

INTEGRATIVE REVIEW ON SUSTAINABILITY TRANSITIONS MODELS FOCUSED ON ORGANIZATIONAL KNOWLEDGE AND EDUCATION

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Resumo: This article examines the extent to which, in different areas of knowledge and productive sectors, there are studies that describe and systematize transitions to sustainability models. The methodology used was an integrative literature review discussing how organizations and actors align themselves in actions towards sustainable solutions, considering the Transition to Sustainability, the treatment of Organizational Knowledge and the relationship between Transition to Sustainability and Organizational Knowledge, whether incorporating directly or indirectly the Triple Bottom Line sustainability perspective in educational field. We analyzed how the identified articles conceptualize sustainability and describe frameworks and/or indicators of this transition process, evaluating whether the studied process is considered successful or not. Our search found 56 articles, but only 4 remained after applying the inclusion and exclusion criteria. The primary findings underscore the imperative of tangible actions, context-specific policies, and collaborative initiatives to facilitate successful sustainable transitions.

Keywords: *sustainability transition; organizational knowledge; knowledge management; sustainable development; indicators or framework.*

INTRODUCTION

The World Commission on Environment and Development's report called Our Common Future, published in 1987, discussed long-term environmental strategies for achieving sustainable development, and achieving the present needs without compromising the ability of the future generations to achieve their own needs. In that sense, Barbosa (2007) says that the sustainability term was defined, firstly, to the Environmental Economy and Business Ethics. Later, the Triple Bottom Line (TBL) business concept was integrated to the sustainability term as organizations should commit

to measuring their social and environmental impact, in addition to their financial performance, rather than solely focusing on generating profit, or the standard “bottom line.” The TBL, therefore, is used to designate corporations with a tridimensional attitude: profit, planet, and people (LEMME, 2005).

The concept of transition, as a deep change in specific social systems, has stood out, connecting the environmental, economic, social and governmental spheres of sustainability. Achieving sustainability requires comprehensive transformations in objectives, incentives, technologies, social practices and governance systems, as well as knowledge structures (EEA, 2021; 2023). The comprehensive dissemination of knowledge plays a fundamental role in training/educating society to achieve sustainability (BECHMANN, 2009).

This article aims to investigate the presence and effectiveness of studies that address transitions to sustainability models in the educational sector, seeking to identify and analyze works that describe and, preferably, systematize these transitions, considering process management and the incorporation of the TBL principles.

SUSTAINABILITY TRANSITION

Nowadays, the vision of an ecologically balanced environment is not restricted to environmentalists alone; it extends as a concern embraced by the entire society. This is due to the wide range of effects that arise from ongoing transformations. Consequently, the need for a paradigm shift and the search for a transition towards sustainability are gaining more and more relevance in society. This dynamic process reflects our constant search to understand, adapt and apply knowledge in an innovative and creative way.

Knowledge is at the heart of organizational operations. It arises from the ability to organize, interpret and synthesize information, providing a comprehensive view by interacting data, experiences and context, generating new perspectives and insights. Knowledge management and strategy are crucial for the competitive agility and survival of organizations (DAVENPORT & PRUSAK, 1998; HISLOP, 2013).

The European Corporate Sustainability Framework (ECSF) defines corporate sustainability as the inclusion of social and environmental aspects in daily operations and relationships with stakeholders. The fusion of sustainable development with knowledge management aims to optimize sustainability efforts, ensuring the effective application of knowledge (BRINK and WOERD, 2004; SEGALÀS; FERRER-BALAS; MULDER, 2010).

Integrating knowledge management practices with sustainability orientation not only strengthens the competitiveness of organizations, but also places them in a proactive position in environmental preservation and promoting social well-being. This strategic merger is essential to leading the transition towards sustainability, and higher

education has a special role, providing methodologies, methods, courses, and much more to educate and commit the society to sustainability.

Loorbach et al. (2017) defines "transition" as a nonlinear change from one dynamic equilibrium to another, a term widely used across several scientific subjects. The field of sustainability transitions emerged in the 1990s, in response to the need to anticipate and adapt to imminent changes, connecting them to sustainable development. It is increasingly used to refer to large-scale social changes seen as crucial to tackling "grand social challenges". This field encompasses several approaches that deepen understanding of the persistence of socially unsustainable systems, exploring trajectories and management strategies to overcome these challenges in sectors such as energy, natural resources, food, mobility, health, education, and in regions and communities' journeys towards sustainability.

