ISSN: 1983-6635

RGO Revista Gestão Organizacional

INTEGRATING FRUGAL INNOVATION AND VALUE CO-CREATION FOR SUSTAINABLE DEVELOPMENT[1]

INTEGRANDO A INOVAÇÃO FRUGAL E COCRIAÇÃO DE VALOR PARA O DESENVOLVIMENTO SUSTENTÁVEL

CRISTINE HERMANN NODARI
Universidade Feevale
Doutora em Administração
http://orcid.org/0000-0003-0397-337X
cristine.nodari@gmail.com

CAROLLINE CANDEIAS DA SILVA
Universidade Federal do Rio Grande Do Norte (UFRN)
Doutoranda em Administração
https://orcid.org/0000-0001-8846-0180
carollinecs@gmail.com

SERJE SCHMIDT
Universidade Feevale
Doutor em Administração
https://orcid.org/0000-0002-5710-1828
serje@feevale.br

FÁBIO DA SILVA
Universidade Federal Rural Do Semi-Árido (UFERSA)
Doutor em Administração
https://orcid.org/0000-0003-0039-0128
fabiosoyme@hotmail.com

ANANERY ALESSANDRA SILVA
Universidade Potiguar
Doutoranda em Administração
https://orcid.org/0000-0002-3001-1064
ananeryalessandra@gmail.com

Editor científico: Sady Mazzioni

Submissão: 06/03/2025. Revisão: 28/05/2025. Aceite: 30/07/2025. Publicação: 23/09/2025.

Como citar: Nodari, C. H., da Silva, C. C., Schmidt, S., da Silva, F., Silva, A. A. (2025). Integrating frugal innovation and value co-creation for sustainable development. *RGO - Revista Gestão Organizacional, 18*(2), 69-93. http://dx.doi.org/10.22277/rgo.v18i2.8387.

[1]Este é um artigo publicado em acesso aberto (Open Access) sob a licença Creative Commons Attribution, que permite uso, distribuição e reprodução em qualquer meio, sem restrições desde que o trabalho original seja corretamente citado.

ABSTRACT

Purpose: This study aims to explore the intersection between frugal innovation, value co-creation, and sustainable development.
Method/approach: Through a systematic literature review following PRISMA guidelines, the analysis covered 53 articles published between 2011 and 2023 to identify emerging patterns.
Main findings: Five key elements were identified as essential to this synergy: customer orientation, sustainability, operational efficiency, flexibility and adaptability, and empowerment.
Theoretical, practical/social contributions: The research highlights the positive outcomes of frugal innovation and value co-creation across various sectors, such as healthcare and sustainable tourism, contributing to the Sustainable Development Goals (SDGs).
Originality/relevance: The findings suggest that integrating these elements provides competitive advantages, including enhanced customer satisfaction through value co-creation, strengthened corporate image through sustainable innovation, and increased profitability through adaptation and innovation. The study concludes by outlining avenues for future research, emphasizing the potential of these approaches to foster sustainable development in diverse contexts.
Keywords: Frugal innovation. Value co-creation. Sustainable development. Corporate sustainability. PRISMA guidelines.

RESUMO

Objetivo: Essa pesquisa teve por objetivo explorar a interseção entre inovação frugal, cocriação de valor e desenvolvimento sustentável.
Método/abordagem: Por meio de uma revisão sistemática da literatura nas diretrizes do PRISMA, a análise abrangeu 53 artigos publicados entre 2011 e 2023, para identificar padrões emergentes.
Principais Resultados: Cinco elementos principais foram identificados como essenciais para essa sinergia: orientação para o cliente, sustentabilidade, eficiência operacional, flexibilidade e adaptabilidade e capacitação.
Contribuições teóricas/práticas/sociais: A pesquisa destaca os resultados positivos da inovação frugal e da cocriação de valor em diversos setores, como saúde e turismo sustentável, contribuindo para os Objetivos de Desenvolvimento Sustentável (ODSs).
Originalidade/relevância: Os resultados sugerem que a combinação desses elementos proporciona vantagens competitivas, incluindo maior satisfação do cliente por meio da cocriação de valor, fortalecimento da imagem corporativa por meio da inovação sustentável e aumento da lucratividade por meio da adaptação e inovação. O estudo conclui com resultados para pesquisas futuras, explorando o potencial dessas abordagens para contribuir para o desenvolvimento sustentável em diferentes contextos.
Palavras-chave: Inovação frugal. Cocriação de valor. Desenvolvimento sustentável. Sustentabilidade corporativa. Diretrizes PRISMA.

1 INTRODUCTION

In a global scenario characterized by political turbulence, extreme natural events, and disruptive challenges such as the pandemic, the adoption of frugal innovation has gained prominence due to its ability to enhance efficiency amid resource constraints (Govindan, 2024). Recognized for addressing issues such as resource scarcity, accessibility barriers, and promoting sustainable development, frugal innovation emerges as a global paradigm with

significant implications in social, environmental, and economic spheres (Hossain et al., 2016; Rosca et al., 2017; Levänen et al., 2022).

In this context, the ambivalent role of digital technologies stands out. Digitalization can enhance the accessibility and scalability of frugal solutions by enabling innovative models of financing and distribution. On the other hand, it may also generate new barriers, such as digital exclusion and increased costs for certain users. Furthermore, it demands appropriate infrastructure and local adaptations to ensure that its benefits are fully realized (Van Tuijl et al., 2024).

Considered a pathway for creating shared value and implementing triple-bottom-line strategies, frugal innovation aligns with business models that respond to complex social and environmental problems, standing out as a promising approach to sustainable development (Albert, 2019). At the same time, the literature on value co-creation emphasizes the importance of collaborative processes to generate value in business networks, involving stakeholders in the design of innovative products, services, and processes (Grönroos et al., 2011; Vargo et al., 2020).

Despite growing academic interest in both topics, an important gap is observed: there is a lack of comprehensive studies investigating how the interaction between frugal innovation and value co-creation can generate competitive advantages for companies while simultaneously promoting sustainable development. Although frugal innovation is often associated with positive sustainability outcomes, some studies reveal that its impacts are not inherently beneficial across all dimensions. Rather, they depend on external factors such as the type of collaboration, stakeholder engagement, and contextual motivations (Albert, 2019, 2022; Stöber et al., 2022).

In this regard, value co-creation can play either a catalytic or constraining role in the outcomes of frugal innovation, as stakeholder involvement in the identification of needs and the implementation of solutions may either amplify or limit the impacts of this approach (Rosca et al., 2018; Bhattacharjya et al., 2023). Indeed, by engaging multiple stakeholders in the frugal innovation process, value co-creation becomes essential to ensuring socially inclusive solutions that are tailored to local needs, thereby fostering sustainable impacts across diverse organizational contexts (Akhtar & Ramkumar, 2024).

However, integrated and critical approaches that examine the conditions under which this synergy truly contributes to sustainable development remain scarce in the literature, highlighting a theoretical gap that this study seeks to address. This gap is particularly relevant given the increasing concerns about the need for effective solutions to environmental and social issues. Thus, this study is guided by the following research questions:

Q1: What are the constitutive elements that support the relationship between frugal innovation and value co-creation in the context of sustainable development?

Q2: What are the primary sectors and contexts in which this interaction manifests, and how does it impact organizational performance?

The objective of this study is to explore the interactions between frugal innovation and value co-creation, identifying their constitutive elements. Furthermore, by examining the impact of frugal innovation and value co-creation on business outcomes, this study contributes to a deeper understanding of the mechanisms through which these approaches can generate economic value for companies, thus promoting competitiveness.

Additionally, this study is relevant for elucidating the central role of value co-creation in fostering stakeholder creativity in the frugal innovation process. In turn, stakeholders help

companies identify opportunities and develop solutions tailored to local consumer needs (Bhattacharjya et al., 2023; Wohlfart et al., 2021).

Drawing on insights from Radjou and Prabhu (2014), who highlight customers as a significant source of frugal innovations for companies, and research by Cozzens and Sutz (2012), Paunov (2013), and Knorringa et al. (2016), which highlight value co-creation as a catalyst for frugal innovation, this study provides managerial guidance on leveraging stakeholder engagement and resource input to drive innovations that result in social and commercial benefits.

2 LITERATURE REVIEW

The theoretical foundations of frugal innovation, value co-creation, and sustainable development are highlighted.

2.1 FRUGAL INNOVATION

The frugal mindset emerged as a response to adversities and extreme needs in market conditions in emerging countries. Thus, during the 1990s and early 2000s, the Base of the Pyramid concept gained prominence, emphasizing the development of products and services targeting low-income consumers in emerging markets. This new paradigmatic approach played a fundamental role in consolidating the conceptual and practical foundations of frugal innovation (Bhatti, 2012).

