UNIVERSIDADE ABERTA

SUSTAINABLE HIGHER EDUCATION INSTITUTIONS: SUSTAINABLE DEVELOPMENT CHALLENGES OF PORTUGUESE HIGHER EDUCATION INSTITUTIONS

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Abstract

This doctoral study explores higher education institutions and their role in fostering sustainability by assessing the perceptions of stakeholders, namely organization leaders. The aims of this research are to assess the importance and responsibility of higher education institutions in the fostering of sustainable development, to identify the barriers faced and challenges to overcome as these also affect their sustainability as teaching institutions, and to analyze the current state of the implementation of sustainability in Portuguese higher education institutions. The empirical study was undertaken in three studies (and organized in four papers). The first analyzed sustainability practices with information collected from the institutions' websites; the second continued the study with a qualitative approach by interviewing the organization leaders and stakeholders, at four Portuguese higher education institutions; and the last took a quantitative approach by examining the implementation of sustainability practice using data obtained from a questionnaire sent to all the Portuguese public higher education institutions. The research demonstrates that sustainability studies in Portuguese public higher education institutions are still scarce, and that higher education institutions are in an embryonic phase of implementing, incorporating and institutionalizing sustainability strategies, measures and policies in all their activities and dimensions. There is clear evidence that higher education institutions play an important role in the promotion of sustainability. However, the lack of financial resources is perceived as the main barriers to sustainability in these institutions. This study clearly demonstrates that although sustainable development is recognized as being very important to higher education institutions and society, it is not yet embedded in the system's strategies, activities, and policies. It is essential to identify sustainability strategies and to introduce sustainable development in all activities, through a “top down” process and involving all stakeholders. Finally, not only does the research identify the importance of a conceptual and organizational change in higher education institutions, but it also contributes to the literature on sustainable higher education institutions, as well as to how higher education for sustainable development is understood and can be improved, namely in the Portuguese higher education system.

Keywords: *Higher Education for Sustainable Development, Sustainability, Portuguese Higher Education Institutions, Implementation of Sustainable Development, United Nations Decade of Education for Sustainable Development*

Resumo alargado

Esta investigação insere-se no domínio do desenvolvimento sustentável das instituições de ensino superior (IES). O seu desenvolvimento foi aplicado às IES portuguesas.

Atualmente são conhecidas diferentes práticas internacionais das IES face ao desenvolvimento sustentável. No entanto, em Portugal, os estudos na área são praticamente inexistentes e a perceção geral é de que estas práticas são, ainda, escassas. Este estudo propõe-se contribuir para reduzir a escassez de estudos na área, no contexto Português. Para a prossecução de tal desiderato, delinearam-se os seguintes objetivos principais de investigação:

(i) Conhecer e caracterizar a abordagem das IES face ao desenvolvimento sustentável;
(ii) Identificar as práticas que caracterizam as IES sustentáveis;
(iii) Identificar as dificuldades, os estímulos e os desafios na implementação da sustentabilidade nas IES portuguesas;
(iv) Analisar o estágio de implementação das práticas de desenvolvimento sustentável nas IES portuguesas.

Para alcançar tais objetivos gerais, desenvolveram-se três estudos separados, mas complementares (organizados e publicados em quatro artigos científicos).

O primeiro visou identificar as práticas promotoras do desenvolvimento sustentável existentes nas IES portuguesas. Como fonte de informação utilizou-se a informação pública, disponível nos sítios de Internet das instituições de ensino. Este primeiro estudo circunscreveu-se às práticas formalmente comunicadas, pelas instituições, à comunidade. As práticas comunicadas foram analisadas através de uma abordagem qualitativa, recorrendo-se para o efeito à análise de conteúdo. Foram analisados os sítios da Internet nucleares de todas as instituições de ensino superior portuguesas públicas (excluiu-se da análise os sítios de departamentos, escolas e faculdades). A identificação de exemplos que pudessem constituir estas práticas nas diferentes dimensões do desenvolvimento

sustentável (ambiental, económica, social e cultural, e institucional, educacional e política) resultou da revisão da literatura sobre desenvolvimento sustentável e IES sustentáveis.

Os resultados sugerem que mais de 50% das instituições de ensino superior portuguesas encontram-se perante estágios iniciais de implementação e comunicação do desenvolvimento sustentável. Apesar da revisão da literatura revelar a importância da dimensão ambiental nas instituições de ensino superior, também associadas ao conceito de práticas de *greenwashing* (lavagem verde), os resultados mostram que as instituições portuguesas dão maior ênfase às dimensões económica e social (pelo menos no que respeita às práticas que são comunicadas à comunidade). Ao priorizar as questões relativas à sustentabilidade na sua agenda, as instituições de ensino superior portuguesas podem melhorar a sua relação com as principais partes interessadas (por exemplo, no âmbito da sua classificação em rankings internacionais, para efeitos de financiamento e ainda no reforço a sua imagem e competitividade).

Face a uma maioria de instituições que não desenvolvem, ou que desenvolvem e não comunicam práticas de desenvolvimento sustentável, emergiu como relevante conhecer e identificar o que influencia a adoção de práticas sustentáveis pelas IES, como as IES veem o seu próprio desenvolvimento enquanto IES sustentável, que barreiras existem nesse processo e como devem ser ultrapassadas. Para responder a estas questões desenvolveu-se o segundo estudo. Neste estudo começou-se por procurar conhecer, junto das principais partes interessadas (presidentes e reitores, funcionários docentes e não docentes, estudantes e entidades externas), qual o conceito de desenvolvimento sustentável, o que entendiam por IES sustentáveis e, ainda, que dificuldades, estímulos e desafios percecionavam perante a implementação da sustentabilidade no ensino superior português.

O estudo foi desenvolvido através de entrevistas semiestruturadas às principais partes interessadas (presidentes e reitores, funcionários docentes e não docentes, estudantes e entidades externas) de quatro instituições de ensino superior (dois politécnicos e duas universidades), as quais foram tratadas através da análise de conteúdo (com recurso ao programa de análise qualitativa MAXQDA). Os resultados foram utilizados para

compreender a conceptualização que cada uma das partes interessadas apresentava em relação aos diversos conceitos (desenvolvimento sustentável, IES sustentáveis, barreiras e desafios à implementação da sustentabilidade). Os resultados sugerem que embora a sustentabilidade seja um conceito amplo, o conceito de IES sustentável está associado à sobrevivência da própria Instituição e à dimensão ambiental. Apesar das principais partes interessadas, desde os líderes institucionais aos estudantes, apresentarem uma visão clara do papel que as IES devem ter em prol da sustentabilidade, prevalecem questões de ordem conjuntural que condicionam a estratégia e a implementação dessa visão, pelo menos nas IES portuguesas, tais como: (i) fatores socioeconómicos, (ii) demografia dos estudantes, (iii) redução de receitas, e (iv) competitividade entre Instituições. Face a este contexto, estas terão que ser priorizadas em detrimento das relacionadas com a sustentabilidade, porque são as primeiras que plenificam o quotidiano das instituições e, podem fazer depender a sua continuidade. Assim, as questões relacionadas com a sustentabilidade, apesar de consideradas significativas, acabam por ser secundarizadas, apesar de planeadas na estratégia de algumas IES Portuguesas. Deste modo, constrangimentos de recursos financeiros e humanos vão implicar menores investimentos numa estratégia das IES orientada para a sustentabilidade.

Por conseguinte, torna-se fundamental conhecer boas práticas nacionais e internacionais e, ainda, desenvolver a criação de redes, uma vez que estas poderão fornecer pistas sobre como as Instituições podem enfrentar os desafios relacionados com a competitividade, o financiamento, o número de estudantes matriculados, as parcerias institucionais e a qualidade/excelência do ensino e da investigação.

Este trabalho contribuiu, também, para investigar como as principais partes interessadas das IES compreendem o comprometimento das instituições Portuguesas no que se refere: (i) ao ensino da sustentabilidade em todos os cursos; (ii) ao incentivo à investigação e divulgação de conhecimentos da sustentabilidade; (iii) à implementação de campi verdes e apoio dos esforços locais de sustentabilidade, e (iv) ao envolvimento e partilha de informação com redes de contactos internacionais (tal como definido na iniciativa de sustentabilidade do ensino superior das Nações Unidas). Pretendia-se, ainda, compreender

que boas práticas ou medidas são reconhecidas como promotoras do desenvolvimento sustentável ou para se tornarem instituições de ensino superior sustentáveis. Os resultados sugerem que a sustentabilidade é reconhecida como importante quer para as IES, quer para a sociedade, no entanto verifica-se que a sustentabilidade não se encontra, ainda, incorporada, implementada e institucionalizada em todo o sistema e atividades das IES. Na maior parte das Instituições, a sustentabilidade encontra-se apenas em algumas das atividades das IES, principalmente ao nível da educação. Apesar das principais partes interessadas serem unânimes em aceitar a importância da educação para o desenvolvimento sustentável, na maioria das IES portuguesas não há declarações formais e estratégicas que encorajem a sua implementação. Na prática, nas IES Portuguesas, as atividades para a promoção da sustentabilidade não estão implementadas em todo o sistema das IES, nem mesmo ao nível da educação para o desenvolvimento sustentável. No entanto, verifica-se que em algumas das atividades existem já algumas iniciativas, nomeadamente ao nível da investigação e da divulgação comunitária.