For organizations, sustainability management focuses on transitions toward sustainable development. The need to coordinate changes in technological domains, management systems and organizational cultures is widely recognized. The importance of harmonization between the individual, group and organizational levels is also highlighted when seeking to implement these changes (LOZANO, 2008; 2014). Promoting sustainable transformations in the organization is not limited to changing paradigms, but also involves progressive adjustments in the organizational structure, operations, management and the promotion of perspectives aligned with sustainability.

Adopting a sustainable mindset highlights the Triple Bottom Line (TBL), which integrates economic prosperity, environmental quality and social progress. This directly influences the generation of value in organizations, driving the search for sustainable initiatives that affect not only financial performance, but also brand reputation and market competitiveness. Organizational sustainability, based on TBL, encompasses the economic, social and environmental spheres, requiring synergy between these three aspects to influence strategic and operational decisions. This implies the generation of wealth for shareholders, environmental preservation and consideration of the well-being of all stakeholders, demanding the institutionalization of values and practices that minimize operational impacts and add value in the economic, social and environmental spheres (CIRELI AND KASSAI 2010).

METHODOLOGY

The methodology used was a literature review on sustainability transition models. We carried out an integrative review using the Scopus and Web of Science databases. The search was conducted in two steps, from April to August 2023.

The search strategy, shown in Table 1, identified 56 articles in Scopus and 29 in Web of Science, with 14 overlaps. The first step combines the reading of the Title, Abstract and Keywords of the documents. At the end, we selected 16 articles that

address the interconnection between transition to sustainability and organizational knowledge. In the second step, we read the entire document, and only 4 articles remained when we included the criterion of the relationship between transition, organizational knowledge, and education.

Table 1. Search String and Number of Articles Found

Database	Search String	Result
Scopus	(TITLE-ABS-KEY ("sustainability transition") AND TITLE-ABS-KEY (knowledge) AND TITLE-ABS-KEY (organizations OR organization OR enterprises OR business) AND TITLE-ABS-KEY (indicator OR indicators OR framework OR frameworks))) OR ((TITLE-ABS-KEY ("sustainable development" OR sustainable OR sustainability) AND TITLE-ABS-KEY ("knowledge management") AND TITLE-ABS-KEY (organizations OR organization OR enterprises OR business) AND TITLE-ABS-KEY (indicator OR indicators OR framework OR frameworks) AND TITLE-ABS-KEY (transition OR transitions))).	56
Web of Science	TS=("sustainability transition") AND TS=(knowledge) AND TS=(organizations OR organization OR enterprises OR business) AND TS=(indicator OR indicators OR framework OR frameworks) and All Open Access (Open Access) and Article (Document Types)	29

All the details and results extracted from the 4 articles found in the literature are presented in the next section. To assist the presentation of the results, we tried to answer all these questions:

1. What is the methodology applied?
2. What are the main concepts?
3. The concept Sustainability is used in the same perspective as the TBL?
4. How does the article address organizational knowledge?
5. How does the article relate the sustainability transition and organizational knowledge?
6. Is there any systematization regarding the sustainability transition process?

7. Are there any conclusions, suggestions or future work to the sustainability transition process?

RESULTS AND DISCUSSION

This section presents the results of the literature review and discusses the questions presented in the last section. Table 2 starts this section with the articles found in the review, and it resumes the author's treat the Sustainability Transitions (ST) in the text, Organizational Knowledge (Org. Knowledge) treatment in the text, and the relationship between Sustainability Transition and Organizational Knowledge.

Table 1 - Organizational knowledge and the relationship with the transition to sustainability

Reference	Sustainability Transitions concept	Organizational Knowledge Concept	Relationship between ST and Org. Knowledge
Wolf et al. (2021)	Presents a conceptual framework about the role of ONGs and Universities as an intermediary in STs.	Do not treat the concept explicitly, but discuss how to create a structure to share knowledge between ONGs, universities, and others.	Suggests that ONGs and universities can support the ST by sharing knowledge and expertise, but do not discuss this relationship deeply.
Sidiropoulos (2022)	Discuss the role of education in STs.	Do not explicitly treat this concept, but emphasize the broader role of education in sustainability and the development of competencies and perspectives for STs.	Suggests that the education for sustainability can develop important competencies/skills for students to support transitions.
Huge et al. (2016)	Provides a general model of the ST process.	Discusses types of knowledge for sustainability but does not delve into Org. knowledge.	Discusses actions for integrating sustainability in academic research, addressing the need for systemic innovation and transition.
Friedrich e Feser (2023)	Examines the role of innovation intermediaries (Higher Education Institutions - HEIs) and knowledge bases in STs.	Explores the various regional knowledge bases and the organizational innovations required for knowledge transfer and localized learning processes among regional actors.	Discusses how the combination of different knowledge bases can support ST. Suggests that innovation policies should promote the efficient transfer of heterogeneous knowledge.