Frugal innovations denote solutions created under resource constraints, offering lower costs compared to conventional alternatives (Brem & Ivens, 2013; Hossain et al., 2016). These innovations play a fundamental role in serving customers who are often overlooked (Prahalad, 2012). An innovation is labeled as "frugal" when it meets three main criteria: significant cost reduction, emphasis on core functionalities, and performance optimization (Hossain et al., 2016; Weyrauch & Herstatt, 2017; 2019; Pisoni et al., 2018).

Thus, the key principles of frugal innovation revolve around accessibility, price, and sustainability. Unlike traditional innovation, which often adds complexity and costs, frugal innovation simplifies functionalities to meet essential needs, leveraging existing technologies and local knowledge. This approach not only increases the value offered to consumers but also empowers marginalized communities by providing access to essential products and services.

Therefore, frugal innovations encompass not only new technologies but also innovative approaches to modifying traditional value creation and capture mechanisms (Nodari et al., 2023; Tiwari & Prabhu, 2018). Several case studies highlight successful frugal innovations, demonstrating the role of different countries and sectors. In India, emblematic initiatives include low-cost cataract surgeries performed by Aravind Eye Care and the portable ECG machine developed by GE, showcasing how affordable solutions can be created to meet healthcare demands (Bhatti et al., 2017). Similarly, in Africa, frugal innovations have emerged in key sectors such as healthcare, energy, agriculture, and water management, contributing to mitigating urgent social and environmental challenges (Moleka, 2024).

Frugal innovations generate substantial reductions in production costs achieved through resource optimization and substantial reduction, as well as the reuse of obsolete materials within the company (Barnikol & Liefner, 2022; Hossain et al., 2021; Govindan, 2024; Dubey et al., 2022). This implies reconfiguring value chain elements, reshaping business models, reengineering products and services, integrating economically disadvantaged

individuals into economic markets, and focusing on addressing accessibility barriers (Radjou et al., 2012; Alves et al, 2023; Hossain et al., 2016; Weyrauch & Herstatt, 2017).

2.2 VALUE CO-CREATION

The value co-creation approach highlights the importance of active collaboration among various participants in the production process, with a special emphasis on the role of consumers. Emerging as a prominent concept in the 1990s, value co-creation emphasizes that both the company and the customer generate mutual benefits through meaningful interactions. Prahalad and Ramaswamy (2004) argue that these exchanges, often in the form of dialogues, result in unique and personalized experiences for both parties involved. This shift marks a departure from traditional business models, where consumers played minimal roles in the value creation process (Vargo & Lusch, 2004, 2008). Erhardt et al. (2019) emphasize that the value co-creation process is intrinsically dependent on the collaborative interaction between the company and its stakeholders.

This collaborative approach has proven effective in promoting sustainable practices throughout the value chain, integrating environmental, social, and economic dimensions (Shahid et al., 2023; Lacoste, 2015). Additionally, co-creation is linked to digital transformation and open innovation, fostering new forms of engagement and solution development (Colabi et al., 2022; Al-Omoush et al., 2023). In some contexts, co-creation is also used as a tool to promote behavioral and educational changes through collaboration among different actors (Chen, 2022; Huang, 2020).

It is important to note that in this study, value co-creation will be examined through the lens of Service-Dominant Logic (SDL) (Fan & Luo, 2020). According to SDL, value is generated through collaboration among various stakeholders (Beckett & Dalrymple, 2020; Morosan, 2018), with the user ultimately determining the value, as it is only realized through the utilization of the offering (Hasan et al., 2015; Vargo et al., 2008). Co-creation processes stimulate stakeholder creativity, encouraging the development of innovative solutions tailored to local realities (Agarwal et al., 2021).

In this context, co-creation is considered a key success factor in frugal innovation processes, both at the grassroots level (Bhattacharjya et al., 2023) and in the development of frugal products targeting affluent markets (Wohlfart et al., 2021). In the current global scenario characterized by constant evolution, value co-creation can be leveraged to enhance efficiency and productivity, thereby reducing waste (Barbu & Militaru, 2019; Fan & Luo, 2020). This, in turn, contributes to corporate sustainability, promotes customer engagement, drives innovation, facilitates knowledge management, and nurtures service ecosystems (Shah et al., 2022).

2.3 SUSTAINABLE DEVELOPMENT

According to Khan and Melkas (2020) and Hossain (2021), the growing concern for global sustainability is forcing companies to adopt a more responsible approach that encompasses environmental, social, and economic aspects. Iqbal et al. (2020) assert that integrating sustainable practices is fundamental for the survival of organizations in the market.

Consequently, companies are actively seeking methods to provide services and products while minimizing their environmental footprint, aligning themselves with current government policies. Hossain (2020) emphasizes that sustainable development should be the primary priority for organizations. Similarly, Rosca et al. (2017) highlight the essential role of

companies as primary financiers of critical projects aimed at achieving the Sustainable Development Goals (SDGs).

In the literature, there is ambiguity regarding the definitions of “sustainability” and “sustainable development” due to their theoretical and empirical complexity, as well as their multifaceted nature (Arnold, 2018; Molina-Maturano et al., 2020). This conceptual ambiguity has led researchers to use these terms interchangeably to denote improvements in processes, products, services, and business models aimed at promoting companies' economic, social, and environmental goals.

In this context, “sustainability,” a term associated with Elkington’s (2012) work, refers to the quality standards used to juxtapose current levels with desired levels concerning human and environmental ecosystems (Feil & Schreiber, 2017). On the other hand, “sustainable development,” a term coined by the United Nations in 1987, denotes the strategies employed to bridge the gap between current sustainability levels and an ideal human-environmental system (Feil & Schreiber, 2017).

Therefore, for the purposes of this study, the use of the term “sustainable development” seems more appropriate, as it encompasses the actions undertaken by companies to harmonize economic gains with socio-environmental imperatives (Bas, 2020; Hossain et al., 2021; Nodari et al., 2023).

3 RESEARCH DESIGN

To investigate the interactions between frugal innovation, value co-creation, and sustainability, a systematic literature review (SLR) was conducted. This methodological procedure is crucial as it provides researchers with a comprehensive understanding of the core concepts related to the study’s theme while also facilitating the identification of research gaps and the generation of new knowledge. Additionally, the SLR contributes to the development of theoretical frameworks and indicates directions for future research, enriching the field of study and broadening the understanding of how sustainable and collaborative practices can be implemented in the organizational context (Loviscek, 2021).

In this regard, the search, analysis, acceptance/rejection criteria for the consulted bibliography in the databases for this systematic literature review followed the PRISMA guidelines (Moher et al., 2015; Tricco et al., 2018).

Data collection was conducted using the SCOPUS database in November 2023. The searches were limited to the title, abstract, and keywords of the articles, using the following search strategy:

a) Boolean Expression 1 (BE1) was used for the Frugal Innovation construct: ("frugal innovation" OR "low-cost innovation" OR "resource-constrained innovation") AND ("sustainable development" OR "sustainability" OR "environmental sustainability" OR "social sustainability") and;