Face à Década da Educação para o Desenvolvimento Sustentável (2014-2025) torna-se imprescindível a identificação das estratégias promovidas pelas IES em prol do desenvolvimento sustentável. Torna-se ainda essencial introduzir as questões da sustentabilidade, em todas as atividades, através de uma abordagem descendente (de cima para baixo), com o comprometimento e planeamento por parte dos órgãos de governo e, envolvendo todas as principais partes interessadas.

Para melhor compreender o nível de implementação de práticas sustentáveis nas IES portuguesas prosseguiu-se com o terceiro estudo desta investigação. Neste âmbito, foi desenvolvido um inquérito por questionário disponibilizado à totalidade das instituições de ensino superiores públicas em Portugal. O questionário visava recolher dados que permitissem auferir as perceções dos dirigentes das IES quanto ao estado de implementação de práticas, projetos ou iniciativas para a sustentabilidade das próprias instituições, nas diferentes dimensões (ambiental, económica, social e cultural, e institucional, educacional e política). Pretendia-se, ainda, que a IES indicasse se havia aderido a rankings, se possuía certificações ou declarações na área do desenvolvimento

sustentável ou na área da educação para o desenvolvimento sustentável. O inquérito por questionário foi enviado por correio eletrónico, através do *LimeSurvey*, a todos os Reitores, Presidentes, Diretores de Escolas, Faculdades e Departamentos de todas IES públicas e portuguesas.

Os resultados sugerem que as instituições de ensino superior portuguesas começam a dar relevância à sustentabilidade nas diferentes dimensões e a incluir esta questão nos seus planos estratégicos e políticas de comunicação. No entanto, a maioria das práticas associadas às dimensões da sustentabilidade encontram-se, ainda, em fase de projeto, ou na fase de planeamento. De acordo com as conclusões finais, as IES portuguesas encontram-se ainda numa fase embrionária no que concerne à implementação, incorporação e institucionalização da sustentabilidade em todo o seu sistema, quer ao nível das atividades (educação, investigação, operações no campus, extensão comunitária e avaliação e comunicação através de relatórios), quer ao nível das dimensões (ambiental, económica, social e cultural e institucional, política e educacional).

Os resultados corroboram o papel importante que as IES desempenham (ou podem desempenhar) na promoção da sustentabilidade. No entanto, a falta de recursos financeiros, a diminuição do financiamento no ensino superior e a diminuição do número de estudantes são percecionadas como as principais barreiras pelas IES, o que por sua vez condicionam este empoderamento, porque estas práticas ainda estão associadas à utilização de recursos financeiros.

A investigação sugere, também, que é essencial identificar as estratégias das instituições de ensino superior, no que diz respeito à sustentabilidade e sua implementação, incorporação e institucionalização em todas as atividades, através de uma abordagem descendente, iniciando-se com atividades de planeamento dirigidas pelos órgãos de governo e que envolvam todas as principais partes interessadas. Por último, a investigação identifica, igualmente, a importância de uma mudança conceptual e organizacional das IES, relacionada com uma maior aproximação às principais partes interessadas, e resultando da incorporação, implementação e institucionalização da sustentabilidade em todo o sistema da IES, permitindo o estabelecimento de objetivos em consonância com as diferentes

partes interessadas, bem como a diminuição da resistência por parte de alguma das partes interessadas ao desenvolvimento da sustentabilidade.

Com este estudo pretendeu-se dinamizar o debate em torno da sustentabilidade no ensino superior e enfatizar as responsabilidades que as IES têm perante este desafio, que pode ser visto como um fator de competição e distinção entre instituições.

Esta investigação abre, ainda, caminho para a necessidade de uma orientação ou estratégia a firmar pelas IES portuguesas que as possa comprometer para o desenvolvimento sustentável e para a educação para o desenvolvimento sustentável, em universidades e politécnicos. Poderá conduzir também a estudos futuros, de âmbito internacional, como forma de alavancar a sustentabilidade financeira das IES que cada vez mais procuram alternativas para fazer face aos seus desafios futuros.

Palavras-chave: Educação Superior para o Desenvolvimento Sustentável, Sustentabilidade, Instituições de Ensino Superior Portuguesas, Implementação do Desenvolvimento Sustentável, Década das Nações Unidas da Educação para o Desenvolvimento Sustentável

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List of abbreviations and acronyms

AASHE – The Association for the Advancement of Sustainability in Higher Education

ACUPCC - The American College & University Presidents' Climate Commitment

AISHE – Auditing instrument for sustainability in higher education

CITE/AMB – Network of Science, Technology Innovation and Environmental Education in Latin America

CSAF - Campus Sustainability Assessment Framework

DESD - Decade of Education for Sustainable Development

DUK – German Commission for UNESCO

EMS – Environmental Management Systems

Es - External stakeholders

ESD - Education for Sustainable Development

F – Faculty

GASU – Graphical Assessment for Sustainability in Universities

GMID – Graz Model for Integrative Development

GRACE – Group of Reflection and Support for Corporate Citizenship

HE - Higher Education

HEI – Higher Education Institution

HEIs - Higher Education Institutions

HESD - Higher Education for Sustainable Development

ICTs - Information and Communication Technologies

ISO 14000 – Environmental management System

ISO 22000 – Food Management System

ISO 26000 – Social Responsibility Management System

ISO 27001 – Information Security Management System

ISO 9001 – Quality Management System

L - Leaders

NP-4469-1:2008 – Management System for Social Responsibility

RSO.PT – National Network of Social Responsibility of Organizations

SC - Sustainability Science

SD - Sustainable Development

Sdt - Students

SHE - Sustainability in Higher Education

SHEI - Sustainable Higher Education Institution

SHEIs - Sustainable Higher Education Institutions

SS - Science of Sustainability

STARS - Sustainability Tracking, Assessment and Rating System

STAUNCH – Sustainability Tool for Assessing Universities´ Curricula Holistically

Stf – Staff

UE4SD – University Educators for Sustainable Development

UN DESD – United Nations Decade of Education for Sustainable Development

UNESCO – United Nations Educational, Scientific and Cultural Organization

PREFACE

This doctoral research has been motivated by my personal interest in sustainable development and the critical responsibility and contribution of higher education institutions for this purpose.

With this doctoral thesis, it is my wish to add a further perspective on how implementing sustainability in higher education institutions can contribute to a sustainable world.

The environmental crisis and social disruption (regional and global crises) with which we are confronted in today's world encourages fear and hatred of others. There is a need for action-driven solutions that explore different aspects and improve well-being.

The United Nations Sustainable Development Goals (UN SDGs) contain a set of 17 measures to foster sustainable development across many areas. They offer a good opportunity for the reinvigoration of sustainable development research. Education plays a fundamental and catalytic role and higher education institutions are critical in the preparation of leaders for the future and the creation of a sustainable future. The last few decades have clearly demonstrated the fundamental role played by higher education institutions (e.g. improving teaching and learning in universities and transforming education, higher education and social change, sustainability assessment tools in higher education).

Higher education institutions are challenged to turn sustainability principles into practice through management, research, the transfer of knowledge and teaching (curricula and the teaching of new competencies to address sustainable development dimensions) and to fully integrate sustainability in their thinking.

In light of the above and as an employee of a higher education institution, it is my belief that research into sustainability is vital, and action must be taken to foster sustainable development even within these institutions and to prepare the leaders for the future. I also believe in embracing sustainability and that the incorporation of sustainability principles provide a competitive advantage.

An environmental and cultural change towards sustainability and leading change toward sustainability implies leadership commitment and stakeholder engagement. To quote the definition of Velazquez, Munguia, Platt, and Taddei (2006) for a “Sustainable University”:

> ‘‘A higher educational institution, as a whole or as a part, that addresses, involves and promotes, on a regional or a global level, the minimization of negative environmental, economic, societal, and health effects generated in the use of their resources in order to fulfill its functions of teaching, research, outreach and partnership, and stewardship in ways to help society make the transition to sustainable lifestyles’’ (Velazquez et al., 2006, p. 812).

The following chapters in this doctoral thesis address these questions and strive to make a substantial contribution to furthering sustainability in Portuguese higher education institutions.

GENERAL INTRODUCTION

> "Universities play a key role in the development of society, and their involvement in sustainable development will be crucial in changing current practices in society towards sustainable development" (Alonso-Almeida, Marimon, Casani, & Rodriguez-Pomeda, 2015, p. 144).

