices in their construction process. Encouraging sufficiency is created by implementing sustainable innovations in construction works to improve residents' quality of urban life.

As for Assumption 2—delivering functionality rather than ownership, adopting a stewardship role, and encouraging sufficiency to improve the company’s reputation and legitimacy in the eyes of society—the data are listed in Table 5.

**Table 5.** Main evidence of Assumption 2.

	<b>Main Innovations in the Business Model</b>	<b>Improve the Company’s Reputation and Legitimacy in Society</b>
Deliver functionality instead of ownership	<ul style="list-style-type: none"> <li>• Piped central gas system replacing bottled gas</li> <li>• Rotating parking system</li> </ul>	Provides convenience to residents
Adopt a stewardship role	<ul style="list-style-type: none"> <li>• Educational instruction, professional training courses for employees on occupational care</li> <li>• Subsidized dental treatment</li> <li>• Pedagogical child support for employees’ dependents</li> <li>• Providing assistance as needed</li> </ul>	Social responsibility actions aim to help employees with internal stakeholders, thereby contributing to a socially responsible perception of management.
Encourage a role of sufficiency	<ul style="list-style-type: none"> <li>• Durable coating</li> <li>• Solar energy</li> <li>• Rainwater harvesting</li> <li>• Valve against river overflow in adjacent roads</li> </ul>	Consumers’ perception of an environmentally friendly posture

Source: Prepared by the authors from interviews and secondary data.

The social innovations in the civil construction companies analyzed seek integration with the community through incentives, especially in the sports field, due to being widely publicized and increasing the visibility of brands. Donations to non-profit institutions, however, are less publicized. Developing a scale of solutions has been less explored, with no sharing of information on sustainable innovations since managers consider it a competitive advantage that should not be disclosed. We also noticed the lack of links or partnerships with higher education institutions, which are known as sources of innovation.

The assumptions are discussed based on the reference and the data obtained in the next section.

Regarding Assumption 3—prioritizing delivery of socio-environmental benefits through close integration between the company and community and the availability of sustainable solutions at a large scale accelerates the process of innovation and market repositioning through clean technologies and consolidates a growth trajectory through a sustainable vision. Table 6 shows the evidence obtained in the archetypes and sustainable value creation.

The results of this study are presented in the following section.

**Table 6.** The main evidence of Assumption 3.

	<b>Main Innovations in the Business Model</b>	<b>Accelerate the Process of Innovation and Repositioning through Clean Technologies and Consolidates a Vision of Sustainable Development</b>
Adapt to society/environment	<ul style="list-style-type: none"> <li>• Sponsorship in cultural events</li> <li>• Sports sponsorship</li> <li>• Donations to charities</li> </ul>	The analyzed companies seek integration with the community by sponsoring events and donating to charity.
Develop solutions scale	<ul style="list-style-type: none"> <li>• Benchmarking</li> <li>• Business fair</li> <li>• Partnerships to implement specific innovations with suppliers</li> </ul>	The scale of sustainable solutions is still less explored, with limited benchmarking with other companies in the sector

Source: Prepared by the authors from interviews and secondary data.

## 5. Discussion of Results

The assumptions formulated based on the theoretical framework in Section 2 with the data presented in the research are the basis for the discussion.

### 5.1. Assumption 1—Energy/Material Efficiency, Value Creation from Waste, and Replacing Traditional Processes with Renewable Ones Increase Profit and Reduce Environmental Risk by Combating Pollution

The results indicated that Brazilian construction companies already employ practices regarding material reuse during construction projects, such as using metallic props to avoid the use of wood and techniques that are considered modern (e.g., reusable plastic molds that accelerate and flexibilize construction projects while reducing environmental impact). Sustainable practices achieve better performance for companies since taking advantage of new resources and innovations reduces costs and increases profits, demonstrating that value opportunities can be found in strategies to decrease resource and cost waste through lean approaches [38,39]. A less explored theme in Brazilian construction is prefabricated buildings. This promising approach may change the industry with the advantage of better standardization and quality, fast assembly, material reuse, and higher productivity compared to traditional construction techniques [24]. The rational use of water during construction projects is another aspect that deserves attention, in which it is perceived that there are still few actions in this direction. Implementing adequate water conservation measures with monitoring and control at construction sites is indispensable to ensure that waste is minimized, and improvements are made to use water efficiently and appropriately [20].