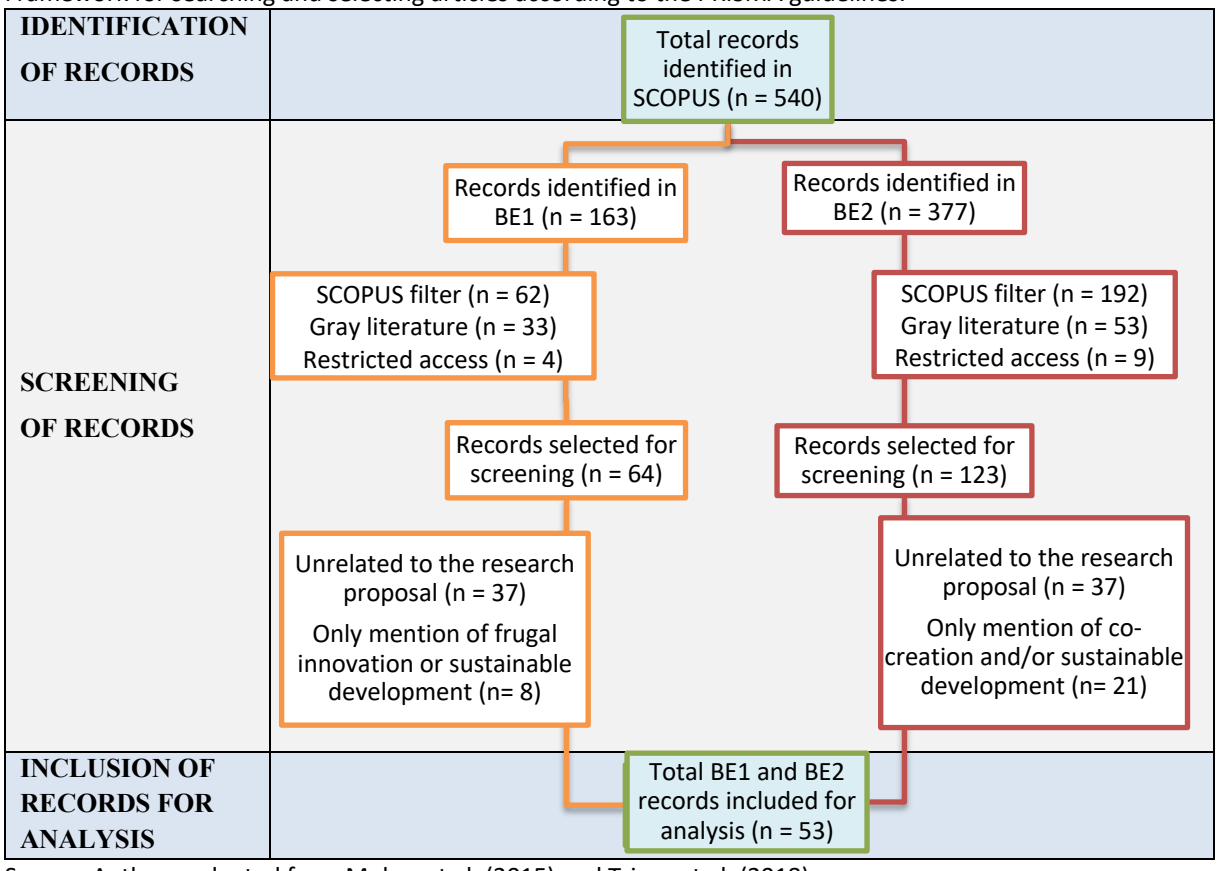
b) Boolean Expression 2 (BE2) was used for the Value Co-Creation construct: ("co-creation of value" OR "value co-creation" OR "customer value co-creation" OR "collaborative value creation") AND ("sustainable development" OR "sustainability" OR "environmental sustainability" OR "social sustainability").

The search phase resulted in 163 records for strategy (BE1) and 377 records for strategy (BE2), totaling 540 studies covering the research topics: frugal innovation, value co-creation, and sustainable development/sustainability. It is important to note that there were no restrictions regarding the year of publication or the language of the articles.

Following the PRISMA protocol, the second phase of the systematic literature review involved selecting records based on the research objectives (Moher et al., 2015; Tricco et al., 2018). Notably, the Scopus database offers a filter to select records by the area of interest. Thus, the initial criterion for excluding records was applying the Scopus filter, selecting only studies that addressed organizational and/or business management in at least one section of the paper. Subsequently, the following criteria were applied: a) Only peer-reviewed scientific articles; b) Only open-access texts.

At this initial screening stage, 64 records from BE1 and 123 records from BE2 were selected. During the eligibility phase, the authors reviewed the titles, abstracts, and keywords of the 187 selected studies to exclude those that were not related to the research objective; specifically, those that did not mention the terms frugal innovation, value co-creation, and/or sustainable development/sustainability. This process resulted in 53 documents for analysis. The research framework is detailed in Figure 1.

Figure 1
Framework for searching and selecting articles according to the PRISMA guidelines.



Source: Authors, adapted from Moher et al. (2015) and Tricco et al. (2018).

The 53 selected records were subjected to a comprehensive review and analysis by the authors. Initially, a descriptive analysis was conducted to chronologically identify the occurrence of publications. Additionally, an examination was carried out to determine the journals that published research on the topics and the frequency of these publications.

Furthermore, a qualitative content analysis (Richardson, 1996) was employed to identify the convergence between frugal innovation and value co-creation, aligned with economic and competitive advantages for companies while simultaneously promoting sustainable development. The articles were categorized according to the integrated

dimensions of sustainability, recognizing the interconnection of various sustainability aspects that cannot be evaluated in isolation. This recognition highlights the complexity of the impacts of frugal innovation and value co-creation, requiring a holistic approach to assessment.

In addition to the selection criteria described, the included studies were cataloged by reference, type of study, clarity of objectives, methodological coherence, and applicability of results. Drawing inspiration from the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework (Guyatt et al., 2008), each study was qualitatively assessed and categorized according to the strength of its contribution to the synthesis, allowing for a more accurate understanding of the confidence level in the patterns observed. This evaluation reinforced the triangulation of theoretical insights.

4 RESULTS

Frugal innovation aims to provide accessible solutions to a broad audience (Prahalad, 2012; Rosca et al., 2017), while value co-creation, through stakeholder engagement, contributes to the development of products and services that meet diverse needs and user profiles. In this context, this study seeks to understand the key elements that sustain the relationship between frugal innovation and value co-creation in sustainable development.

One of the key elements linking these two concepts is customer needs orientation. Frugal innovation places customer needs—especially those with lower purchasing power—at the center of the development process. In parallel, co-creation actively involves end users in the design and improvement of products and services. This collaborative approach ensures that the developed solutions are truly relevant and effective for their target audience (Barnikol & Liefner, 2022; Rao, 2013; Hossain, 2021; Levänen et al., 2022).

Additionally, sustainability emerges as a central pillar connecting these concepts. Frugal innovation seeks to minimize environmental and social impact through efficient resource utilization, while co-creation encourages stakeholder engagement in constructing sustainable solutions. As a result, this convergence leads to the development of products and services that not only meet immediate needs but also contribute to a more sustainable future (Von Janda et al., 2020; Levänen et al., 2022).

Another essential aspect is efficiency. Frugal innovation prioritizes simple, effective, and low-cost solutions, eliminating unnecessary features. In this context, co-creation enhances this approach by facilitating the identification of efficient solutions, leveraging user knowledge and experiences. The result is innovations that deliver maximum value with minimal complexity and cost (Govindan, 2024; Dubey et al., 2022; Dressler & Bucher, 2018; Park et al., 2022; Ebolor et al., 2022).

The fourth element is adaptability and flexibility. The ability to quickly adapt to market changes is a defining characteristic of frugal innovation. Co-creation enhances this flexibility by enabling continuous user feedback, leading to solutions that can organically evolve in response to changing market needs (Albert, 2019; Molina-Maturano et al., 2020; Iqbal et al., 2020; Dabić et al., 2022; Régnier, 2023; Rosca et al., 2017; Pedroso et al., 2023; Hossain et al., 2022; Barnikol & Liefner, 2022; Hossain, 2020; Park et al., 2022; Pedroso et al., 2023; Hossain et al., 2022).

Frugal innovation has the potential to empower local communities, encouraging their active participation in the creation of solutions. This participation fosters collaboration among diverse actors, including companies, governments, academia, and civil society. This multifaceted approach results in more robust and inclusive solutions (Barnikol & Liefner, 2022; Hossain, 2021; Arnold, 2018; Dressler & Bucher, 2018; Hossain, 2020; Rao, 2013; Régnier,

2023; Pedroso et al., 2023; Ebolor et al., 2022; Dubey et al., 2022; Govindan, 2024; Albert, 2019; Molina-Maturano et al., 2020; Iqbal et al., 2020; Dabić et al., 2022; Rosca et al., 2017). Table 1 provides an analytical lens to examine how the integration of Frugal Innovation and Value Co-Creation can drive Sustainable Development.

Table 1
Comparison of the Constitutive Elements of Frugal Innovation and Value Co-Creation in the Context of Sustainable Development

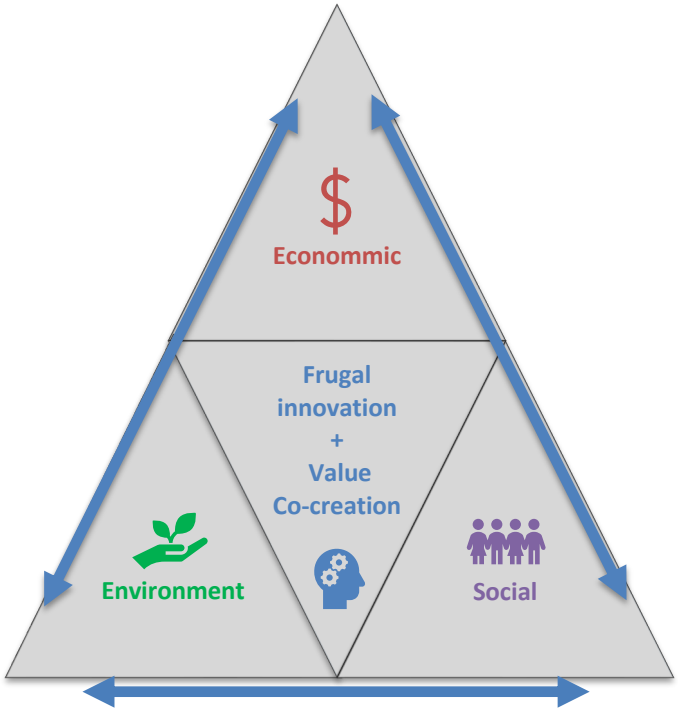
Elements	Frugal Innovation	Value Co-Creation	Synergy for Sustainable Development
Customer Orientation	Focus on essential needs of low-income segments	Direct customer involvement in the development process	Solutions aligned with real demands and specific socio-economic contexts
Sustainability	Resource optimization and minimization of environmental impacts	Integration of diverse perspectives for environmentally responsible solutions	Sustainability approach considering economic, social, and environmental aspects
Operational Efficiency	Process simplification and elimination of non-essential features	Leveraging collective knowledge to identify efficiencies	Maximization of delivered value with minimal resource usage
Flexibility and Adaptability	Flexibility for rapid changes in response to market shifts	Iterative development based on continuous feedback	Solutions adaptable to various contexts and changes over time
Empowerment	Empowerment of local communities for problem-solving	Facilitation of multi-stakeholder collaborations	Creation of inclusive and participatory innovation ecosystems

Source: Authors.

