

Knowledge Management and Sustainability: An Integrated Approach in Portuguese Higher Education Institutions

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Abstract

Objectives - This study aims to analyze how Portuguese Higher Education Institutions (HEIs) adopt knowledge management (KM) strategies to integrate sustainability into their academic, administrative and social dimensions, thereby contributing to the United Nations Sustainable Development Goals (SDGs).

Theoretical Framework - The research is grounded in the interrelationship between KM and sustainability. KM is understood as a dynamic process of creating, sharing and applying knowledge to generate innovation and organizational efficiency, while sustainability is framed as a multidimensional concept involving environmental, social and economic pillars, aligned with the 2030 Agenda.

Method - A qualitative and exploratory multiple case study was carried out between January and April 2025. Data were collected from institutional reports, strategic documents and official HEI websites. Content analysis was used to categorize practices and initiatives according to KM and sustainability dimensions.

Results and Discussion - The findings show that Portuguese HEIs are increasingly embedding sustainability transversally into teaching, research, community engagement and institutional management. Initiatives include sustainability-oriented curricula, interdisciplinary research projects, university extension programs, and partnerships with local communities. The study highlights the role of digitalization and emerging technologies in strengthening KM and facilitating sustainable innovation. Collaborative networks, such as the Sustainable Campus Network and Lusophone HEI Sustainability Network, enhance knowledge sharing and collective learning.

Research Implications - The study emphasizes the need for HEIs to strengthen their organizational culture, digital infrastructures and international collaborations to consolidate the

integration of KM and sustainability. It suggests that HEIs can act as strategic agents in advancing the SDGs by fostering innovation, ethics and social responsibility.

Originality/Value - This article contributes to the literature by presenting an integrated analysis of KM and sustainability in Portuguese public HEIs, an underexplored context. It demonstrates how the articulation between these two fields not only enhances institutional performance but also generates a wider social impact, positioning HEIs as transformative actors in addressing global challenges.

Keywords: Knowledge management, Sustainability, Higher education institutions (HEIs), Sustainable development, Sustainable Development Goals (SDGs), Climate change

Introduction

In recent decades, the debate on sustainability and knowledge management has become central in the context of Higher Education Institutions (HEIs). The increasing complexity of global challenges such as climate change, social justice and sustainable economic development require innovative and integrated responses. In this sense, knowledge management emerges as a strategic tool to promote sustainable practices and develop effective solutions, allowing HEIs to play an active role in training conscious citizens and building a more resilient society.

This article explores the interconnection between knowledge management and sustainability in the context of HEIs in Portugal. It seeks to highlight how these institutions can articulate knowledge management practices with sustainability principles in order to improve academic, social and organizational performance, as well as contribute to the United Nations SDGs.

Through a qualitative methodological approach, based on a literature review and exploratory study, strategies, practices and concrete cases implemented by Portuguese HEIs are analyzed. The aim is to highlight the advances, challenges and opportunities that arise in the construction of an institutional culture committed to innovation, ethics and social responsibility, reaffirming the strategic role of HEIs as agents of transformation for the 21st century.

1. Literature review

The relationship between knowledge management and sustainability in HEIs in Portugal reflects how these concepts complement each other to promote innovation and sustainable development. Knowledge management, by systematizing the creation, sharing and application of knowledge, plays a crucial role in the formation of sustainable practices in HEIs, and contributes to the construction of solutions that address ecological, social and economic challenges (Hislop et al., 2020).

Knowledge management and sustainability in HEIs is gaining increasing relevance, especially in the context of global challenges such as climate change, social justice and sustainable economic development.

For a better understanding of the topic, some definitions of knowledge management are presented.

1.1 Knowledge management concepts and definitions

Knowledge management (KM) is an interdisciplinary field that emerged strongly in the 1980s and 1990s, driven by the need for organizations to better capture, store, share and apply knowledge to gain competitive advantages.

According to Nonaka and Takeuchi (1995), pioneers on the subject, knowledge management can be defined as the process of creating, disseminating and internalizing organizational knowledge, with knowledge being a strategic resource capable of driving innovation. For these authors, the dynamics of knowledge creation is based on the continuous interaction between tacit and explicit knowledge, a concept they introduced as the SECI model (Socialization, Externalization, Combination and Internalization).