Although seen by construction companies for the economic benefit, reducing material waste still presents few behaviors implemented in the analyzed companies, including the reuse of materials intended for landfills. A highly efficient way related to this reduction is recycling rubble to obtain aggregates, which basically involves selecting recyclable materials from the rubble and crushing them in the appropriate equipment [13]. Replacing traditional processes with renewable ones concerns the final product of the companies, and some implementations such as rainwater harvesting for everyday cleaning use and photovoltaic panels for power generation are already a reality in modern buildings. The benefit of employing renewable energy and natural processes may help reduce resource depletion and the corresponding value destroyed, for example, due to climate change and negative impacts on local species and populations [39].

From the practices used in construction, it is possible to verify the opportunity to obtain economic gains and at the same time contribute to reducing negative environmental impacts

from its activities through efficiency in the construction projects. Organizations have become aware of the possibility of creating a “win-win-win” situation (company–customer–society/environment) when due to their actions, they help the environment and society and contribute positively to developing the business healthily and efficiently. Therefore, the so-called “sustainable initiatives” can bring environmental well-being and consistent profits to any company. In fact, this understanding was already proven in construction companies that have introduced innovations with a sustainable bias in production processes and products [46]. The following assumption analyzes whether business model innovations improve the companies’ reputation and legitimacy in the market.

*5.2. Assumption 2—Delivering Functionality Rather Than Ownership, Adopting a Stewardship Role, and Encouraging Sufficiency Improve the Company’s Reputation and Legitimacy in the Eyes of Society*

Delivering functionality instead of ownership was still incipient in the construction companies analyzed, with practices restricted to traditional solutions that have already been accepted by the industry, such as central gas systems. The minor expansion of this innovation is due to the builders’ perception of the cultural resistance of the consumer market to this change, which makes them cautious so as not to financially harm their business. However, there is room for future efforts in this direction, as exemplified by a company that offers rotary parking in its latest commercial and residential development, making it possible to replace ownership by hiring the service when necessary.

This kind of change is still a delicate issue for entrepreneurs since consumers do not perceive the *product-service system* as a substitute for ownership and are unwilling to opt for it [44]. Providing innovations for consumption substitution requires long-term strategies and projects geared towards this transition. A major challenge is not only to design the concepts of product substitution for services but also to understand the contextual conditions in which they are introduced and appropriate ways for incorporation into society [43].

To encourage sufficiency in construction, solutions that minimize environmental impact began to be explored, particularly through long-lasting practices such as solar energy, rational use of water through rainwater harvesting, smart waste disposal, and external coatings that do not require regular maintenance (e.g., ceramic tiles, organic resins, and natural stones). These practices are crucial in view of the benefits that a company may gain from encouraging sufficiency, including better reputation, lower environmental risk, and lower operating costs. Developing new forms of consumption is challenging, albeit having significant potential to reduce modern societies’ material and energy intensity [8].

The stewardship role adopted by companies aiming to ensure the well-being of stakeholders takes place mainly by valuing employees with training, guidance, and timely assistance. One of today’s most pressing challenges is to ensure that improvements in economic competitiveness are not achieved at the expense of quality of life or by increasing inequality among people [45]. Regarding the relationship with suppliers to promote sustainability, few actions were found to ensure or require good practices from business partners in the supply chain, being an aspect that should be better observed in the construction industry because the activities developed have a vast supply chain and possible immense negative socio-environmental impacts if not properly managed. To achieve a sustainable business model, it is essential to include suppliers who take responsibility for their stakeholders and the company’s stakeholders [3].

The following assumption analyzes the delivery of social and environmental benefits and sustainable solutions, the process of innovation and market repositioning through clean technologies, and the growth path through a sustainable vision.