1. Overview

This General Introduction aims to give an overview of the research topic and describe how the doctoral thesis is organized.

1.1 Identification of the problem and relevance of the research

Although sustainability in higher education institutions (HEIs) has been studied for over twenty years, relatively little is known about the status of its implementation in the Portuguese HEIs. Besides identifying the status of the implementation of sustainable development (SD) in Portuguese HEIs and addressing how these institutions interpret and implement sustainability, research is needed into the role of higher education for sustainable development (HESD) and the challenges and obstacles they face and difficulties this entails. As institutions responsible for the formation of leaders and future citizens, HEIs play a fundamental role in educating them towards a sustainable future. In addition to furthering knowledge, these institutions can and should develop national and international networks that can leverage the incorporation of sustainability in all their practices and activities, so that they can disseminate these initiatives through good practices. However, in order to be successful, it is important that all HEIs and the entire higher education (HE) system actually put these principles into practice. There is an urgent need to understand and characterize the higher education institution (HEI) approach to SD, the practices that characterize the sustainable HEIs, as well as the stimuli, barriers and practices observed in Portuguese HEIs.

1.2 Research questions and objectives

Based on the gap in the literature identified above, this research is guided by the following question "Have the Portuguese HEIs responded to the challenge launched by the United Nations on SD?"

This also led to other research questions, namely:

1. Have the Portuguese HEIs implemented practices for SD and do the Portuguese HEIs formally communicate these practices?
2. What are the perceptions of the stakeholders of HEIs in relation to the SD concept, the sustainable higher education institutions (SHEIs) concept, the role of HEIs in achieving a sustainable future, strategies and key issues to SD and Barriers to SD?
3. Should HEIs teach and encourage research on SD issues, as well as to implement SD practices on their campuses and work with stakeholders to promote more sustainable communities?
4. What are the main practices fostering SD that are implemented in Portuguese HEIs?
5. At what stage of SD are the Portuguese HEIs?
6. What kind of approach do Portuguese HEIs take toward SD?

After the end of the first Decade of Education for Sustainable Development 2005-2014 (DESD 2005-2014), it is now imperative to identify the conception of SHEIs in the panorama of Portuguese HEIs, the main practices promoting sustainable development and their level of implementation, as well as how key stakeholders perceive the SD already achieved (or attained).

The study aims to shed light on the level of implementation, incorporation, and institutionalization of SD in Portuguese Public HEIs and also the perceptions of stakeholders in Portuguese HEIs regarding the conceptualization of SHEIs, as well as the roles, barriers and challenges of HEIs.

The specific goals of this research are to:

1) Identify the SD practices adopted by Portuguese public HEIs and formally communicated through the institutional websites;
2) Compare the SD practices adopted by Portuguese HEIs by size, type, and stage of implementation;
3) Analyze how stakeholders of Portuguese HEIs understand the concepts of sustainability and SHEIs;

4) Understand the role played by Portuguese HEIs in fostering sustainability;
5) Identify the challenges and barriers to adopting a sustainability focused approach in Portuguese HEIs;
6) Assess whether stakeholders consider the main intervention areas of HEIs in the SD domain to be pertinent, and to reflect on how SD can be implemented in Portuguese HEIs;
7) Explain the perceptions of key stakeholders about the importance of teaching sustainability across all curricular disciplines, encouraging research and the dissemination of sustainability knowledge, implementing green campuses, supporting local sustainability efforts, and engaging and sharing information with international networks;
8) Describe the degree of implementation of sustainability practices in Portuguese HEIs in the environmental, economic, social and institutional dimensions of SD.

1.3 Methodological approach and research design

Methodologically, the work includes three phases, two qualitative and the other quantitative (e.g., Echambadi, Campbell, & Agarwal, 2006; Jick, 1979; Saunders, Lewis, & Thornhill, 2009; Stainton-Rogers, 2008). Therefore, a mixed methodology was chosen. Accordingly, the work carried out was applied to the Portuguese HEIs, initially through the analysis of the institutional websites of the Portuguese Public HEIs, then with interviews with the main stakeholders of four HEIs (two polytechnics and two universities). In the third phase, a questionnaire survey was administered to all public Portuguese public HEIs.

I. Content analysis of the institutional websites of the Portuguese public HEIs

This aimed to portray the current state of integration of SD practices in Portuguese public HEIs (20 polytechnics and 14 universities), using content analysis on web-based content from the institutional websites. The practices developed by the HEIs were evaluated through the analysis of the environmental, economic, social/cultural and institutional/political/educational dimensions. An overall index of SD practices was developed for each HEI, which includes an index for each dimension studied

(environmental index, economic index, social/cultural index, institutional/education/ political index). The same weight was attributed to all dimensions in this index. A cluster analysis was used to "group" the HEIs into the different stages of incorporating SD in their activities.

II. Interview Survey

According to Brewerton and Millward (2001), interviews are a flexible research tool that can be adopted at any time in the research process, and which intend to identify in greater detail certain areas in greater detail and /or generate hypotheses. In the qualitative phase, semi structured interviews were used to obtain information in order to analyze the conceptualization of SD in HEIs (e.g., SHEIs, education for sustainable development (ESD) and sustainability science (SS). Thus, using the perceptions of HEI stakeholders, the aim is to study: (i) the conceptualization of SD in Portuguese HEIs; (ii) the role played by HEIs with regards SD; and (iii) strategies and barriers for the implementation of sustainable initiatives in HEIs. In view of the results, it was possible to identify which SD approaches are being promoted by the Portuguese HEIs and where they are allocated. During the interview, participants were asked to answer fifteen questions. However, it was considered important to adjust some of the questions, one of which was only applied to the directors and another to the students, because it was found they were not appropriate for the other stakeholders (confirmed during the pre-test). The selected HEIs were the Polytechnic Institute of Leiria, the Polytechnic Institute of Santarém, the University of Coimbra and the University of Aveiro. A convenience sample is used that consists of representative main stakeholders of each HEIs (internal and external). This type of sample was chosen due to the accessibility of contacts and availability of information about the different HEI, which would make future work viable. The investigation followed Wright's research line (Elliott & Wright, 2013; Wright, 2010; Wright & Horst, 2013; Wright & Wilton, 2012) which was adapted to the context of Portuguese tertiary education and taking new groups of stakeholders into account.

Semi-structured interviews (Bryman, 2012) were used to explain the perceptions of the stakeholders in Portuguese HEIs with regards the conceptualization of SHEIs, as well as the roles, barriers and challenges of HEIs.

The sample includes four Portuguese public HEIs where we interview five stakeholders (leaders, faculty, staff, students and external stakeholders) from each HEI, a total of 20 individuals. These individuals are defined as follows. Leaders (L) are the rectors or vice-rectors, presidents or vice-presidents of polytechnic institutes or directors of research units or departments. Faculty (F) are the teachers with projects or research in the SD area. Staff (Stf) are individuals whose duties involve project management, strategy, planning and development of HEIs. Students (Sdt) are individuals were selected who represent the students in the IES organs (e.g., Associative leaders). External Stakeholders (Es) are the institutions with whom HEIs have partnerships for national or regional strategic development. The participants were contacted by email in order to arrange an interview to discuss HEIs and SD. Each respondent was interviewed once face-to-face; the average length of the interviews was 36.15 minutes (ranging from 15 to 90 minutes). The data was collected between October 11, 2014 and April 21, 2015. All interviews were audio-recorded and transcribed with the permission of the participants. The objective was for all respondents to be aware of the information collected (Fortin, Côté, & Filion, 2009). Confidentiality was insured by allocating an alphanumeric identification was given to each of the respondents so that their names and the respective institutions did not appear in the publication results (e.g., Leaders (L); Faculty (F); Staff (Stf), Students (Sdt) and External Stakeholders (Es)).

III. Survey by Questionnaire

In a third phase, a quantitative study was carried out. Quantitative research can contribute to the collection of broader and randomly selected data (Carmo & Ferreira, 2008).Thus, the aim was to identify the SD approaches promoted by Portuguese HEIs, the stage which they have reached and the main practices promoting SD implemented by Portuguese HEIs. The study universe consisted of the leaders (rectors, presidents, directors of Portuguese public HEIs). This data was collected using a questionnaire survey. The questionnaire was sent by

e-mail to the HEI leaders of Portuguese public HEIs. The questionnaire, elaborated from the exploratory study of the analysis (qualitative interview from previous phase), sought to determine whether:

I. The HEIs had projects, practices and initiatives in the environmental dimension
II. The HEIs had projects, practices, and initiatives in the economic dimension;
III. The HEIs had projects, practices, and initiatives in the social/cultural or cultural dimension;
IV. The HEIs had projects, practices, and initiatives in institutional, educational or political dimension;
V. The HEIs was on any rankings;
VI. The HEIs had any type of certification;
VII. The HEIs had signed any declaration of commitment to SD and/or ESD.