Davenport and Prusak (1998) complete this view by stating that KM involves explicit and systematic organizational processes to identify, capture, structure, value and share knowledge, aiming to improve organizational effectiveness. For these authors, knowledge is a fluid mixture of experience, values, information and contextual perception.

In a more contemporary context, authors such as Alavi and Leidner (2001) reinforce the importance of information technology as support for KM practices, but warn that technology, by itself, is not enough; Effective knowledge management also depends on a strong organizational culture that values sharing and learning.

More recently, Hislop, Bosua and Helms (2018) updated the concept, highlighting KM as a set of social, technological and managerial practices designed to support the knowledge life cycle (creation, storage, dissemination and application), in an environment of increasing complexity and digitalization.

Donate and Sánchez de Pablo (2015) emphasize that KM is a catalyst for sustainable innovation, especially in highly competitive and rapidly changing environments. Thus, knowledge is seen not only as an internal asset, but also as an essential element in the construction of open and collaborative innovation networks (Valarmathi and Vasanth, 2020).

In this way, knowledge management can be understood as a dynamic and integrated process that evolves beyond the simple administration of information, focusing on the creation of strategic value, stimulating innovation and sustaining long-term competitive advantage.

In the table below we can see a summary of the main definitions, that is, the main ideas of the authors who constructed them.

Table 1 - Summary of definitions

Author	Main definition
Nonaka e Takeuchi (1995)	Process of creating and converting tacit and explicit knowledge.
Davenport e Prusak (1998)	Systematic knowledge management to generate value and organizational advantage.
Alavi e Leidner (2001)	Organizational process that integrates people, processes and technology for the knowledge cycle.
Hislop, Bosua e Helms (2018)	Social and technological practice to manage the knowledge lifecycle in digital contexts.
Donate e Sánchez de Pablo (2015)	KM as support for open and sustainable innovation.

Source: Prepared by the author

Likewise, the evolution of knowledge management definitions over time is presented.

Table 2 – Evolution of KM definitions

Year	Evolution of KM definitions
1990	Nonaka & Takeuchi (1995) - Creation of organizational knowledge - SECI model (tacit and explicit)
1998	Davenport & Prusak (1998) - Systematic knowledge management - Organizational value and advantage
2001	Alavi & Leidner (2001) - Integration of people, processes and IT - Knowledge cycle management
2015	Donate & Sánchez de Pablo (2015) - KM as support for sustainable innovation - Knowledge of collaborative networks
2018	Hislop, Bosua & Helms (2018) - KM as a social and technological practice - Knowledge management in digital environments

Source: Prepared by the author

1.2 Concepts and definitions of sustainability

The notion of sustainability is broad and multifaceted, evolving over time in response to society's growing environmental, social and economic concerns. The modern concept of sustainability gained international prominence with the publication of the Brundtland Report in 1987, prepared by the UN World Commission on Environment and Development. In this report, sustainable

development is defined as that which "meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). This definition emphasizes intergenerational responsibility and the integration of economic development, social equity and environmental preservation.

In the 1990s, the Summit held in Rio de Janeiro in 1992 consolidated the concept of sustainability as a pillar of global policies, reinforcing the need for integrated strategies to deal with environmental and social issues.

Over time, sustainability has been refined and expanded. Elkington (1997) introduced the concept of the Triple Bottom Line, proposing that organizational success should be measured in three dimensions, social, environmental and economic, also known as the "three dimensions of sustainability" or "3Ps" (People, Planet, Profit).

More recently, in the context of the SDGs established by the UN in 2015, sustainability began to be understood in an even more comprehensive way, involving 17 objectives that include quality education, gender equality, innovation, reduction of inequalities and climate action (United Nations, 2015).

Contemporary authors, such as Leal Filho (2020), reinforce that sustainability must be seen not only as a goal, but as a continuous process of institutional and cultural transformation, particularly in HEIs, where the training of new leaders is crucial to achieving sustainable practices.

Thus, sustainability is perceived today as a dynamic, integrative and strategic concept, which goes beyond the environmental field to encompass social, economic, cultural and political dimensions.