The integration of frugal innovation with value co-creation offers a pathway to sustainable development. Co-creation ensures that the developed solutions are aligned with the real needs of customers, while frugal innovation guarantees that these solutions remain accessible and sustainable.

To provide a comprehensive view of how frugal innovation and value co-creation interact across the economic, environmental, and social dimensions, Figure 2 presents a conceptual model that synthesizes the main findings of this study. The model highlights the five constitutive elements as fundamental to the synergy between frugal innovation and value co-creation and illustrates the key outcomes and mechanisms within each dimension of sustainability.

Figure 2
Conceptual model of the integration between frugal innovation and value co-creation for sustainable development



Source: Authors.

4.1 DIMENSIONS OF SUSTAINABLE DEVELOPMENT

A qualitative content analysis was conducted to explore the dynamics of the interaction between frugal innovation, value co-creation and sustainable development. Initially, the contribution of frugal innovation and value co-creation to sustainable development was examined comprehensively (Figure 3), considering the inclusion of the three dimensions of sustainability (Elkington, 2012).

The results indicate that 30 articles addressed all three dimensions of sustainability, suggesting that both frugal innovation and value co-creation have the potential to promote sustainable development by addressing environmental concerns, social issues, and economic development. Additionally, 13 articles focused on two dimensions, while 10 articles covered only one dimension. After individually reviewing the 53 studies, it was revealed that: a) 46 articles included the environmental dimension; b) 42 articles included the social dimension, and; c) 36 articles included the economic dimension.

This approach aligns with the perspective of Khan (2016), who emphasizes sustainability as a concept recognizing the intrinsic interdependence of environmental, social, and economic systems. It also highlights that both frugal innovation and value co-creation inherently incorporate sustainability and can contribute to achieving the Sustainable Development Goals (SDGs) (Albert, 2019).

In terms of the economic dimension, it is worth noting that frugal innovation can generate significant economic impacts by reducing costs, lowering prices for customers, and facilitating social inclusion throughout the innovation and consumption processes (Hossain et

al., 2021; Prahalad, 2012). At the same time, companies are adjusting their marketing and service delivery strategies to integrate sustainability into their operations, aiming to co-create sustainable value in their relationships (Lacoste, 2016).

Moreover, within the economic dimension, some authors highlight frugal innovation as part of a broader movement toward socially inclusive businesses, contributing to social and political empowerment (Barnikol & Liefner, 2022; Govindan, 2024; Hossain et al., 2021; Levänen et al., 2022). In this context, the process of value co-creation involves engaging stakeholders (Colabi et al., 2022; Mihailova et al., 2022) from a social perspective, thereby fostering socially inclusive and democratic actions (Enquist et al., 2015).

In terms of the environmental dimension, frugal innovation can contribute to overall environmental sustainability (Dubey et al., 2022; Ebolor et al., 2022) and reduce the consumption of natural resources by promoting the digital transformation of services (Park et al., 2023; Rao, 2013). Similarly, value co-creation has the potential to enhance environmental sustainability (Singh et al., 2022; Zhang et al., 2021) across various sectors of the economy (Akhmedova et al., 2020; Ma et al., 2019), encompassing both theoretical education (Chen, 2018; Monavvarifard et al., 2019) and practical initiatives (Bordian et al., 2023; Wyllie et al., 2022).

The interaction between value co-creation and frugal innovation manifests in various sectors and primary contexts, each with its specific characteristics and dynamics. In the healthcare sector, the development of the Lullaby product by GE Healthcare illustrates how adaptation and co-creation processes are essential for creating accessible solutions for emerging or low-income markets (Le Bas, 2023).

In the Information and Communication Technology (ICT) sector, studies identify a research cluster focused on frugal innovation, highlighting that collaboration and the joint development of solutions are common practices in this field, particularly in contexts that require collective efforts (Melnikova & Gilsanz, 2022).

In the retail sector, Hossain (2020) emphasizes that the development of frugal innovations and the adaptation to consumer demands in emerging markets depend on interactions with customers. This process, aligned with the logic of value co-creation, involves customers as active participants in generating and validating new ideas. By providing feedback and directly influencing the development of products and services, customers help build solutions more aligned with their needs.

In the construction sector, the application of frugal innovation is mentioned in studies that highlight its contribution to sustainable development. The adaptation of solutions to local needs, often through collaborative processes, reflects the interaction between co-creation and innovative practices in this sector (Ebolor et al., 2022). In the agriculture sector, the development of the Butiá depulping machine involves the direct participation of local farmers in the process, demonstrating how co-creation can serve as a tool for frugal innovation (Pedroso et al., 2023).

In the service sector, particularly in sustainable tourism and hospitality, examples of value co-creation include the interaction between guests and staff to implement more eco-friendly practices (Aagaard & Ritzén, 2019). These examples highlight how the synergy between frugal innovation and value co-creation can be tailored to meet the unique challenges and opportunities of different sectors, driving sustainable development while addressing specific local needs.

5 DISCUSSIONS OF RESULTS

To investigate the existence of additional points of intersection, an analysis of the impact of the selected articles on business outcomes was conducted. The primary objective of this analysis was to examine how frugal innovation and value co-creation can provide more agile responses to market demands, directly influencing aspects such as profitability, reputation, and customer satisfaction.

Several studies highlight significant managerial contributions, offering insights that can assist managers in formulating effective strategies to enhance customer satisfaction, foster innovation, and strengthen user loyalty. In this context, the impact on business outcomes was evaluated and categorized based on its influence on profitability, organizational reputation, and customer satisfaction (see Table 2).

Additionally, an analysis was conducted to examine how factors such as profitability, reputation, and customer satisfaction influence companies' economic performance and their support for sustainable development. The results indicate that the selected studies predominantly focus on investigating how companies are developing frugal innovations and engaging in value co-creation to promote sustainable development, even if this involves forgoing immediate economic returns.

Table 2
Impacts on Business Outcomes

Profitability	Customer Satisfaction	Reputation	Support for Sustainable Development	References
✓	✓	✓		Arnold (2018); Dressler & Bucher (2018)
✓	✓			von Janda *et al.* (2020); Park *et al.* (2022)
✓		✓		Pedroso *et al.* (2023)
✓				Rao (2013); Rosca *et al.* (2017); Hossain (2020)
✓			✓	Albert (2019)
	✓	✓		Molina-Maturano *et al.* (2020); Dubey *et al.* (2022); Levänen *et al.* (2022);
	✓			Hossain *et al.* (2022)
		✓		Iqbal *et al.* (2020)
			✓	Biggemann *et al.* (2014); Enquist *et al.* (2015); Lacoste (2016); Jurietti *et al.* (2017); Aquilani *et al.* (2018); Chen (2018); Kruger *et al.* (2018); Monavvarifard *et al.* (2019); Akhmedova, Mas-Machuca & Marimon (2020); Giacomarra *et al.* (2020); Huang (2020); Widjojo *et al.* (2020); Apostolidis *et al.* (2021); Font *et al.* (2021); Lin *et al.* (2021); Loia *et al.* (2021); Mani & Gunasekaran (2021); Wan *et al.* (2021); Zhang, Atwal, Kaiser (2021); Aagaard & Ritzén (2022); Brown *et al.* (2022); Colabi *et al.* (2022); Mihailova *et al.* (2022); Singh *et al.* (2022); Wyllie *et al.* (2022); Bordian, Gil-Saura, Šerić (2023); Huang *et al.* (2023); Palakshappa *et al.* (2023); Bal *et al.* (2023)

Source: Authors

These findings align with the theoretical perspective of frugal innovation, which prioritize addressing local socio-environmental challenges as the main objective of this form of innovation (Albert, 2019, 2022; Hossain et al., 2016; Nodari et al., 2023; Rosca et al., 2017).