### 5.3. Assumption 3—Prioritizing Delivery of Socio-Environmental Benefits through Close Integration between the Company and Community and the Availability of Sustainable Solutions at a Large Scale Accelerates the Process of Innovation and Market Repositioning through Clean Technologies and Consolidates a Growth Trajectory through a Sustainable Vision

Integration with stakeholders in search of generating socio-environmental benefits varied according to each organization's policy. Sponsorship was the main instrument employed by the construction companies analyzed, especially for sports and cultural events, although other forms of interaction were also seen, such as aid and donations to homes for the elderly and needy educational institutions. Cooperating with stakeholders encompasses all activities to foster a mutually positive partnering relationship between companies and their *stakeholders* [18]. This business realignment movement may lead to new opportunities in which positive societal contributions and broader stakeholder concerns become part of the business model [39]. In other words, even though there is a concern for society, the industry is not firmly committed to integration in the sense of achieving a mutually positive partnership, limiting itself to offering some specific benefits.

In developing scaling solutions, the construction companies surveyed demonstrated a reactive posture, with most innovations being operationalized through one-off partnerships with higher education institutions and benchmarking with other companies, which do not reflect an expected commitment to change in the sustainable business model capable of generating sustainable value. Scale-up solutions refer to providing sustainable alternatives at a large scale to maximize benefits to the environment and society. Innovations contributing to this archetype include impact investing, slow capital, and collaborative and open innovation platforms [39].

This effect is more significant in firms that feature environmental innovations, as they reflect their commitment to environmental issues and the relative influence of these issues on innovation activities [37]. Brears [49] corroborates this idea that to consolidate a growth trajectory through a sustainable vision, it is pivotal to modify the linear model (production/consumption/disposal) and reduce resource consumption, recover materials, and recycle waste into new products and materials to decouple economic growth from resource use and associated environmental impacts. The commitment and support of upper management are essential for developing and implementing innovation with an environmental bias [37].

Fernandez et al. and Bocken et al. [8,51] also pointed out that it is essential to implement social and environmental responsibility practices because in addition to economic benefits, they position the company strategically with its different *stakeholders*, allow greater permanence and growth in the market, and are also more attractive to investors and beneficial to consumers. Through the information presented, it was possible to identify that the Brazilian construction companies analyzed have some actions and practices that seek to benefit society and the environment. Nonetheless, companies need to be more engaged to enable the creation of sustainable value. Moreover, the need for processes that lead to the development of technological, social, and organizational innovations given the necessity of changing the core of the business model to address unsustainability at its source was noted.

### 5.4. Synthesis of the Results

The value created by the analyzed construction companies was strongly related to the economic and immediate benefits of implementing the innovations, especially during the execution of the construction works with the economy of resources. The search for improvement in reputation and legitimacy was translated into the introduction of environmentally correct elements that provide consumers with the perception of investments in sustainability in buildings and with actions aimed at increasing the well-being of the construction companies' employees. The repositioning and market trajectory through a sustainable vision had no emphasis on the analyzed companies, as innovations were rare or non-existent. The summary of the results is listed in Table 7.