Regarding the transition process, "Combining Knowledge Bases for Small Wins in Peripheral Regions", Friedrich and Feser (2023) offers a literature review on the geography of sustainability transitions and mission-oriented innovation systems. The authors argue that sustainability transitions involve radical changes in sociotechnical systems to overcome social, economic, and ecological issues, requiring the development of new practices and technologies that are more sustainable and resilient. The article underscores the importance of small victories in promoting sustainability transitions, referring to incremental changes achievable through the integration of different types of knowledge, including organizational, social, and technical knowledge.

They suggest that small victories can be used to create momentum for larger sustainability transitions by demonstrating the feasibility and convenience of new practices and technologies. The authors provide a framework for understanding sustainability transition processes, emphasizing the role of innovation intermediaries (higher education institutions - HEIs) and small gains in promoting sustainability-oriented innovation in regional contexts.

They highlight the role of innovation intermediaries (HEIs) in knowledge flow within a Regional Innovation System (RIS). For universities to play a significant role in innovation regions, it points out that effective knowledge transfer must meet specific regional knowledge base requirements. The concept of knowledge bases, as outlined in the study, refers to distinct categories: analytical, synthetic, and symbolic. The analytical base, known as "know-why," is derived from deductive and abstract models, highly encoded, and universal. The synthetic base, or "know-how," is linked to the innovative application of existing knowledge, combining spatially specific and transferable coded parts. The symbolic base, or "know-who," relates to innovative creation and economic use of aesthetic values, arising from interactions in professional networks, emphasizing transnational cooperation among actors with different cultural backgrounds.

The study pointed out that contributions to systemic-level innovation can be linked to three dimensions: combining social and organizational innovation with participatory discussion among teachers, researchers, administrators, and students for knowledge transfer; linking organizational and social innovations to systemic changes by gathering heterogeneous actor groups through knowledge transfer networks and a combination of technical, social, and organizational innovation by encouraging multilateral cooperation among social, public, and business actors.

The process is not systematized but described through case studies showing how knowledge transfer contributes to sustainability transitions. Highlights the need for tailored policy measures matching the specific context of a Regional Innovation System (RIS) and the importance of participative and collaborative initiatives integrating diverse knowledge bases for sustainability transitions.

In "The Influence of Higher Education on Student Learning and Agency for Sustainability Transition", Sidiropoulos (2022) investigated sustainability learning in

higher education, the contribution of higher education (HE) and education for sustainability (EDS) to development of their capacity and agency to contribute to sustainability transitions in various contexts.

The text addresses various barriers and challenges in implementing sustainable development in universities, emphasizing the importance of addressing such obstacles through collaborative and participatory approaches. A significant challenge is the lack of systematic implementation, with academics adopting a "free-choice" approach to sustainability in their courses. Additionally, teaching practices are limited by external constraints imposed by faculty, institutions, disciplinary traditions, professional bodies, government agencies, and/or sectoral organizations. In the learning context, students face challenges in perceiving the relevance of sustainability to their programs or disagreeing with it in principle.

It concludes that the current free-choice approach to ESD in higher education produces learning outcomes that are too weak and scattered to create the necessary momentum for significant changes in student dispositions beyond incremental learning and limited personal change. Agency was rare and emerged when personal motivation coincided with competence.