5.1 PROFITABILITY

Companies that respond quickly to crises and changes can gain a significant competitive advantage, thereby increasing profitability. The ability to adapt and innovate in volatile environments often creates new business opportunities and pathways for economic growth (Prahalad, 2012; Singh et al., 2022). It is in such environments that frugal innovation emerges as a solution to resource constraints (Pisoni et al., 2018). The results suggest that value co-creation, by incorporating customer feedback, can promote frugal innovation across various economic sectors. This process optimizes resources, supports sustainability, and results in more sustainable products aligned with market expectations (Mihailova et al., 2022; Zhang et al., 2021).

In the agrifood sector, collaborations between companies and suppliers facilitate the co-development of improvements and new services, thereby fostering value co-creation (Huang, 2020). These strategies have proven effective for companies facing production and product flow challenges, generating greater economic benefits for all parties involved (Brown et al., 2022). In the tourism sector, products and services labeled as "sustainable" are perceived by customers and users as a differentiating factor when selecting a destination. Moreover, tourists are often willing to pay a higher price for environments that prioritize environmental preservation and sustainable labor practices (Font et al., 2021).

From a more practical perspective, von Janda et al. (2020) developed a tool to evaluate and compare the frugality of products across different scenarios. This tool helps managers make strategic decisions and develop products aligned with consumer expectations and market demands while minimizing costs, optimizing resources, and increasing profits. Finally, gamification has proven to be an effective mechanism for engaging stakeholders in value co-creation, promoting sustainability, and achieving economic gains, particularly in the context of small and medium-sized enterprises (Colabi et al., 2022).

5.2 REPUTATION

The combination of frugal innovation, value co-creation, and sustainable development can significantly enhance a company’s reputation by delivering innovative and accessible products or services that align with customer expectations while demonstrating transparency, social responsibility, and adaptability (Radjou & Prabhu, 2014; Levänen et al., 2022). Frugal innovation is considered a means to create shared value and adopt triple bottom line strategies, in which business approaches are expected to generate positive social, environmental, and economic outcomes, thereby promoting sustainable development at local, regional, and global levels (Levänen et al., 2022). By integrating frugality and value co-creation with a sustainability focus into their business models, companies can exponentially enhance their image among stakeholders and in the market. In this context, Sharma et al. (2010) propose a framework for integrating sustainability into B2B marketing, highlighting how the adoption of sustainable practices can strengthen a company's reputation by attracting customers who value environmental and social responsibility.

The results reveal various strategies to strengthen reputation and promote sustainable development, including collaborative efforts with customers and local communities (Chen,

2018), effective relationship management, open innovation, and proactive behaviors (Giacomarra et al., 2020), and managing power dynamics between companies and suppliers (Mani & Gunasekaran, 2021). Along similar lines, Wan et al. (2021) propose a comprehensive framework for evaluating supply chain sustainability, outlining three key pathways for building a strong and positive reputation: a) Collaboration with stakeholders; b) Ensuring a safe work environment that prioritizes employee well-being and; c) Making positive contributions to the Community.

In the tourism sector, destinations labeled as "sustainable" create a unique perception among customers and users, leading to enhanced behavioral and emotional benefits for tourists, fostering trust and deeper connections with the destination (Font et al., 2021). This approach, centered on trust-building, aligning value propositions with diverse customer segments, and prioritizing sustainability, positively impacts the company reputation while ensuring customer satisfaction.

In the eHealth services sector, companies have improved their reputation through dialogical engagement, readiness of involved actors (including users, healthcare professionals, and other stakeholders), and a consumer empowerment focus. Effective stakeholder engagement drives participatory innovation, co-creating value for the company, improving health outcomes, and strengthening corporate reputation (Wyllie et al., 2022).

In the information technology sector, artificial intelligence (AI) is used to guide decision-making, identify and analyze critical success factors, and adopt innovation strategies that emphasize frugality and sustainability while strengthening corporate brand reputation through online channels (Govindan, 2024).

5.3 CUSTOMER SATISFACTION

Value co-creation is the cornerstone of long-term success in sustainability-driven ventures (Biggemann et al., 2014). Stakeholders' perception of value is critical to the success of sustainability projects, leading to greater operational efficiency, cost reduction, increased customer satisfaction, and stronger relationships with stakeholders. Theoretical frameworks for evaluating and promoting frugal innovation and value co-creation based on customer satisfaction have gained significant attention across various economic sectors. Studies have explored B2B business networks (Lacoste, 2016), assessment systems based on Sustainable Development Goals (SDGs) in different market segments (Dressler & Bucher, 2018), sustainable business models (Hossain, 2021), and frugal innovation processes with a sustainability focus (Hossain et al., 2022).

In practice, findings on customer satisfaction highlight a research focus on sectors such as the sharing economy (Akhmedova et al., 2020), the green economy (Huang et al., 2023), supply chains (Lin et al., 2021), and water and sanitation (Molina-Maturano et al., 2020). These studies demonstrate how frugal innovation and value co-creation have driven sustainable development within companies and communities, positively impacting both customer and stakeholder satisfaction.

These management approaches emphasize active and inclusive engagement of customers, suppliers, local communities, governments, and other stakeholders in co-creating and innovating products and services beyond the boundaries of the company (Bordian et al., 2023; Ma et al., 2019). As a result, companies can achieve their goals of generating economic gains, enhancing brand image, meeting customer needs, and promoting sustainable development.

The intersection of frugal innovation, value co-creation, and sustainability leads to: a) Increased customer satisfaction through value co-creation; b) Enhanced corporate image through sustainable innovation and; c) Higher profitability through adaptation and innovation.

6 FINAL CONSIDERATIONS

The objective of this article was to identify, evaluate, and synthesize the existing literature on the relationship between frugal innovation and value co-creation from the perspective of sustainable development. The study advances the understanding of the intersection between frugal innovation, value co-creation, and sustainable development by identifying five key elements that explain their synergy: a) Customer Orientation; b) Sustainability; c) Operational Efficiency; d) Flexibility and Adaptability and; e) Empowerment.

By identifying five common constitutive elements (customer orientation, sustainability, efficiency, adaptability, and empowerment), the study suggests that frugal innovation and value co-creation operate according to a complementary logic, challenging linear or isolated models of innovation. At the same time, it implies a repositioning of stakeholder role; not merely as strategic co-producers, but as key agents in a broader understanding of engagement within inclusive innovation processes.

This research highlights future perspectives for analyzing the interactions between frugal innovation, value co-creation, and sustainability, as summarized in the following synthesis. In the field of entrepreneurship, a suggestion for future studies emerging from this research could involve developing frameworks to identify how sustainable entrepreneurship, integrated with frugal innovation and value co-creation, can drive sustainability across economic, social, and environmental dimensions. Additionally, by associating the strategic role of stakeholders, future research is encouraged to explore the role of stakeholder network engagement in addressing disruptive events and to investigate the long-term impact of value co-creation initiatives on companies and their stakeholders.

In terms of methodologies and metrics, future research could contribute to the development of new models that integrate triple bottom line thinking with interactive communication practices among stakeholders and examine how gamified dynamics contribute to value co-creation between internal and external stakeholders.

In addition to these suggestions, the findings of this study open avenues for innovative empirical research. It is recommended that comparative case studies be conducted across different sectors and regions to identify how contextual factors influence the integration between frugal innovation and value co-creation. Longitudinal studies are also relevant to measure impacts over time, particularly regarding the consolidation of benefits across economic, social, and environmental dimensions. Furthermore, there is significant potential for original associations, such as analyzing the relationship between frugal innovation, digital inclusion, and the empowerment of vulnerable communities, as well as examining the role of collaborative digital platforms in expanding the sustainable outcomes of these strategies. Finally, investigations that explore governance mechanisms and stakeholder engagement may contribute to a deeper understanding of the factors that enable (or hinder) the success of such initiatives.

This research demonstrates how these approaches interact with the environmental, social, and economic dimensions of sustainability, reinforcing their interdependence. The analysis reveals that frugal innovation and value co-creation have positive impacts across various sectors, from healthcare to sustainable tourism, contributing to the Sustainable Development Goals (SDGs). Additionally, the study highlights that this intersection results in

significant competitive advantages, including increased customer satisfaction through value co-creation, enhanced corporate image through sustainable innovation, and improved profitability through adaptation and innovation.

Although this study advances the integration of frugal innovation and value co-creation from a sustainable development perspective, it is essential to acknowledge the limitations of the assembled evidence and reflect on its theoretical and practical implications. From a methodological standpoint, the study primarily focused on the Scopus database, prioritizing peer-reviewed and open-access articles, which may have limited the geographic and sectoral diversity of the contexts investigated. However, it is worth noting that, in addition to the systematic search in Scopus, some studies from the Web of Science were used in a complementary and non-systematic manner to enrich the theoretical discussion.