**Table 7.** Synthesis of the results.

Assumption	Sustainable Innovations	Value Created
Energy/material efficiency, value creation from waste, and replacement of traditional processes with renewable ones increase profit and reduce environmental risk by fighting pollution	<ul style="list-style-type: none"> <li>• Techniques and constructive processes with reuse and minimization of resources</li> <li>• Little value creation from waste</li> <li>• Replacing traditional processes with renewable ones in buildings</li> </ul>	<p>Savings in the total cost of works and building maintenance, mitigating the environmental impact.</p> <p>Possibility of new unexplored (precast) construction techniques</p>
Delivering functionality instead of ownership, adopting a management role, and encouraging sufficiency improve the company's reputation and legitimacy in the eyes of society	<ul style="list-style-type: none"> <li>• Difficulty in introducing product-service substitution</li> <li>• Leadership role limited to internal social responsibility actions.</li> <li>• Encouraging sufficiency by introducing environmentally friendly elements into buildings</li> </ul>	<p>Improvement of reputation and legitimacy before society, not very expressive in the social aspect due to the benefits focused on the internal public and greater due to the introduction of sustainable elements in the buildings</p>
Prioritizing the delivery of socio-environmental benefits with close integration between the company/community and the availability of sustainable solutions on a large scale accelerates the process of innovation and market repositioning through clean technologies and consolidates a growth trajectory through a sustainable vision.	<ul style="list-style-type: none"> <li>• Adaptation (or integration) with society through sponsorships and donations without participation in management</li> <li>• There is no search for innovations to deliver socio-environmental benefits on a large scale</li> </ul>	<p>Repositioning in the market through technologies and a sustainable vision to be explored from strategic actions of involvement with the community and search for innovations with broad benefits for society and the environment</p>

Source: Prepared by the authors from research data.

The conclusions of the study are presented below.

## 6. Conclusions

This study sought to analyze how innovations in the business model contribute to creating sustainable value in Brazilian construction companies through qualitative research with four construction companies in Santa Maria (Rio Grande do Sul State, Brazil). For this, three assumptions were elaborated to relate the archetypes proposed by Bocken et al. [8] to create sustainable value from innovations, following the model of Hart and Milstein [4].

Several practices were identified regarding the first assumption, including material reuse (use of metal props and reusable plastic molds) and replacing traditional processes with renewable ones (installation of photovoltaic panels and rainwater harvesting). Such practices, although incipient, contribute to reducing operating costs and consequently increase profits and reduce the environmental impact. There is still, on the part of construction companies, the need to implement processes that contribute to the rational use of water and waste reduction during construction projects.

Inasmuch as the second assumption is concerned, delivering functionality instead of ownership was still at an early stage in the analyzed companies, being restricted to traditional solutions such as installing central gas systems. The stewardship role adopted by the companies was materialized by valuing the employees by offering courses, guidance, and support, and the incentive to sufficiency was provided with solutions that minimize the environmental impact.

Lastly, the third assumption regarding the integration between the company and the community was established with sponsorships, primarily in sports and cultural events, and assistance to homes for the elderly and needy educational institutions. The construction companies analyzed had few actions related to large-scale sustainable solutions, which does not reflect a commitment to the expected change in the sustainable business model capable of generating sustainable value.

The results demonstrated herein showed that despite sustainability-related innovations not being widely used in the construction industry, they have the potential to promote social and environmental benefits for all stakeholders.

Our findings showed that the sustainability agenda is present in the companies in the civil construction industry (participants in the study). The benefits of investments in sustainability can be measured by increasing operational efficiency and obtaining a competitive advantage over competitors with a traditional business model.

As the main implications of this study, from a theoretical point of view, the contribution to a better understanding of the process of promoting sustainability in civil construction companies stands out because of the establishment of a relationship between innovations in the business model and sustainability, as suggested by authors such as Lüdeke-Freund et al. [3], Boons [39], Bocken et al. [8], Schaltegger, Lüdeke-Freund, Hansen [2] and Lüdeke-Freund et al. [39], in addition to the sustainable value creation proposed by Hart and Milstein [4].

Furthermore, from a practical point of view, this study has the importance of identifying actions that are oriented towards generating benefits for society and the environment and analyzing them from the perspective of the creation of sustainable value from innovations in the business model. This information can contribute to disseminating practices that can be adopted by other companies in the sector as well as highlight aspects that require improvement.

Among the limitations, it should be noted that the evidence is based on the perception of representatives of some companies, which prevented the realization of the quantitative stage of the study and did not allow the results to be generalized.

Finally, it is suggested in a quantitative approach that further research be conducted to investigate the themes addressed with companies from other cities and states to identify the practices that are employed in other contexts. Additionally, a study that contemplates a quantitative and qualitative stage and covers a larger number of companies may also bring important information and shed more light on this theme.

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