All Portuguese public HEIs were selected for the questionnaire survey for the purposes of this study, and to fill the research gap on the perceptions of leaders of Portuguese universities and polytechnics about SD initiatives, projects and practices implemented in their institutions. Taking into account the growing interest in SD among HEIs worldwide, the research question is: Are Portuguese universities and polytechnics implementing SD practices? This work is the first attempt to fill this gap in the literature in the Portuguese context. This research is in line with the work of Lozano et al. (2015) and Jorge, Madueno, Cejas, and Peña (2015) and it has the following main objectives: (1) to describe the degree of implementation of sustainability practices in Portuguese HEIs in the environmental, economic, social and institutional dimensions of SD; (2) to analyze whether there are differences between the implementation of SD practices in polytechnics and universities; (3) to examine any differences between the implementation of SD practices reported by rectors/presidents (central services) and by directors of departments, faculties or schools (decentralized services); (4) to identify the rankings, certifications and declarations in the SD domain adhered to by Portuguese HEIs; and (5) to study the stage of SD implementation in Portuguese HEIs. Regarding the limited research specifically addressing to Portuguese public HEIs, the findings contribute to a better understanding of sustainability projects, practices and strategies implemented by Portuguese HEIs, and also

shed further light on the stage of SD implementation in these institutions. In addition, they enable a comparison to be made of SD practices in Portuguese public polytechnics and universities as well as those of central and decentralized services.

1.4 Theoretical reference

For Clugston and Calder (1999) a sustainable university is one that enables students to understand the environmental degradation, motivates them to follow sustainable practices, and raises awareness of societal injustices. Clugston and Calder (1999) argue that a sustainable institution: (i) includes this commitment in their mission and academic goals; (ii) incorporates the concept of SD in teaching and research; (iii) encourages critical thinking by students on environmental problems; (iv) demonstrates sustainable practices which reduce their ecological footprint; (v) promotes support services for students; (vi) develops local and global partnerships in order to improve sustainability. However, Velazquez et al. (2006, p. 8) showed that few HEIs included sustainability in their mission statement and Antje Disterheft, Caeiro, Azeiteiro, and Walter (2013, p. 4) report that not many institutions have a holistic practice of SD although there has been some progress and good practices have been developed.

There has been much debate in the literature on the concept of sustainability (Leal Filho, 2011; Lozano, 2008; Naredo, 1996; Owens & Legere, 2015; Waas, Hugé, Verbruggen, & Wright, 2011). For some authors, the SD concept presented in the Brundtland Report had many interpretations and underlying ideologies. Meadowcroft (2007, p. 300) argues that the concept of sustainability is complex and contested. Despite the various interpretations, the concept of SD however has evolved (Leal Filho, 2011; Waas et al., 2011).

Three pillars or SD dimensions can be identified (Alshuwaikhat & Abubakar, 2008; Amaral, Martins, & Gouveia, 2015; Baker, 2006; Disterheft et al., 2013; García & Vergara, 2000; Godemann, Bebbington, Herzig, & Moon, 2014; Hass, Brunvoll, & Hoie, 2002; Lozano, 2010; Meadowcroft, 2007; Sammalisto, Sundstrom, & Holm, 2015; Waas et al., 2011): (a) economic, (b) social and (c) environmental. However, depending on the SD model, it is

increasingly common to find other SD pillars, namely (a) institutional (e.g., Antje Disterheft et al., 2013; Leal Filho, Manolas, & Pace, 2015; Lozano, 2008) and (b) cultural (e.g., Antje Disterheft et al., 2013; Leal Filho, Manolas, et al., 2015). Waas et al. (2011) identifies four dimensions, namely economic, social, environmental, and institutional. Based on the theoretical framework of the authors above, the dimensions can be briefly described as follows: i) the economic dimension of sustainability implies the economic viability of a given system, which should address economic needs; ii) the environmental dimension encompasses strategy along with the economic and social issues in an organization's resources; iii) the social dimension refers to an organization's human resources or the surrounding community; and iv) the institutional dimension encompasses the ability to coordinate human interaction in order to achieve specific sustainability goals.

Rogers' theory on the adaptation and diffusion of innovation (Rogers, 1995) has been used within the framework of the SD intervention and behavior of the main HEI stakeholders. There are five stages of implementing SD (see Lozano, 2006; Lozano, Lukman, Lozano, Huisingh, & Lambrechts, 2013): (i) innovators, (ii) early adopters, (iii) early majority, (iv) late majority, and (v) laggards. Assuming that Rogers' theory on adaptation and diffusion of innovation (Rogers, 1995) is a suitable theoretical model for the study of factors influencing the adoption of SD practices in HEIs, we propose an interpretative model for the phases of implementation of SD in HEIs and adjust Rogers' terminology to the different stages or phases of implementation. Whereas SD is integrated and developed most in HEIs in the innovator stage, there is a higher level of resistance to change in the later stages, namely the late majority and the laggards. According to Sammalisto et al. (2015), the institutionalization of SD in HEIs is an ongoing process where knowledge, inspiration, practice, and the development of intelligence for SD are skills that should be fostered within the institution and then taken to the outside world. It entails a real commitment from stakeholders, and Lozano (2006) states that it is difficult in the early stages for SD to be automatically included in all aspects of HEIs.

A number of scholars claim that HEIs should already be better prepared to play a significant role in promoting SD (e.g., Amaral et al., 2015; Godemann et al., 2014; Wright, 2004, 2006,

2010) and Amaral et al. (2015, p. 156) suggest that HEIs should “lead by example”. Stephens, Hernandez, Roman, Graham, and Scholz (2008, p. 319) state that “a transition to a new pathway toward more sustainable practices and lifestyles is required”. In this context, Stephens et al. (2008, p. 320) also note that HEIs can “catalyze and/or accelerate a societal transition toward sustainability”.

This leads to the concept of SHEIs (e.g., Jorge et al., 2015; Milutinovi & Nikoli, 2014; Wright & Horst, 2013). The definition of SHEI, also known as a sustainable university, used in this doctoral research come from Velazquez et al. (2006, p. 3). For this author, a SHEI is “a HEI (…) that addresses, involves and promotes, on a regional or a global level, the minimization of negative environmental, economic, societal, and health effects generated in the use of their resources in order to fulfil its functions of teaching, research, outreach and partnership, and stewardship in ways to help society make the transition to sustainable life-styles”. In HEIs consider the issues of SD through all structural and organizational dimensions, infrastructure and energy related aspects, the efficient use of resources, by on-going strategic actions in education, research, knowledge transfer and with stakeholders (partnerships and community).

Most HEIs do not yet implement sustainability practices (Lozano, Lukman, et al., 2013; Velazquez et al., 2006; Velazquez, Munguia, & Sanchez, 2005). There are barriers that affect actions fostering sustainability in HEIs, namely the ambiguity and complexity of the actual sustainability concept, which is seen as an abstract and complex topic (Leal Filho, 2000; Shriberg & Harris, 2012; Wright & Horst, 2013), the lack of financial resources and funding (Figueredo & Tsarenko, 2013; Shriberg & Harris, 2012; Waas et al., 2012) and the resistance to change associated to behaviors, practices or initiatives (Adams, 2013; Waas et al., 2012; Weber & Duderstadt, 2012). Poor commitment, engagement, awareness, interest, and involvement of faculty, students, staff, management and policy makers (Verhulst & Lambrechts, 2015; Waas et al., 2012; Weber & Duderstadt, 2012), and the lack of training and specialization in sustainability (Jorge et al., 2015; Verhulst & Lambrechts, 2015) also contribute to this situation.

Portuguese HEIs also come up against the above barriers, most notably due to the rigid organizational structure which is characterized by many hierarchical levels and high spatial distance between buildings within the same university or polytechnic. The lack of financial autonomy also fosters the weak commitment, engagement, awareness, interest, and involvement of most stakeholders.

Turning to the management of sustainability in HEIs, Adams (2013) highlights the importance of the following: (a) proactive leadership, (b) clear and consistent communication, (c) the inclusion of sustainability in the HEI strategy, (d) multidisciplinarity in research and courses, (e) engagement of students and staff, and (f) other initiatives that develop engagement in sustainability practices. For M. Barth (2013), the implementation process of sustainability is also driven by a flexible organizational structure based on on-going communication, support systems, and leadership.

Despite the extensive discussion about the strategies and drivers for sustainability in HEIs, it is accepted that the engagement of all the participants in the concept is the major driver (Godemann et al., 2014; Too & Bajracharya, 2015). The studies conducted by Too and Bajracharya (2015), Jones et al. (2013), Sammalisto et al. (2015), and Figueredo and Tsarenko (2013) were the first to focus on the importance of stakeholders' perceptions. According to Leal Filho (2011), the goals of sustainability in HEIs can only be achieved once the key stakeholders' attitudes to sustainability are known. Cooperation with stakeholders should be part of the strategy towards sustainability Stephens et al. (2008).