Furthermore, the predominantly descriptive and sector-specific nature of the studies included in the analysis poses challenges to the generalization of the findings in practical terms. These limitations suggest that the positive effects identified are highly context-dependent and influenced by stakeholder engagement and local adaptation of initiatives. Therefore, future research is encouraged to expand database coverage, adopt comparative methods, and develop more standardized metrics to measure the economic, social, and environmental impacts of these approaches, enabling more robust and generalizable analyses.

REFERENCES

Aagaard, A., & Ritzén, S. (2020). The critical aspects of co-creating and co-capturing sustainable value in service business models. Creativity and Innovation Management, 29(2), 292-302. https://doi.org/10.1111/caim.12339

Agarwal, N., Oehler, J., & Brem, A., (2021). Constraint-Based Thinking: A Structured Approach for Developing Frugal Innovations. *IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT, 68(3),* 739-751. https://doi.org/10.1109/TEM.2020.3042929

Akhmedova, A., Mas-Machuca, M., & Marimon, F., (2020). Value co-creation in the sharing economy: The role of quality of service provided by peer. *Journal of Cleaner Production, 266*. https://doi.org/10.1016/j.jclepro.2020.121736

Albert, M. (2019). Sustainable Frugal Innovation - The connection between frugal innovation and sustainability. *Journal of Cleaner Production, 237*. https://doi.org/10.1016/j.jclepro.2019.117747

Albert, M. (2022). Assessing the sustainability impacts of frugal innovation – A literature review. *Journal of Cleaner Production, 365*. https://doi.org/10.1016/j.jclepro.2022.132754

Al-Omoush, K. S., Lucas, A., & Val, M. T. del. The role of e-supply chain collaboration in collaborative innovation and value-co creation. *Journal of Business Research*, 158, 113647. https://doi.org/10.1016/j.jbusres.2023.113647

Alves, K. T., Nodari, C. H., Bohnenberger, M. C., & Aloise, P. G. (2023). Predisposição à inovação frugal: Análise de fatores diferenciais em pequenas e médias empresas. Revista Gestão Organizacional, 16(1), 153–173. https://doi.org/10.22277/rgo.v16i1.7144

Apostolidis, C., Brown, D., Wijetunga, D., & Kathriarachchi, E., (2021). Sustainable value co-creation at the Bottom of the Pyramid: using mobile applications to reduce food waste and improve food security. *Journal of Marketing Management*, 37(9-10), 856-886. https://doi.org/10.1080/0267257X.2020.1863448

Aquilani, B., Silvestri, C., Ioppolo, G., & Ruggieri, A., (2018). The challenging transition to bio-economies: Towards a new framework integrating corporate sustainability and value co-creation. *Journal of Cleaner Production, 172,* 4001-4009. http://dx.doi.org/10.1016/j.jclepro.2017.03.153

Arnold, M. G., (2018). Sustainability value creation in frugal contexts to foster Sustainable Development Goals. *Business Strategy and Development*, 1, 265–275. https://doi.org/10.1002/bsd2.36

Arnold, M., (2017). Fostering sustainability by linking co-creation and relationship management concepts. *Journal of Cleaner Production, 140,* 179–188. https://doi.org/10.1016/j.jclepro.2015.03.059

Bal, A.S., Käpylä, J., Li, H., & Helander, N., (2023). Collaborative Value Co-creation from a Stakeholder Perspective: A Literature Review. *Journal of Creating Value, 9(2),* 259-274. https://doi.org/10.1177/23949643231151831

Barbu, A., & Militaru, G., (2019). Value co-creation between manufacturing companies and customers. The role of information technology competency. *Procedia Manufacturing, 32,* 1069-1076. https://doi.org/10.1016/j.promfg.2019.02.323

Barnikol, J., & Liefner, I., (2022). The prospects of advanced frugal innovations in different economies. *Technology in Society, 71*. https://doi.org/10.1016/j.techsoc.2022.102081

Beckett, R., & Dalrymple, J., (2020). A triadic actor view of value co-creation in business incubation. *Technology Innovation Management Review, 10(8),* 27-37. http://doi.org/10.22215/timreview/1379

Bhattacharjya, B. R., Bhaduri, S., & Kakoty, S. K. (2023). Co-creating community-led frugal innovation: An adapted Quadruple Helix? *Technovation, 124(102752)*. https://doi.org/10.1016/j.technovation.2023.102752

Bhatti, Y. (2012). *What is Frugal, What is Innovation? Towards a Theory of Frugal Innovation*. INTL: Descriptive Studies in Emerging Markets (Topic). https://doi.org/10.2139/ssrn.2005910

Bhatti, Y., Prime, M., Harris, M., Wadge, H., McQueen, J., Patel, H., Carter, A., Parston, G., & Darzi, A. (2017). The search for the holy grail: frugal innovation in healthcare from low-income or middle-income countries for reverse innovation to developed countries. *BMJ Innovations, 3*, 212 - 220. https://doi.org/10.1136/bmjinnov-2016-000186

Biggemann, S., Williams, M., & Kro, G., (2014). Building in sustainability, social responsibility and value co-creation. *Journal of Business and Industrial Marketing, 29(4),* 304–312. https://doi.org/10.1108/JBIM-08-2013-0161

Bordian, M., Gil-Saura, I., & Šerić, M., (2023). The impact of value co-creation in sustainable services: understanding generational differences. *Journal of Services Marketing, 37(2),* 155-167. https://doi.org/10.1108/JSM-06-2021-0234

Brem, A., & Ivens, B.S., (2013). Do Frugal and Reverse Innovation Foster Sustainability? Introduction of a Conceptual Framework. *Journal of Technology Management for Growing Economies, 4(2),* 31-50. https://doi.org/10.15415/jtmge.2013.42006

Brown, D. M., Apostolidis, C., Singh, P., Dey, B. L., & Chelekis, J., (2022). Exploring multi-stakeholder value co-creation as an entrepreneurial approach to survival and sustainability: The case of Pennine Pubs. *The International Journal of Entrepreneurship and Innovation*. https://doi.org/10.1177/14657503221145101

Chen, C-W., (2018). Incorporating artistic thinking into sustainability. *Journal of Cleaner Production, 198*, 1007-1012. https://doi.org/10.1016/j.jclepro.2018.07.050

Chen, C-W., (2022). Incorporating artistic thinking into sustainability. Journal of Cleaner Production, 198, 1007-1012. https://doi.org/10.1016/j.jclepro.2018.07.050

Colabi, A.M., Sharaei, F., & Alipour, S., (2022). The relationship between Gamification and Sustainability of small and medium enterprise: Explaining the role of digital transformation in open innovation and value co-creation. *Journal of Information Technology Management*, *14(4)*. https://doi.org/10.22059/jitm.2022.340460.3045

Cozzens, S., & Sutz, J. (2012). Innovation in informal settings: Reflections and proposals for a research agenda. *Innovation and Development, 4(1)*, 5-31. https://doi.org/10.1080/2157930X.2013.876803

Dabić, M., Obradović, T., Vlačić, B., Sahasranamam, S., & Paul, J., (2022). Frugal innovations: A multidisciplinary review & agenda for future research. *Journal of Business Research*, 142, 914-929. https://doi.orgQ10.1016/j.jbusres.2022.01.032

Dressler, A., & Bucher, J., (2018). Introducing a Sustainability Evaluation Framework based on the Sustainable Development Goals applied to Four Cases of South African Frugal Innovation. *Business Strategy and Development, 1(4),* 276–285. https://doi.org/10.1002/bsd2.37

Dubey, R., Bryde, D.J., Foropon, C., & Tiwari, M., (2022). How frugal innovation shape global sustainable supply chains during the pandemic crisis: lessons from the COVID-19. *Supply Chain Management, 27(2),* 295–311. https://doi.org/10.1108/SCM-02-2021-0071

Ebolor, A., Agarwal, N., & Brem, A., (2022a). Fostering the Sustainable Development Goals with technologies underpinned by frugal innovation. *International Journal of Technology Management*, 88, 155–174. https://doi.org/10.1504/IJTM.2022.121503

Ebolor, A., Agarwal, N., & Brem, A., (2022b). Sustainable development in the construction industry: The role of frugal innovation. *Journal of Cleaner Production, 380*. https://doi.org/10.1016/j.jclepro.2022.134922

Elkington, J. (2012). *Sustentabilidade, canibais com garfo e faca*. São Paulo: M. Books do Brasil.