The article emphasizes the need for a holistic and interdisciplinary approach to sustainability education, integrating different areas of knowledge and promoting critical thinking skills, beyond problem-solving. The author highlights that sustainability transitions involve transformative changes on a large scale in complex systems, requiring changes in values, beliefs, and governance. The conceptual framework guiding the research includes sustainability transition theories proposing that transitions progress non-linearly from one dynamic equilibrium to another. Not explicitly systematized, but the study covers various aspects of sustainability education and its impact on students' learning and attitudes, and recommend, for tertiary business schools, to audit and embed sustainability into all courses, understanding students' perspectives on sustainability, and fostering threshold learning towards sustainability

Huge et al. (2016) in "How to Walk the Talk? Developing Actions for Sustainability in Academic Research", present a general framework for sustainability transitions, involving a shift from the current unsustainable system to a more sustainable one. The framework includes three phases: pre-transition, transition, and post-transition. The pre-transition phase involves identifying the need for change and creating momentum for transition. The transition phase involves experimenting with new practices and technologies, building networks and coalitions, and creating new institutions and policies. The post-transition phase involves consolidating the gains achieved during the transition and ensuring that the new system is resilient and adaptable to changing circumstances. While the article does not provide a detailed step-by-step guide for sustainability transitions, it offers a useful conceptualization of the process and

emphasizes the importance of experimentation, learning, and collaboration in achieving sustainability goals.

The article proposes a range of actions for implementing sustainability in academic research, acknowledging limitations, and the need for a multidimensional conceptualization of sustainability in academic contexts. The authors argue that sustainability transitions require a systemic and transformative approach that goes beyond incremental changes and addresses the root causes of unsustainability. They suggest that academic research can play a pivotal role in advancing sustainability transitions by generating knowledge, promoting innovation, and engaging diverse stakeholders. However, they also acknowledge that sustainability transitions are complex and contested processes that require continuous learning, experimentation, and collaboration.

“Non-Governmental Organisations and Universities as Transition Intermediaries in Sustainability Transformations Building on Grassroots Initiatives”, by Wolf et al. (2021) lacks a systematization of the sustainability transition process. Instead, it focuses on developing a conceptual framework that integrates the expected activities of universities and NGOs in sustainability transitions, specifically in the acceleration phase. The framework combines the expected activities of these actors in existing literature and establishes connections between them. The authors then test this framework in three case studies in the plastic reassessment field, comparing and drawing on the perspectives of niche actors, intermediaries, and regimes.

The results confirm the conceptual framework and suggest adjustments and expansions. The authors provide detailed insights into sustainability transitions and offer a structure for understanding the role of intermediaries in supporting sustainability innovations.

The authors emphasize several key points. Firstly, as highlighted by Loorbach et al. (2017), there is a need for a systemic and transformative approach in sustainability transitions, going beyond incremental changes and requiring a deep understanding of challenges and collaborative efforts from various stakeholders. Secondly, Wolf et al. (2021) emphasize the importance of knowledge and education in the context of sustainability transitions, providing fundamental tools for innovative solutions and understanding complex issues. Sidiropoulos (2022) further underscores the crucial role of education in shaping individuals capable of contributing to sustainability through interdisciplinary competencies and perspectives. Additionally, Hüge et al.'s studies (2016) highlight the necessity of adaptive and collaborative approaches, recognizing the dynamic and complex nature of sustainability transitions. Finally, Friedrich and Feser (2023) stress the importance of policies and strategies tailored to specific contexts, taking into account the unique characteristics of each region and organization. They acknowledge that there is no one-size-fits-all solution to sustainability challenges, and policies and practices must be adjusted according to local circumstances.

FINAL CONSIDERATIONS

The different articles provide complementary and converging perspectives on how to systematize the transition process towards sustainability. They emphasize the importance of active stakeholder participation, co-production of knowledge, experimentation, policy and institutional changes, and the need for adaptive approaches to address the complex challenges associated with sustainability transitions.

These research findings reinforce the notion that, to address the global challenges of sustainability, it is important to unite efforts, integrate diverse forms of knowledge, and adopt adaptive approaches that acknowledge the inherent complexities in transitioning towards a sustainable future. It need tangible actions, contextualized policies, and participative initiatives to achieve sustainable transitions. The challenge lies not only in recognizing the importance of sustainability but also in embedding it into daily practices, academic curricula, and regional policies, fostering a mindset shift that involves all societal actors.

As we navigate the global challenge of sustainability transitions, the collective wisdom of these authors underscores the essential role of knowledge, education, collaboration, and adaptation in advancing toward a more sustainable future. As we confront the intricate socio-environmental challenges of our time, it is imperative that we continue to engage in research, acquire knowledge, and work collaboratively, drawing from the insights shared by these authors, to promote sustainability across all facets of society.

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