According to Lozano (2006), university leaders must ask themselves how SD should be incorporated in their policies as a whole. Lozano (2006) concludes that HEIs have a growing number of SD practices, within and outside the institutions, but the approaches are not yet considered from a systematic and holistic perspective/vision. Several authors defend the integration of SD into HEI systems (for example Alonso-Almeida et al., 2015; Cortese, 2003; Antje Disterheft et al., 2013; Jorge et al., 2015; Kościelniak, 2014; Leal Filho, Shiel, & Paço, 2015; Nejati & Nejati, 2013; Popescu & Beleau, 2014), and claim it should be integrated into the whole system: curricula (education), research, campus operations, community outreach and partnerships, and assessment and reporting.

1.4 Structure of the thesis

This thesis has a cumulative format and is based on three studies organized in four peer reviewed scientific publications (two book chapters from International Editions and two research papers in Web of Science Core Collection Quartile 1 Journals), resulting from the different research stages of the empirical studies.

The first published paper "Aleixo, A.M., Azeiteiro, U. & Leal, S. (2016). Toward Sustainability Through Higher Education: Sustainable Development Incorporation into Portuguese Higher Education Institutions. In J.P. Davim and W. Leal Filho (Eds.), *Challenges in Higher Education for Sustainability* (Chapter 7, pp.159-187, in the series "Management and Industrial Engineering"). Switzerland: Springer. DOI 10.1007/978-3-319-23705-3_7. Available at: http://link.springer.com/chapter/10.1007%2F978-3-319-23705-3_7" addresses the current state of integration of SD practices in Portuguese HEIs using content analysis on web-based content

The second published paper "Aleixo, A.M., Leal, S., Azeiteiro U.M. (2016). Conceptualizations of sustainability in Portuguese higher education: roles, barriers and challenges toward sustainability. *Journal of Cleaner Production*, http://dx.doi.org/10.1016/j.jclepro.2016.11.010 (2015 Impact Factor: 4.959; 2014 Q1)", presents the exploratory study investigating how the main stakeholders of Portuguese Public Higher Education Institutions perceive the concepts of sustainability and sustainable higher education institutions, the role of higher education for sustainable development, and the barriers, challenges and obstacles to implementing sustainable initiatives in Portuguese Public Higher Education Institutions.

The third published paper is "Aleixo, A.M., Azeiteiro, U. & Leal, S. (2017). UN Decade of Education for Sustainable Development: Perceptions of Higher Education Institution's Stakeholders. In W. Leal Filho, U.M. Azeiteiro, F. Alves, P. Molltan-Hill (Eds.), *Handbook of Theory and Practice of Sustainable Development in Higher Education* (Volume 4, pp.417-428, in the series "World Sustainable Development Series). Berlin: Springer. DOI 10.1007/978-3-319-47877-7. Available at:

https://link.springer.com/chapter/10.1007/978-3-319-47877-7_28". This paper continues the research of the second paper. It parallels the previous research using a qualitative approach (semi-structured interviews and content analysis), and explored how twenty stakeholders from four Portuguese public HEIs (leaders, faculty, staff, students, and external stakeholders) perceive the HEIs' commitment to: (a) teaching sustainability across all courses, (b) encouraging research and dissemination of sustainability knowledge, (c) implementing green campuses and supporting local sustainability efforts, and (d) engaging and sharing information with international networks (as defined in Higher Education Sustainability Initiative, United Nations).

The fourth (submitted to publication) paper is "Aleixo, A.M., Azeiteiro, U.M., Leal, S., (Submitted). The Implementation of Sustainability Practices in Portuguese Higher Education Institutions, *International Journal of Sustainability in Higher Education*. IF: 1.763, 2015/16 Q1" addresses the research gap on perceptions of leaders of Portuguese HEIs in relation to SD initiatives, projects and practices in the Portuguese universities and polytechnics. The main question is "Are Portuguese universities and polytechnics implementing SD practices? This research is in line with the work of and Jorge *et al.* (2015) and has the following main objectives: (1) to describe the degree of implementation of sustainability practices in Portuguese HEIs in the environmental, economic, social and institutional dimensions of SD; (2) to analyze whether polytechnics and universities implementation SD practices in different ways; (3) to analyze whether there are differences in the way rectors/presidents (central services) report the implementation of SD practices as opposed to directors of departments, faculties or schools (decentralized services by); (4) to identify the rankings, certifications and declarations that Portuguese HEIs have adhered to in the SD domain; and (5) to study the stage of SD implementation in the Portuguese HEIs. To meet the objectives outlined, a questionnaire was developed to measure the level of implementation of the SD practices in HEIs as well as the number of rankings, certifications, declarations these institutions have. The questionnaire was sent by e-mail to all rectors, presidents, directors of faculties, departments and schools of Portuguese universities and polytechnics. A sample of 53 leaders was obtained.

A general introduction to the thesis precedes these four chapters; they are followed by some final reflections and conclusions. The four chapters intend to response to the research questions presented above. Limitations of the study and as well as future research are included in the last chapter of this thesis. It is followed by the bibliography with all sources cited in the chapters.

CHAPTER 1

Toward Sustainability through Higher Education: Sustainable Development incorporation into Portuguese Higher Education Institutions

Reference: Aleixo, A.M., Azeiteiro, U. & Leal, S. (2016). Toward Sustainability Through Higher Education: Sustainable Development Incorporation into Portuguese Higher Education Institutions. In J.P. Davim and W. Leal Filho (Eds.), *Challenges in Higher Education for Sustainability* (Chapter 7, pp.159-187, in the series "Management and Industrial Engineering"). Switzerland: Springer. DOI 10.1007/978-3-319-23705-3_7. Disponível em http://link.springer.com/chapter/10.1007%2F978-3-319-23705-3_7, [1]

Abstract

This study aims to investigate how sustainable development (SD) has been incorporated into Portuguese higher education institutions (HEIs). A literature review was conducted and the documentation available in the various HEIs' institutional webpages analyzed to establish the theoretical framework and validate the current state of the integration of sustainability in Portuguese HEIs (how SD is integrated in HEI practices). We examined the two types of Public HEIs (Universities and Polytechnics) and identified different approaches to SD. The following SD dimensions were analyzed: environmental, economic, social/cultural, and institutional/political/educational (e.g., Leal Filho, Manolas*, et al.*, 2015; Lozano, 2011; Segalàs, Ferrer-Balas, & Mulder, 2010; Waas *et al.*, 2011). We also addressed the different stages of the HEIs' incorporation, dissemination, and institutionalization of SD. We reviewed the institutional websites for the 34 Public HEIs in Portugal, 20 of which are polytechnics and 14 universities. Although SD practices are actively communicated by the majority of HEIs, they vary considerably from one HEI to another. Overall, it was found that SD is still in its early stages in Portuguese HEIs.

Keywords: *Sustainable development in higher education, Dimensions of sustainability development, Stages of implementation of sustainable development, Portuguese Higher Education*

[1] There are differences between the text of this first chapter and the paper published due to corrections in the English.

1. Introduction

The twentieth century was characterized by a deep concern for environmental issues, and this led to political debate that questioned growth policies (e.g., Carson, 1962; Ehrlich & Ehrlich, 1968; Hardin, 1968; Meadows, Meadows, Randers, & Behrens III, 1972) and the exploitation of natural resources.

As the first publications on economic growth did not place sufficient importance on social and environmental concerns, people realized it was time for a new approach. As a result, sustainable development emerged as a new concept in 1972 in the framework of the the Conference of the United Nations on Sustainable development (Clugston & Calder, 1999; Lozano, Lukman*, et al.*, 2013; Waas *et al.*, 2011).

Following the publication of the Brundtland Report, entitled "Our Common Future", in 1987, greater emphasis was given to SD, which is defined as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 45).

The Talloires Declaration is a written statement for sustainability signed in 1990 by more than 265 presidents of HEIs in 40 countries on five continents; Clugston e Calder (1999, p. 3) refer to it as determinant to the definition of sustainability for higher education institutions (HEIs).

A number of written statements recognize the importance of HEIs to the promotion of SD (e.g., Beringer, Wright, & Malone, 2008; Disterheft *et al.*, 2013; Disterheft, Caeiro, Ramos, & Azeiteiro, 2012; Leal Filho, 2011; Lozano, Lukman*, et al.*, 2013; Wright, 2002 ; Wright & Leal Filho, 2002; Wright & Wilton, 2012). These documents and guidelines propose great changes in HEIs so that all aspects of SD (e.g., environmental, social, economic, and institutional) can be implemented (Popescu & Beleau, 2014).