Enquist, B., Johnson, M., & Rönnbäck, Å., (2015). The paradigm shift to Business Excellence 2.0. *International Journal of Quality and Service Sciences, 7(2/3),* 321-333. https://doi.org/10.1108/IJQSS-03-2015-0032

Erhardt, N., Martin-Rios, C., & Chan, E., (2019). Value co-creation in sport entertainment between internal and external stakeholders. *International Journal of Contemporary Hospitality Management, 31(11),* 4192-4210. https://doi.org/10.1108/IJCHM-03-2018-0244

Fan, X. N., & Luo, Y. T. (2020). Value Co-Creation: A Literature Review. *Open Journal of Social Sciences, 8,* 89-98. https://doi.org/10.4236/jss.2020.82008

Feil, A. A., & Schreiber, D. (2017). Sustentabilidade e desenvolvimento sustentável: desvendando as sobreposições e alcances de seus significados. Cadernos Ebape. BR, 15(3), 667-681. https://doi.org/10.1590/1679-395157473

Font, X., English, R., Gkritzali, A., & Tian, W.S., (2021). Value co-creation in sustainable tourism: A service-dominant logic approach. *Tourism Management, 82*. https://doi.org/10.1016/j.tourman.2020.104200

Giacomarra, M., Crescimanno, M., Sakka, G., & Galati, A., (2020). Stakeholder engagement toward value co-creation in the F&B packaging industry. *EuroMed Journal of Business, 15(3),* 315-331. https://doi.org/10.1108/EMJB-06-2019-0077

Govindan, K., (2024). How Artificial Intelligence Drives Sustainable Frugal Innovation: A Multitheoretical Perspective. *IEEE Transactions on Engineering Management, 71,* 638–655. https://doi.org/10.1109/TEM.2021.3116187

Grönroos, C., Ravald, A., & Voima, P., (2011). A service perspective on business relationships: The value creation, interaction and marketing interface. *Marketing Theory, 40(2),* 279–301. http://dx.doi.org/10.1016/j.indmarman.2010.06.036

Guyatt, G. H., Oxman, A. D., Vist, G. E., Kunz, R., Falck-Ytter, Y., Alonso-Coello, P., Schünemann, H. J., & GRADE Working Group. (2008). GRADE: An emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*, 336(7650), 924–926. https://doi.org/10.1136/bmj.39489.470347.AD

Hasan, N., Rahman, A.A., & Saeed, F., (2015). Motivations for value co-creation in higher education institutions using online platforms: case of idea bank. *Journal Teknologi, 73(2),* 61-66. https://doi.org/10.11113/jt.v73.4194

Hossain, M., (2020). Frugal innovation: Conception, development, diffusion, and outcome. *Journal of Cleaner Production, 262*. https://doi.org/10.1016/j.jclepro.2020.121456

Hossain, M., (2021). Frugal innovation and sustainable business models. *Technology in Society, 64*. https://doi.org/10.1016/j.techsoc.2020.101508

Hossain, M., Agarwal, N., Bhatti, Y., & Levänen, J., (2022). Frugal innovation: Antecedents, mediators, and consequences. *Creativity and Innovation Management, 31(3),* 521–540. https://doi.org/10.1111/caim.12511538

Hossain, M., Levänen, J., & Wierenga, M., (2021). Pursuing Frugal Innovation for Sustainability at the Grassroots Level. *Management and Organization Review, 17(2),* 374–381. https://doi.org/10.1017/mor.2020.53

Hossain, M., Simula, H., & Halme, M., (2016). Can frugal go global? Diffusion patterns of frugal innovations. *Technology in Society, 46,* 132-139. http://dx.doi.org/10.1016/j.techsoc.2016.04.005

Huang, C.-C., (2020). Cocreating social innovations between an agro-food company and rice farmers in Taiwan: exploring the process mechanisms. *British Food Journal, 122(12),* 3837-3851. https://doi.org/10.1108/BFJ-10-2019-0759

Huang, S.-Z., Tian, H.-H., & Cheablam, O., (2023). Promoting sustainable development: Multiple mediation effects of green value co-creation and green dynamic capability between green market pressure and firm performance. *Corporate Social Responsibility and Environmental Management*, 1–16. https://doi.org/10.1002/csr.2613

Iqbal, Q., Ahmad, N.H., & Halim, H.A. (2020). Insights on entrepreneurial bricolage and frugal innovation for sustainable performance. *Business Strategy and Development, 4(3).* https://doi.org/10.1002/bsd2.147

Jurietti, E., Mandelli, A., & Fuduric, M., (2017). How do virtual corporate social responsibility dialogs generate value? A case study of the Unilever Sustainable Living Lab. *Corporate Social Responsibility and Environmental Management, 24(5),* 357-367. https://doi.org/10.1002/csr.1407

Khan, R. (2016). How frugal innovation promotes social sustainability. *Sustainability, 8(1034).* https://doi.org/10.3390/su8101034

Khan, R., & Melkas, H. (2020). The social dimension of frugal innovation. *International Journal of Technology Management, 83*(1-3), 160-179. https://doi.org/10.1504/IJTM.2020.109247

Knorringa, P., I, P., Leliveld, A., & van Beers, C., (2016). Frugal Innovation and development: Aides or adversaries? *European Journal of Development Research, 28(2),* 143-153. https://doi.org/10.1057/ejdr.2016.3

Kruger, C., Caiado, R.G.G., França, S.L.B., & Quelhas, O.L.G., (2018). A holistic model integrating value co-creation methodologies towards the sustainable development. *Journal of Cleaner Production, 191*, 400–416. https://doi.org/10.1016/j.jclepro.2018.04.180

Lacoste, S., (2016). Sustainable value co-creation in business networks. *Industrial Marketing Management*, 52, 151–162. http://dx.doi.org/10.1016/j.indmarman.2015.05.018

Le Bas, C. (2020). Frugal innovation as environmental innovation. *International Journal of Technology Management*, 83(1–3), 78–96. https://doi.org/10.1504/IJTM.2020.109231

Le Bas, C. (2023). The economics of frugal innovation. Edward Elgar Publishing Limited, Chelteham, UK. https://dx.doi.org/10.4337/9781035302338

Levänen, J., Hossain, M., & Wierenga, M., (2022). Frugal innovation in the midst of societal and operational pressures. *Journal of Cleaner Production, 347*. https://doi.org/10.1016/j.jclepro.2022.131308

Lin, Y., Chen, A., Yin, Y., Li, Q. Zhu, Q., & Luo, J., (2021). A framework for sustainable management of the platform service supply chain: An empirical study of the logistics sector in China. *International Journal Production Economics, 235*. https://doi.org/10.1016/j.ijpe.2021.108112

Loia, F., Basile, V., Capobianco, N., & Vona, R., (2021). Value Co-Creation Practices in the Decommissioning of Offshore Platforms: A Case Study Approach. *Journal of Creating Value, 7(2),* 206-218. https://doi.org/10.1177/23949643211032040

Loviscek, V. (2021). Triple Bottom Line em direção a uma estrutura holística para a sustentabilidade: uma revisão sistemática. *RAC - Revista de Administração Contemporânea*, 25(3), e-200017. https://doi.org/10.1590/1982-7849rac2021200017.en

Ma, Y., Rong, K., Luo, Y., Wang, Y., Mangalagiu, D., & Thornton, T.F., (2019). Value Co-creation for sustainable consumption and production in the sharing economy in China. *Journal of cleaner production, 208*, 1148-1158. https://doi.org/10.1016/j.jclepro.2018.10.135

Mani, V., & Gunasekaran, A., (2021). Upstream complex power relationships and firm's reputation in global value chains. *International Journal Production Economics, 237*. https://doi.org/10.1016/j.ijpe.2021.108142

Melnikova, L., & Gilsanz, A. (2024). Frugal Innovation: Meta-Analysis of Bibliographic Relationships and Identification of Research Trends for the Period 2010–2021. *IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT*, 71, 2024. https://doi.org/10.1109/TEM.2022.3169288

Mihailova, D., Schubert, I., Burger, P., & Fritz, M.M.C., (2022). Exploring modes of sustainable value co-creation in renewable energy communities. *Journal of Cleaner Production, 330*. https://doi.org/10.1016/j.jclepro.2021.129917

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., Stewart, L.A., & PRISMA-P GrouP., (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews, 4(1).* https://doi.org/10.1186/2046-4053-4-1

Moleka, P. (2024). Frugal innovation for inclusive and sustainable development in Africa. *Advanced Research in Economics and Business Strategy Journal*, 5(1), 107–117.https://doi.org/10.52919/arebus.v5i1.58

Molina-Maturano, J., Bucher, J., & Speelman, S. (2020). Understanding and evaluating the sustainability of frugal water innovations in México: An exploratory case study. *Journal of Cleaner Production, 274(122692).* https://doi.org/10.1016/j.jclepro.2020.122692

Monavvarifard, F., Baradaran, M., & Khosravipour, B., (2019). Increasing the sustainability level in agriculture and Natural Resources Universities of Iran through students' engagement in the value Cocreation process. *Journal of Cleaner Production, 234*, 353-365. https://doi.org/10.1016/j.jclepro.2019.06.175

Morosan, C., (2018). An empirical analysis of intentions to cocreate value in hotels using mobile devices. *Journal of Hospitality & Tourism Research, 42(4),* 528-562. https://doi.org/10.1177/1096348015597034

Nodari, C.H., Specht, I., Bondan, J., & Silva, F., (2023). Predisposição de empresas inovadoras à inovação frugal. *Revista Pensamento Contemporâneo em Administração (RPCA), 17(2),* 101-117. https://doi.org/10.12712/rpca.v17i2.58571

Palakshappa, N., Dodds, S., & Stangl, L.M., (2023). Understanding sustainable service ecosystems: a meso-level perspective. *Journal of Services Marketing*. https://doi.org/10.1108/JSM-02-2023-0054

Park, S., Rosca, E., & Agarwal, N., (2022). Driving social impact at the bottom of the Pyramid through the internet-of-things enabled frugal innovations Author links open overlay panel. *Technovation, 118*. https://doi.org/10.1016/j.technovation.2021.102381

Paunov, C. (2013). *Innovation and inclusive development: A discussion of the main policy issues*. OECD Science, Technology and Industry Working Papers, No. 2013/01. https://doi.org/10.1787/5k4dd1rvsnjj-en.