Below is a summary of the main definitions.

Table 3 - Summary of sustainability definitions

Author/Institution	Main Definition
WCED ¹ – Relatório Brundtland (1987)	Development that meets current needs without compromising future generations.
Elkington (1997)	Triple Bottom Line: integration of economic, social and environmental dimensions.
United Nations (2015)	Sustainability as compliance with the 17 SDGs, covering different areas of human development.
Leal Filho (2020)	Sustainability as continuous institutional and social transformation.

¹ World Commission on Environment and Development.

Source: Prepared by the author

The table below shows the evolution of the concept of sustainability.

Table 4 - Evolution of the concept of sustainability

Year	Evolution of the concept of sustainability
1987	Brundtland Report (WCED, 1987) - Meet current needs without compromising future generations - Integration of environment, society and economy
1992	Earth Summit (Rio-92) - Consolidation of sustainability as a policy - Agenda 21 for global action
1997	Elkington (1997) - Triple Bottom Line (People, Planet, Profit) - Sustainability as a balance of 3 dimensions
2015	ONU - Agenda 2030 (ODS) - 17 Sustainable Development Goals - Multidimensional vision: eradication of poverty, education, gender equality, climate action
2020	Leal Filho (2020) - Sustainability as a cultural transformation - Emphasis on the role of Educational Institutions

Source: Prepared by the author

1.3 Interrelationship between Knowledge Management and Sustainability and its relevance

Knowledge management and sustainability, although originating from different fields, demonstrate strong interdependence in the organizational context. KM, by structuring processes of creation, sharing and use of knowledge, favors practices that drive sustainable development. According to Nonaka and Takeuchi (1997), "knowledge is created through the dynamic interaction between tacit and explicit knowledge within organizations" (p. 72), which is essential for sustainable innovation.

On the other hand, sustainability demands, which encompass social, environmental and economic dimensions, drive the continuous creation of new knowledge. According to Silva and Beuren (2015), "knowledge management presents itself as a means of consolidating sustainable practices, promoting innovation and competitiveness" (p. 74). In this way, organizations that combine knowledge management with sustainability demonstrate a greater capacity to anticipate trends and respond more effectively to society's demands.

In the HEIs environment, the interrelationship between KM and sustainability is even more critical. HEIs act as hubs for the production and dissemination of knowledge, being central to the formation of conscious citizens and the generation of innovative solutions. For Leal Filho, Shiel and Paço (2018), "universities play a vital role in advancing sustainable development through education, research and institutional example" (p. 478).

The adoption of systematic KM practices strengthens the capacity of HEIs to integrate teaching, research and extension in an articulated manner, maximizing resources and preserving organizational memory. As Almeida and Pinho (2011) state, "knowledge management contributes to improving institutional efficiency, strengthening the mission of universities as generators of innovation" (p. 360).

At the same time, sustainability requires that the administrative and pedagogical practices of HEIs be reoriented towards social and environmental responsibility. Integrating KM with these practices is essential for institutions to not only achieve greater internal efficiency, but also promote broader social changes, training individuals prepared to act ethically and sustainably (Aleixo et al., 2018; Escorcía and Barros, 2020).

2. Knowledge Management in Higher Education Institutions

Knowledge management in Higher Education Institutions has become a strategic element for promoting innovation, academic quality and organizational efficiency (Megnounif, and Asma, 2020). With the intensification of information flows and the growing need for constant updating, KM aims to ensure the creation, dissemination, sharing and preservation of institutional knowledge, which has a direct influence on teaching, research and continuing education processes (Almeida and Pinho, 2011; Aleixo et al., 2016; Escorcía and Barros, 2020).

KM practices and strategies in HEIs vary according to size, institutional mission and available resources, but they have common elements. These include the creation of institutional repositories, the promotion of communities of practice, the implementation of document management systems, and the encouragement of interdisciplinary collaboration (Carvalho et al., 2016).

According to Davenport and Prusak (1998), "managing knowledge is, above all, managing people and environments that favor the exchange of experiences and the generation of new ideas" (p. 42). In this sense, strategies such as the systematization of good practices, the holding of internal seminars and the stimulation of academic networks have been fundamental to boosting the circulation of knowledge in HEIs.