Lozano, Lukman*, et al.* (2013, p. 11) reports that although these written statements, charters, and national and international partnership aimed to provide guidelines and frameworks for the incorporation of sustainability throughout the HEI system, in most

cases, they did not go far enough. Indeed, researchers have criticized them for being over-theoretical and inadequately linked to practice (e.g., Lozano, Lukman*, et al.*, 2013).

Nevertheless, Clugston e Calder (1999) note that the above-mentioned documents inspired a movement and an agenda to address the future and there are now more than 31 written sustainability statements for HEIs that have been signed by over 1400 universities around the world (Grindsted, 2011). Despite this apparent interest, there are few known examples where sustainability programs in HEIs have been successful.

The literature refers to various initiatives for SD in the United States of America (Barlett & Chase, 2013; Leal Filho, 2011), Canada and Mexico (Leal Filho, 2011), which, in general, called for the involvement of all stakeholders of the institution. In most cases, these initiatives only have an impact when someone is specifically in charge of these sustainability goals (e.g., Office of SD or SD Working Group).

According to Clugston e Calder (1999), the institutions' mission statements should express their philosophies and commitments to sustainability, namely they ought to "express prominent and explicit concern for sustainability" (Clugston & Calder, 1999, p. 4). The SD is considered one of the critical dimensions of sustainability in higher education.

Popescu e Beleau (2014) draw attention to a number of studies based on the analysis of HEI websites; they report the interest of this kind of analysis and the need to measure information that leads to an improvement in HEIs' SD performance.However, they argue that the SD concept is not fully understood in most HEIs which means that SD principles are not correctly applied.

Ramos e Pires (2013) note that the internet has been important for disseminating information about different SD practices in HEIs. Some studies analyzed the Internet as a communication tool for reaching stakeholders and report SD practices (e.g., Popescu & Beleau, 2014; Ramos & Pires, 2013). Thus, the Internet can be a useful tool for communicating SD practices and, consequently, to develop a positive social image for institutions' stakeholders (Ramos & Pires, 2013).

Not only are studies about SD in HEIs still scarce in Portugal, but there is no known study on current SD practices in Portuguese HEIs (Madeira, 2008). Tauchen e Brandli (2006) published a study where they systematized the different procedures for implementing an environmental management system based on good practices, including practices in Portuguese HEIs, but it addressed only the environmental dimension.

Our aim is fill the gap in the literature by describing how SD has been incorporated in Portuguese HEIs. We start by reviewing the topic and establishing the theoretical framework. We then verify the current situation of sustainability in Portuguese HEIs through data collected from their websites. This data is analyzed to determine the role of SD in each HEI. The main objective of our research is to shed light on the level of implementation, incorporation, and institutionalization of the SD in Portuguese Public HEIs.

The specific goals of this research are as follows: (a) to identify the SD practices adopted by Portuguese Public HEIs and formally communicated through the institutional websites; and (b) to compare the SD practices adopted by Portuguese HEIs by size, type, and stage of implementation.

This paper will allow us to ascertain for the first time which SD and sustainability issues are being addressed in Portuguese HEIs through the analysis of their institutional websites.

2. Theoretical Framework

2.1 Sustainable Development in HEIs

Some researchers believe that the HEIs' role in the development of their own SD is determinant to the development of sustainability as a whole and it represents a significant part of their identity (Sammalisto *et al.*, 2015; Steiner, Sundstrom, & Sammalisto, 2013).

According to Zilahy, Huisingh, Melanen, Phillips, e Sheffy (2009), HEIs have a growing responsibility for the globalization of a knowledge-based society. It is the HEIs' mission to develop citizens who are capable of making a critical analysis of their surroundings, of being active citizens who respect and demand the respect of others, and of learning continuously

(Vieira & Marques, 2014, p. 29). Their mission today goes far beyond the role of training new technicians and leaders.

Disterheft *et al.* (2012, p. 80) believe that HEIs have a twofold mission in today's world: to reduce the environmental impact of their direct and indirect activities as operating institutions, and "to carry out research and teaching in the field of sustainability, and on creating settings that allow students and staff to develop new competencies that lead to more sustainable practices and finally to a more sustainable society".

Clugston e Calder (1999) add that a sustainable university is one that enables students to understand the environmental degradation, motivates them to follow sustainable practices, and raises awareness of societal injustices. They argue that a sustainable institution: (i) includes this commitment in their mission and academic goals; (ii) incorporates the concept of SD in teaching and research; (iii) encourages critical thinking by students on environmental problems; (iv) demonstrates sustainable practices which reduce their ecological footprint; (v) promotes support services for students; (vi) develops local and global partnerships in order to improve sustainability. Velazquez *et al.* (2006, p. 8) showed that few HEIs included sustainability in their mission statement. Disterheft *et al.* (2013, p. 4) report that not many institutions have a holistic practice of SD although there has been some progress and good practices have been developed.

Zilahy *et al.* (2009) report that despite increasing funding for research and development response to competitiveness between HEIs, their incorporation of SD has been hampered by financial issues, its appeal to students and the quality of teaching.

The main barriers to the development of SD that influence innovation strategies in HEIs are: (e.g., Barth, 2013; Leal Filho, 2000; Lee & Schaltegger, 2014; Lee, Barker, & Mouasher, 2013; Littledyke, Manolas, & Littledyke, 2013; Lozano, 2006; Lozano, Lukman, et al., 2013; Shriberg, 2002; Shriberg & Harris, 2012; Stephens et al., 2008; Velazquez et al., 2006; Velazquez et al., 2005; Wright & Leal Filho, 2002): (a) the lack of management support, human resources, and infrastructure to ensure their development; (b) ignorance and misunderstandings of the concept; (c) the lack of finance; and (d) resistance to change.

Almost all authors agree that these factors have hampered the implementation of SD practices in HEIs (e.g., Davis, O'Callaghan, & Knox, 2009; Leal Filho, 2011; Shriberg, 2002; Shriberg & Harris, 2012; Velazquez *et al.*, 2006; Velazquez *et al.*, 2005; Wright, 2010; Wright & Wilton, 2012) and have led to a lack of commitment to their implementation and incorporation. Thus, Velazquez *et al.* (2006, p. 389) referred to raising *cultural awareness* as a strategy to implement sustainability initiatives.

According to Lozano (2006), university leaders must ask themselves how SD should be incorporated in their policies as a whole. He concludes that HEIs have a growing number of SD practices, within and outside the institutions, but the approaches are not yet considered in a systematically and holistically.

Multidisciplinary, interdisciplinary, and transdisciplinary education are facilitators of the merging, dissemination and institutionalization of SD in HEIs (Lozano, 2006). Disterheft et al. (2013) argue that the Science of Sustainability (SS) and education for sustainable development (ESD) can be critical for the transition to sustainable HEIs.

In addition to the four activities that comprise the HEI system identified by Cortese (2003) (i.e., education, research, campus operations and community outreach), Lozano (2006) proposes a fifth (Lozano, 2006, 2011; Lozano, Lukman*, et al.*, 2013): the communication and disclosure of SD practices. Lozano (2011) agrees that the GRI Sustainability Guidelines would be more appropriate if they were adjusted to the needs of HEIs. He also argues that it is important to learn from the experience of companies. This fifth activity refers to the HEIs' communication with the different stakeholders through education, research, operations on campus, and raising awareness in the community. This implies the need to keep records of the implementation of the SD in HEIs, its evaluation, and reports.

For Disterheft *et al.* (2012), HEIs could implement SD across their system through practices such as eco-efficiency, green curricula, operations on campus that take into account SD and environmental issues, the involvement of stakeholders, conferences on SD, assessment tools, and a certification system.

Godemann *et al.* (2014) also state that the environmental, social, and economic factors should be considered when discussing the HEIs' role in boosting SD. Many HEIs already disclose environmental performance (though most of them are still in the first stages of doing so), but this practice should increase not only in this pillar but also in the social, economic and cultural/institutional ones as well.

These initiatives are often developed through eco-management, audits, and ISO 14001. However, there is a lack of evidence of a significant investment in the social dimension. Godemann *et al.* (2014) report that community involvement or sustainable consumption (e.g., regional and fair trade) still leave a lot to be desired and HEIs can improve the developing strategies for SD.

Godemann *et al.* (2014) emphasize the need for a change in the HEIs mindset on SD and that transdisciplinary research may have an important role. They also note that few HEIs are committed to these practices throughout the system. It is only when HEIs perceive the true importance of these concepts for organizational change that this need will be met.

2.2 Dimensions of SD in HEIs

There has been much debate in the literature on the concept of sustainability (Leal Filho, 2011; Lozano, 2008; Naredo, 1996; Owens & Legere, 2015; Waas *et al.*, 2011). For some authors, the SD concept presented by Brundtland Report had many interpretations and underlying ideologies. Meadowcroft (2007, p. 300) argues that the concept of sustainability is complex and contested.