Pedroso, I.D., Soares, M.A.F, Dutra, A.R.A., Cubas, A.L.V., Guerra, J.B.S.O.A., & Brem, A., (2023). Frugal innovation development for sustainability: The case of extractivism of the "Butia catarinensis" in Brazil. *Journal of Cleaner Production, 412.* https://doi.org/10.1016/j.jclepro.2023.137318

Pisoni, A., Michelini, L., & Martignoni, G., (2018). Frugal Approach to Innovation: State of the Art and Future Perspectives. *Journal of Cleaner Production, 171(10),* 107–126. https://doi.org/10.1016/j.jclepro.2017.09.248

Prahalad, C. K., & Ramaswamy, V. (2004). *The future of competition: Co-creating unique value with customers*. Harvard Business School Press.

Prahalad, C.K., (2012). Bottom of the pyramid as a source of breakthrough innovations. *Journal of Product Innovation Management, 29(1),* 6-12. https://doi.org/10.1111/j.1540-5885.2011.00874.x

Radjou, N., & Prabhu, J., (2014). *Frugal Innovation: How to Do More with Less*. 1st ed., Profile Books Ltd., London, UK.

Radjou, N., Prabhu, J., & Ahuja, S., (2012). *Jugaad Innovation: think frugal, be flexible, generate breakthrough growth*. Jossey-Bass: San Francisco-CA.

Rao, B.C., (2013). How disruptive is frugal? *Technology in Society, 35,* 65–73. http://dx.doi.org/10.1016/j.techsoc.2013.03.003

Régnier, P., (2023). Innovation, Appropriate Technologies and Entrepreneurship for Global Sustainability Development: A Review Until the Early Twenty-first Century. *Journal of Entrepreneurship, 32(2),* 12–26. https://doi.org/10.1177/09713557231201115

Richardson, J.T.E. (1996). *Handbook of Qualitative Research Methods for Psychology and the Social Sciences.* Leicester: BPS Books.

Rosca, E., Arnold, M., & Bendul, J.C. (2017). Business models for sustainable innovation an empirical analysis of frugal products and services. *Journal of Cleaner Production, 162,* 133-145. https://doi.org/10.1016/j.jclepro.2016.02.050

Shah, H., Noor, S., Ahmad, A.B., Butt, A.S., & Lei, S., (2022). Retrospective view and thematic analysis of value co-creation through bibliometric analysis. *Total Quality Management & Business Excellence, 33(7-8),* 752-776. https://doi.org/10.1080/14783363.2021.1890017

Shahid, I., Islam, T., & Albert, A. (2023). Nothing about us without us: A co-production strategy for communities, researchers, and stakeholders to identify ways of improving health and reducing inequalities. *Health Expectations, 26*(1), 3–15. https://doi.org/10.1111/hex.13709

Sharma, A., Iyer, G.R., Mehrotra, A., & Krishnan, R., (2010). Sustainability and business-to-business marketing: A framework and implications. *Industrial marketing management, 39(2),* 330-341. https://doi.org/10.1016/j.indmarman.2008.11.005

Singh, P., Brown, D.M., Chelekis, J., Apostolidis, C., & Dey, B.L., (2022). Sustainability in the beer and pub industry during the COVID-19 period: An emerging new normal. *Journal of Business Research, 141,* 656–672. https://doi.org/10.1016/j.jbusres.2021.11.066

Stöber, L. F., Sommer D., & Ebersberger, B. (2022). The impact of frugal innovation on sustainability: a systematic literature review. *International Journal of Innovation Management*, 26(8). https://doi.org/10.1142/S1363919622300021

Tiwari, R., & Prabhu, J., (2018). *Soft power of frugal innovation and its potential role in India's emergence as a global lead market for affordable excellence*. Working Paper, n. 104, Hamburg University of Technology (TUHH), Institute for Technology and Innovation Management (TIM), Hamburg. https://doi.org/10.15480/882.1737

Tricco, A.C., Lillie, E., Zarin, W., O'Brien, K.K., Colquhoun, H., Levac, D., Moher, D., Peters, M.D.J., Horsley, T., Weeks, L., Hempel, S., Akl, E.A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M.G., Garritty, C., Lewin, S., Godfrey, C.M., Macdonald, M.T., Langlois, E.V., Soares-Weiser, K., Moriarty, J., Clifford, T., Tunçalp, Ö., & Straus, S.E., (2018). PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Annals Internal of Medice, 169(7),* 467-473. https://doi.org/10.7326/M18-0850

Van Tuijl, E. (2024). Increasing or decreasing frugality: the connection between digitalization and frugal innovation. *International Journal of Innovation Management*, 28(3-4). https://doi.org/10.1142/S1363919624500130

Vargo, S. L., & Lusch, R. F. (2004). Evolving to a New Dominant Logic for Marketing. *Journal of Marketing,* 68, 1–17.

Vargo, S. L., & Lusch, R. F. (2008). Service-dominant logic: continuing the evolution. *J. of the Acad. Mark. Sci.* (2008) 36, 1–10. https://doi.org/10.1007/s11747-007-0069-6

Vargo, S. L., Mglio, P. P., Akaka, M. A. (2008). On value and value co-creation: A service systems and service logic perspective. *European Management Journal*, 26, 145– 152.

Vargo, S.L., Koskela-Huotari, K., & Vink, J., (2020). *Service-dominant logic: foundations and applications*. The Routledge handbook of service research insights and ideas, 3-23.

Von Janda, S., Kuester, S., Schuhmacher, M.C., Shainesh, G., (2020). What frugal products are and why they matter: A cross-national multi-method study. *Journal of Cleaner Production*, *246*. https://doi.org/10.1016/j.jclepro.2019.118977

Wan, X., Liu, X., Du, Z., & Du, Y., (2021). A novel model used for assessing supply chain sustainability integrating the ANP and ER approaches and its application in marine ranching. *Journal of Cleaner Production, 279.* https://doi.org/10.1016/j.jclepro.2020.123500

Weyrauch, T., & Herstatt, C., (2017). What is frugal innovation? Three defining criteria. *Journal of Frugal Innovation, 2(1).* https://doi.org/10.1186/s40669-016-0005-y

Weyrauch, T., & Herstatt, C., (2019). What is frugal innovation? *In:* Mcmurray, Adela J.; WAAL, Gerret. A. de. *Frugal Innovation: a global research companion*. New York: Routledge. Cap. 1, 3-39.

Widjojo, H., Fontana, A., Gayatri, G., Soehadi, A. W. *et al.* (2020). Value Co-Creation platform in Indonesian SME Community: SDL perspective. *Journal of Developmental Entrepreneurship, 25(2).* https://doi.org/10.1142/S1084946720500090

Wohlfart, L., Groganz, J., Manefeld, S., & Fröhlich, F. (2021). Frugal Innovation for Developed Markets: Target Customers, Characteristics, Success Factors. *In:* Agarwal, N., Brem, A. (Eds.) (2021). *Frugal Innovation and Its Implementation: Leveraging Constraints to Drive Innovations on a Global Scale*. Switzerland: Springer Nature (eBook).

Wyllie, J., Carlson, J., Heinsch, M., Kay-Lambkin, F., McCoy, A., (2022). eHealth services and SDG3: Increasing the capacity of Care. *Australasian Marketing Journal, 30(2),* 131-141. https://doi.org/10.1177/183933492110691

Zhang, M., Atwal, G., & Kaiser, M., (2021). Corporate social irresponsibility and stakeholder ecosystems: The case of Volkswagen Dieselgate scandal. *Strategic Change, 30,* 79–85. https://doi.org/10.1002/jsc.2391