Furthermore, continuing education policies, skills management and the promotion of open innovation are relevant practices for consolidating organizational learning environments and collective knowledge production.

3. The Role of Digitalization and Emerging Technologies

Digitalization and emerging technologies play a central role in the transformation of KM in HEIs. The adoption of digital platforms, such as virtual learning environments, digital repositories and academic management software, has significantly expanded the capacity to collect, store and disseminate knowledge (Souza & Cury, 2020).

According to Alavi and Leidner (2001), "information technologies can serve as powerful instruments to support the creation, transfer and application of knowledge" (p. 114). Emerging technologies, such as artificial intelligence, big data, blockchain and augmented reality, are also beginning to be integrated into everyday academic life, offering new possibilities for knowledge management on a broader scale and with greater personalization.

For Poveda and Cinfuentes (2020), it is through these technologies that HEIs are able to not only better organize internal knowledge, but also offer new teaching, research and extension models, driving pedagogical and scientific innovation.

Despite the opportunities, the effective implementation of KM in HEIs faces several barriers and challenges. Among them, the following stand out, cultural resistance to change, the fragmentation of knowledge between departments, the lack of specific institutional policies for KM, and the limitations of technological infrastructures (Carvalho et al., 2016; Leal, 2020).

According to Dalkir (2011), "the biggest barrier to knowledge management is not technological, but cultural" (p. 38), pointing to the need for changes in institutional values, behaviors and practices. The resistance of teachers and administrative staff to sharing knowledge, the lack of formal incentives for shared initiatives and the overload of academic activities also hinder the consolidation of KM practices.

Another relevant challenge is the formation of specific skills for knowledge management, which is still in its infancy in many HEIs, requiring continuous investment in training and institutional development.

Overcoming these barriers requires a strategic approach, involving committed leadership, investments in infrastructure and technology, and the construction of an organizational culture focused on sharing and innovation.

4. Methodology

This study adopts a qualitative approach, of an exploratory and descriptive nature, with the objective of analyzing how KM has been integrated into public HEIs in Portugal. The research seeks to understand institutional practices, critical factors and organizational dynamics that influence the implementation of KM in these organizations.

The research was based on a multiple case study, allowing an in-depth analysis of KM practices in different Portuguese HEIs. The choice of this strategy is justified by the complexity and specificity of institutional contexts, in addition to the need to capture the unique experiences of each institution.

The research focused on institutions that provide information on knowledge management, sustainability and other aspects related to these topics, along with credible news published online, considering the following criteria: (a) Institutional relevance in the higher education scenario in Portugal; (b) Participation in knowledge management innovation projects, networks or programs; (c) Availability of access to institutional data and collaboration with strategic sources.

Data collection was carried out between January and April 2025, by consulting the institutional pages of the targeted entities and other sources of information available online about the institutions, in particular (and whenever they existed) in strategic plans, activity reports, internal regulations and technical documents on institutional management and innovation.

Data analysis followed the content analysis technique, grouped into theoretical categories from the literature on knowledge management in the public sector. Aspects such as organizational culture, use of technologies, knowledge sharing processes, institutional barriers and facilitators were considered.

5. Interconnection between knowledge management and sustainability: practical analysis

Public HEIs in Portugal have been implementing several initiatives to integrate sustainability into their teaching, research and extension activities. Below, some recent and concrete practices are described. These initiatives demonstrate the commitment of Portuguese public HEIs to integrating sustainability into their activities, promoting a systemic approach that involves teaching, research, community and technological innovation.

It is worth highlighting the various initiatives that public HEIs in Portugal have been implementing to integrate sustainability into their teaching, research and extension activities. Some recent and concrete practices are highlighted below.

5.1 Practices implemented by HEIs

a) Sustainability-focused curricula

The Polytechnic of Lisbon is committed to incorporating sustainability into its training offering, promoting ethics and literacy in this area, as well as offering spaces for debate and experimentation on sustainable development.