Kidd (1992) distinguished six principles of sustainability, namely ecological/carrying capacity, resources/environment, biosphere, critique of technology, no-growth/slow growth, and ecodevelopment. Some years later, Jabareen (2008) presented seven principles: ethical paradox, equity, global agenda, eco-form, utopia, integrative management, and natural capital stock. For Quental, Lourenço, e da Silva (2011) there are four principles: limits, means and ends, needs, and complexity. These references and others can be found in Waas *et al.* (2011, p. 1638) who reviewed the “analysis of the

plethora of sustainability literature, including its terminology, genesis, fundamental principles, mainstream views of sustainability and several governing aspects, together with the arguments to combat common misconceptions of sustainability".

Baker (2006) presents four models for SD, namely (a) pollution control, (b) weak sustainability, (c) strong sustainability, and (d) the ideal model. In order, these models go from the most anthropocentric (associated with weak sustainability) SD concept to the most ecocentric view (associated with a stronger SD concept). Also according to Baker (2006), while the concept associated with weak sustainability refers to replacing natural capital with human capital, strong sustainability means natural resources cannot be replaced by any other type of resource.

For Waas *et al.* (2011, p. 1640), sustainability is considered by many as a way of addressing large, complex, and interrelated environmental and social problems; it is therefore vital for the well-being of present and future generations as it leads to changes in critical practices and conventional thinking.

There have been various interpretations of the concept of SD as it has evolved (Leal Filho, 2011; Waas *et al.*, 2011). However, three pillars or dimensions can be identified (Alshuwaikhat & Abubakar, 2008; Amaral *et al.*, 2015; Baker, 2006; Disterheft *et al.*, 2013; García & Vergara, 2000; Godemann *et al.*, 2014; Hass *et al.*, 2002; Lozano, 2010; Meadowcroft, 2007; Sammalisto *et al.*, 2015; Waas *et al.*, 2011): (a) economic, (b) social and (c) environmental. These three dimensions are referred by García e Vergara (2000) as integral and transdisciplinary sustainability. According to Disterheft *et al.* (2013), many researchers believe the definition of SD should encompass more dimensions and that these three are vague and anthropocentric.

Waas *et al.* (2011) state that the three dimensions or pillars of SD are often designated "3 Ps", "Triple Bottom Line", or "People-Planet-Profit"; this originates from the work of the founder of the model and Nobel Peace Prize winner, Mohan Munasinghe, who demonstrated the interaction between economic, ecological or natural, and social (poverty/equity) objectives. However, depending on the SD model, it is increasingly

common to find other SD pillars, namely (a) Institutional (e.g., Baker, 2006; Disterheft *et al.*, 2013; Leal Filho, Manolas*, et al.*, 2015; Lozano, 2008; Pfahl, 2005) and (b) Cultural (e.g., Baker, 2006; Disterheft *et al.*, 2013; Leal Filho, Manolas*, et al.*, 2015; Lozano, 2008; Siemer, Elmer, & Rammel, 2006).

(Elizabete, Seiffert, & Loch, 2005) quoted by Alshuwaikhat e Abubakar (2008, p. 1778) propose five SD dimensions: ecological, social, economic, cultural, and one called spatial. On the other hand, Waas, Verbruggen, e Wright (2010) refer to four dimensions (economic, social, environmental, and institutional).

In addition to different conceptual frameworks, some dimensions are given different names. This is the case of the cultural dimension, referred to by Siemer *et al.* (2006) as the social dimension. Leal Filho, Manolas*, et al.* (2015) report that the cultural dimension is necessary for SD if peace and well-being are to be achieved.

Lozano (2010) adds an educational dimension, through which SD topics should be incorporated to the curriculum, research, and services in HEIs.

The economic dimension of sustainability implies the economic viability of a given system, which should address economic needs. This area includes economic growth and equity, which should be considered in the long-term and extended to all (Baker, 2006). According to (Santos, Silva, Sampaio, Henriques, & Eusébio, 2005, p. 41), it is necessary to adopt policies and practices that coincide with greater social responsibility and ensure greater sustainability. It draws attention to the community's impact on natural resources and ecosystems, and on urban development (Baker, 2006). Ultimately, this comes down to how individuals impact the environment, and related limitations that will face future generations

The environmental dimension encompasses strategy along with the economic and social issues in an organization (Santos *et al.*, 2005, p. 51) so that viable solutions can be found to conserving habitat, reducing pollution, and the over consumption of resources (Baker, 2006). Santos *et al.* (2005) propose integrating environmental concerns into the organization's strategy.

The social dimension refers to a fair distribution of justice based on intragenerational solidarity and the resulting changes in economic policy (García & Vergara, 2000) and cohesion (Baker, 2006). SD is associated with the concepts of freedom, democracy, and social justice (Baker, 2006; Waas *et al.*, 2010), and therefore includes the need to work for food, education, health, energy, and sanitation (Baker, 2006). For Santos *et al.* (2005), the social dimension of sustainability acts either through an organization's human resources or the surrounding community.

The reference to the institutional dimension of SD dates back to 1985 when the United Nations Commission developed an indicator to assess progress in the implementation of Agenda 21. The World Bank Development Report (Pfahl, 2005) provides more evidence of this dimension. For Pfahl (2005), the institutional dimension refers to how institutions shape their behavior, values, and how different stakeholders perceive the approach to and objectives of SD. According to Pfahl (2005, pp. 83-84), institutional sustainability must be judged on the basis of the institution's ability to coordinate human interaction in order to achieve specific sustainability goals.

The literature describes various declarations, commitments to good practice, and case studies adopted, which are considered relevant to the response to implementing SD in institutions (Disterheft *et al.*, 2013).

According to Waas *et al.* (2011), this fourth dimension refers to democracy and governance and the institutional change required to achieve SD that includes local public participation (national and international). For Pfahl (2005), it also implies participation in and transparency of decision making and accountability for sustainable policies (HEI activities, policies, and effectiveness).

The political or institutional dimension refers to governance, fostering peace, and the common good. Rockefeller (cited Leal Filho, Manolas*, et al.*, 2015) present the political dimension as an opportunity for SD values to interact and trigger action; it is presented as the answer to mitigating the adverse impacts of economic development.

According to Disterheft, Caeiro, Azeiteiro, e Leal Filho (2015) HEIs need to change their vision of SD from one simply of environmental sustainability to something more holistic that implies modifying their culture. On the other hand, the financial constraints facing HEIs mean that most of their actions or practices focus on the institution's economic sustainability (Disterheft *et al.*, 2013), which also justifies taking a more holistic view. The institutional dimension can be presented as the culmination of the strategy to develop sustainable HEIs.

To facilitate our analysis, we follow Siemer *et al.* (2006) and address the social and cultural dimensions together. Indeed, a number of indicators and practices reveal the similarities between these two dimensions (e.g., indicators and/or practices suggested by Hass *et al.*, 2002; Santos *et al.*, 2005).

We also chose to combine the educational and institutional dimensions as we believe this is justified by commonalities in the educational sector. As education is the purpose and mission of HEIs, it is part of the institutional dimension, particularly in relation to indicators such as the promotion of education for the SD through the curriculum and science technology. Similarly, the political dimension was included in the institutional dimension; it is also termed institutional by Leal Filho, Manolas*, et al.* (2015) (linked to good governance).

Table 1 summarizes and systematizes the review of the literature (Burford *et al.*, 2013; Ferrer-Balas *et al.*, 2010; Khalil, Ramzy, & Mostafa, 2013; Leal Filho, 2011; Leal Filho, Manolas*, et al.*, 2015; Lozano, 2006, 2010, 2011; Popescu & Beleau, 2014; Segalàs *et al.*, 2010; Sibbel, 2009; Siemer *et al.*, 2006; Singh, Murty, Gupta, & Diskshit, 2012, pp. e.g., ; Waas *et al.*, 2011) on the dimensions of SD.

This methodology and dimensions have been used by various authors when reporting sustainability practices and the implementation of SD in HEIs (e.g., Alshuwaikhat & Abubakar, 2008; Lozano, 2011).

Table 1 – Issues of sustainable development practices in HEIs

Dimensions	Practices
Environmental	Declarations and actions related with HEIs' involvement in environmental issues and resource scarcity (environment and management of natural resources; prevention of pollution; protection of environment and biodiversity; restoration of natural habitats; ecological footprint; non-renewable resources; depletion of materials; degradation).
Economic	Declarations and actions related to the direct economic impact and financial sustainability of HEIs (financial situation; results; efficiency).
Social/Cultural	Declarations and explanations on policies and procedures concerning human rights (labor practices and decent work; human rights; quality of life, occupational health and safety; the equity dimension; training of employees, involvement in social issues and action within HEIs community).
Institutional/Educational/Political	Declarations and statements of the HEI views, values, strategy, transparency in governance and ethical commitments. Also declarations, charters and partnerships regarding the national and international criteria on aspects of sustainable development. Practices in education, research, university operations (e.g., certifications), community outreach and assessment and reporting were also considered.