The Polytechnic of Leiria is committed to promoting ethics for sustainability and literacy in this area, providing training and spaces for debate on sustainable development.

b) Interdisciplinary research projects

The Faculty of Sciences of the University of Lisbon (FCUL) actively participates in working groups of the Sustainable Campus Network, addressing topics such as circular economy, sustainable mobility and energy efficiency. FCUL has also promoted research projects that integrate different disciplines to address environmental and social challenges.

The University of Beira Interior (UBI) is part of the UNITA consortium, an alliance of European universities that promotes the socioeconomic development of rural and cross-border areas, with a focus on areas such as renewable energy and the circular economy.

c) University extension and community involvement

The University of Lisbon has established a cooperation protocol with Sociedade Ponto Verde to promote recycling in universities, involving the academic community in training and awareness-raising actions.

The Faculty of Psychology and Educational Sciences of the University of Porto (FPCEUP) received the “Green Heart” Certificate from Lipor, recognizing its good sustainability practices, including the management and collection of urban waste, with active involvement of the academic community.

d) Digitalization and emerging technologies

The University of Évora participates in the EU GREEN Alliance, which aims to create an innovation ecosystem facilitating collaboration between universities and territories, promoting sustainable solutions through digitalization and emerging technologies.

The Polytechnic of Coimbra is part of the new university under the name “The Green European University – UNGreen”, within the scope of the Erasmus+ program. This is an important step in the creation of a network of European Universities in the field of Sustainable Agriculture, Green Biotechnology and Environmental and Life Sciences.

e) Collaborative networks

The Sustainable Campus Network (RCS-PT) is a cooperation network between Portuguese HEIs to implement sustainable development practices. The network promotes working groups in areas such as sustainable cities, circular economy and gender equality.

The Sustainability Network of HEIs in Portuguese-Speaking Countries and Regions includes institutions from Portuguese-speaking countries committed to the Sustainable Development Goals of the 2030 Agenda, promoting partnerships and sharing of good practices.

5.2 Sustainability and Digitalization in Portuguese Public HEIs

a) University of Coimbra (UC)

UC was recognized as the most sustainable higher education institution in Portugal for the fourth consecutive year, occupying 29th position in the world ranking of the Times Higher Education Impact journal. The university has implemented several initiatives, such as:

- Provision of bicycles (UCicletas project).
- Installation of photovoltaic systems.
- Promotion of campaigns to combat food waste.
- Integration of sustainability criteria in canteen acquisitions.

b) Polytechnic Institute of Coimbra (IPC)

The IPC participates in the European U-Green project, which aims to promote the green transition in education and training institutions. This project, within the framework of the Erasmus+ programme, involves nine European partners and focuses on:

- Development of green skills.
- Promotion of sustainable practices in infrastructure and resources.
- Administrative management and teaching.
- Community involvement and awareness.

Furthermore, the IPC is a founding member of the Sustainability Network of Higher Education Institutions in Portuguese-Speaking Countries and Regions, committing to the Sustainable Development Goals of the UN 2030 Agenda.

c) University of Lisbon (ULisboa)

ULisboa is also a founding member of the Sustainability Network of Higher Education Institutions in Portuguese-Speaking Countries and Regions. The university is committed to:

- Share experiences with higher education institutions in different contexts.
- Identify actions that promote compliance with the Sustainable Development Goals.
- Strengthen partnerships from the perspective of social dynamics committed to sustainable development.

d) University of Trás-os-Montes and Alto Douro (UTAD)

UTAD stands out as an Eco-University, operating on an eco-campus with exemplary environmental management. The university has one of the largest botanical gardens in Europe and is focused on transferring knowledge for regional development, promoting sustainability through:

- Creation of spaces for incubation and business development.
- Encouragement of entrepreneurship.
- Promoting connections with the business world.

5.3 Digitalization and Emerging Technologies

Portugal's National Digital Strategy positions the country as a European leader in digital transformation, promoting an inclusive, sustainable and ethical transition. This strategy aims to:

- Simplify digital interaction between citizens, companies and the State.
- Ensure the protection of fundamental rights.
- Ensure universal accessibility to digital technologies.

These initiatives demonstrate the commitment of Portuguese public HEIs to integrating sustainability into their activities, promoting an overall vision that involves teaching, research, community and technological innovation.

Portuguese public HEIs align themselves with this strategy, integrating digital technologies into their teaching and management practices, promoting sustainability and innovation.

6. Discussion of results

The results of the research carried out show that public HEIs in Portugal have been adopting a global and strategic approach to integrating sustainability, incorporating it transversally into their essential functions, such as teaching, research, extension and institutional management. This action reflects a clear articulation with the principles of knowledge management, since it involves the production, sharing, application and retention of knowledge in favor of sustainable development.

The presence of curricula focused on sustainability reveals the intention of HEIs to train conscious citizens, promoting environmental literacy and sustainable ethics. At the same time, interdisciplinary research projects demonstrate an effort to integrate diverse knowledge and practices, breaking down disciplinary barriers and expanding the scope of KM to address complex social and environmental challenges.

Community involvement and university extension actions, such as protocols with external entities and awareness-raising projects, reinforce the social dimension of sustainability, while expanding the flow of knowledge between academia and society. These practices are configured as mechanisms for disseminating and applying knowledge, aligned with the pillars of KM.

The incorporation of digitalization and emerging technologies highlights a modernization of the internal processes of HEIs, optimizing institutional management and creating environments conducive to innovation. This technological dimension, when oriented towards sustainable purposes, strengthens the knowledge infrastructure, while promoting efficiency, accessibility and adaptation to the demands of the 21st century.

Collaborative networks play a crucial role in consolidating KM, enabling the sharing of good practices, the exchange of experiences and the collective construction of sustainable solutions. Both national and international networks, such as the Sustainable Campus Network and the Sustainability Network of HEIs in Portuguese-Speaking Countries, reinforce this ecosystem of continuous organizational learning.

Cases such as those of the University of Coimbra, Polytechnic of Coimbra, University of Lisbon, UTAD and University of Évora illustrate the growing maturity of Portuguese public HEIs in integrating sustainable policies and practices based on structured knowledge, digitalization and social engagement.

In summary, it is observed that sustainability in Portuguese public HEIs is not just an institutional guideline, but a practice anchored in effective knowledge management. The articulation between KM and sustainability strengthens the capacity of institutions to innovate, collaborate and transform the context in which they operate, consolidating them as strategic actors in the implementation of the 2030 Agenda.

Conclusions

Knowledge management is a strategic pillar in promoting sustainability in Portuguese public HEIs. This article examines how these two concepts interconnect, highlighting the strategic role of HEIs in promoting innovative and sustainable practices.

The results of this study show that the effective interconnection between knowledge management and sustainability in HEIs not only improves academic and organizational performance, but also expands the positive impact of these institutions on society. This integration contributes to strengthening a culture of innovation, ethics and social responsibility, preparing HEIs for the challenges of the 21st century.

The institutions analyzed demonstrate a clear integration between KM practices, such as production, sharing and application of knowledge and sustainable initiatives, which reveals an alignment between the educational mission and the SDGs.

Public HEIs adopt a global and collaborative perspective in integrating sustainability. Through innovative curricula, interdisciplinary research projects, community actions and national and international cooperation networks, the institutions show that sustainability is addressed in a transversal manner, involving different actors and areas of knowledge.

Digitalization and emerging technologies are key factors in strengthening sustainability-oriented KM. Projects such as EU GREEN, Eco-campus initiatives and digital platforms facilitate innovation, optimize institutional management and contribute to the construction of more sustainable, accessible and efficient environments.

Collaborative networks amplify the impact of sustainability in higher education through the sharing of good practices. The active participation of HEIs in networks such as the Sustainable Campus Network and the Sustainability Network of Lusophone HEIs, reinforces the institutional capacity to learn from other experiences, consolidating communities of practice and boosting KM on a regional and global scale.

It is concluded that HEIs in Portugal have a unique opportunity to position themselves as agents of transformation, promoting the connection between knowledge management and sustainability as a strategic axis for the future. Strengthening this connection is not only desirable, but necessary to align higher education with the principles of equality and sustainable development, with long-term benefits for current and future generations. This article concludes that

strengthening this connection is essential to position institutions as transformative agents in the context of global challenges, promoting a culture of innovation and collective responsibility.

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