2.3 Approaches to SD in HEIs

Lozano (2006, 2010, 2011), and Lozano, Lukman*, et al.* (2013) have long taken an interest in the subject of SD and its implementation in HEIs. Their work analyzes the international and national guidelines, (agreements and declarations) and examines their objectives (implementation of SD in HEIs).

According to Lozano (2010, p. 637) SD is still an innovation for most HEIs despite the growing number that are now beginning to see it favorably. Additionally, in most cases, these practices have not been fully absorbed either by academics and university administrators or within curricula and disciplines. Various barriers, mentioned above, must still be overcome; the involvement of stakeholders will probably be the means to success. For Lozano, Lukman*, et al.* (2013), most HEIs continue to follow the reductionist and mechanistic paradigms; this approach is styled on the "Newtonian and Cartesian mental

model" and is characterized by a restricted and isolated vision based only on scientific knowledge. Change is seen as difficult to implement and this linear approach makes it an easier option.

Hopwood, Mellor, e O´Brien (2005) claim there are multiple perspectives of SD and arrange them in three different positions: (i) Status Quo; (ii) Reform; and (iii) Transformation. They go from lower awareness and the need to adopt more sustainable behavior (e.g., Status Quo) to greater awareness and need for a more holistic view expressed through actions addressing socio-economic problems, such as poverty and inequality, and the future of coming generations (e.g., Transformation).

Some HEIs both in Portugal and elsewhere are now developing sustainable practices as part of their intervention, and Hopwood *et al.* (2005) state that it is essential to map them. However, SD measures can only be fully implemented if SD has been accepted by everyone in the institution (Lozano, Lukman*, et al.*, 2013). The approaches to SD and stages of development vary from one organization to another; the next section outlines the literature on the stages of SD notably in HEIs.

2.4 Stages of SD in HEIs

Rogers' innovation theory (1995) has been used by several authors to classify the different stages of SD implementation in HEIs. According to Lozano (2006; 2013), there are five stages of implementing innovation in SD (Rogers, 1995): (a) innovators, (b) early adopters, (c) early majority, (d) late majority, and (e) laggards. Whereas SD is integrated and developed most in HEIs in the innovator stage, there is a higher level of resistance to change in the later stages, namely the late majority and the laggards.

Lozano (2006) identified two types of innovators, namely (i) incremental and (ii) radical. Incremental innovation is characterized by continuous improvement through the HEI's policies and strategies. On the other hand, radical innovation is observed even without HEI policies and strategy. Innovators incorporating SD in their HEI are pioneers. However, some people find innovation more difficult to implement. Rogers (1995) proposes the following

stages are necessary to develop sustainability in HEIs (Lozano, 2006): (a) awareness, (b) interest, (c) test, and (d) adoption.

On the other hand, Sherry (2003) presented three stages of innovation: (i) initiation, (ii) implementation, and (iii) institutionalization; by the final stage, the innovation has already been incorporated into the organization's culture and operations (research and education) according to a number of authors (e.g., Sammalisto *et al.*, 2015; Wright, 2010; Wright & Horst, 2013; Wright & Wilton, 2012).

Leal Filho (2009) presents a different approach to SD in HEIs with three stages. In the first stage, Leal Filho (2009) suggests the principles of SD are not fully understood and there is no effort to promote sustainability in the HEIs. In the second stage, significant efforts can already be seen to develop sustainability projects on campus although the principles of the SD are not widely understood. The third stage is characterized by a long-term commitment to foster SD (e.g., sustainability policies, certifications, and coordination of SD activities in HEIs).

According to Leal Filho (2010), most HEIs are in the first stage so there is much to be done before SD is implemented throughout the HEI system. Using the Lozano (2006) classification, it is difficult to incorporate SD in all HEI activities in the first stage (innovation). There is broad agreement on this difficulty and the delay in institutionalizing SD in HEIs (e.g., Dobes, 2011; Leal Filho, 2010; Sammalisto *et al.*, 2015).

According to Sammalisto *et al.* (2015), the institutionalization of SD in HEIs is an ongoing process where knowledge, inspiration, practice, and the development of intelligence for SD are skills that should be fostered within the institution and then taken to the outside world. It entails a real commitment from stakeholders, and Lozano (2006) states that it is difficult in the early stages for SD to be automatically included in all aspects of HEIs.

The next section addresses factors that can foster (or discourage) the implementation and institutionalization of SD in HEIs.

2.5 The critical success factors in the implementation of SD and assessment tools in HEIs

Disterheft *et al.* (2015) identified three critical success factors for the development of SD initiatives, namely structure (top management support), process (communication strategy) and people (listening, giving feedback and not making value judgments), in which some are influenced by others. On the other hand, Barth (2013) defines them as ongoing communication, systems of support, and leadership, which may be expressed through students as agents of change, routines and innovation, and brand recognition (Barth, 2013).

HEIs use different types of assessment tools (standardized and non-standardized) to identify their sustainability performance (Disterheft *et al.*, 2015), but it is usual for them to establish indicators that demonstrate their concern about SD and communicate its implementation (Ramos, 2009; Ramos & Pires, 2013). Disterheft *et al.* (2015) states that HEIs must have indicators to monitor SD and identify problems so that it can be developed. They identify various types of initiative that illustrate the HEIs commitment to SD, such as implementing an environmental management system, activities for signing of the Higher Education Sustainability Initiate Rio+20 declaration , and student projects for campus sustainability; the forms of participation can vary enormously (individual/social/public participation) and consequently meet different objectives .

Lozano (2011) also notes that sustainability reports are important for HEIs to align strategy with sustainability and that, this kind of reporting is already done in companies.

The next section provides an overview of the higher education sector in Portugal and its main characteristics.

2.6 Higher education sector in Portugal

There are both public and private HEIs in Portugal, namely universities, university colleges, polytechnics institutes, among others. Their over-riding objective is to foster research and create knowledge by providing solid scientific and cultural preparation, technical training to perform professional and cultural activities, and fostering the development of

competences, innovation capacities, and critical analysis (DGES - Direcção Geral do Ensino Superior, 2015).

By the end of 2014, the Portuguese public network of HEIs was made up of fourteen Universities, twenty Polytechnic Institutes, and eight Higher Education schools for the Military and Police. It is noted, however, that although only the Universities and the Polytechnics are considered in this study, some polytechnics schools are integrated in the university system (14 polytechnics schools were integrated in six universities), and are therefore included in the university domain. The Military and Police Higher Education system is not included in this study due to its very specific form of organization, educational context and objectives.

Public higher education institutions are defined by decree-law as part of the national network of higher education (DGES - Direcção Geral do Ensino Superior, 2015).

Higher education has been on the political agenda in Portugal for some time due to its importance to economic and social development, and significant changes have therefore been made. A binary system (university and polytechnic) was adopted in the 1980s, as in other European countries, which created a subsystem of polytechnic education. The aim of the polytechnic network was to provide training that was closely linked to the economy and industry; in other words, more technical, profession-oriented, focusing on "know-how" and designed to the social, economic and regional needs.

The legislation underpinning the creation of polytechnics emphasizes the institutions' bond with their regions not only through institutional partnerships but also by developing scientific areas that are directly linked with the region's economic activities and structure.

In recent years, the responsibility and intervention of HEIs has grown and now includes broader functions of study and research. As we progress toward a knowledge economy in which the economic value of science is growing, some authors attribute a "third mission" to HEIs (Jongbloed, Enders, & Salerno, 2008), namely contributing to the economic development of a country or region by the transfer of knowledge to the business sector.

3. Factors leading to the implementation of SD practices in HEIs and hypotheses

SD practices in HEIs are influenced by internal, external and contextual factors. We present below the theoretical support for some of the factors leading to the implementation of SD practices in the HEIs analyzed herein. We investigate how the institution size and type of HEI (university or polytechnic) influence the adoption of SD practices, as well as the stage of implementation of SD in these institutions in Portugal.

3.1 Institution size

Institution size has been "one of the variables most used in order to explain the disclosure of information" (Gallego, Rodríguez, & García, 2011, p. 362). Within any one country, HEIs are very heterogeneous and some are very large in size and population. A number of studies found a positive relationship between size and implementation of practices of sustainability (Alshuwaikhat & Abubakar, 2008; Gallego *et al.*, 2011; Jorge *et al.*, 2015); we also defend that institutional size has an impact on the commitment to sustainability. Bigger institutions have a greater impact on the environment and on society (Alshuwaikhat & Abubakar, 2008) and are therefore more likely to be motivated to introduce SD in their strategies and practices. Furthermore, as larger HEIs reach a wider audience, they are more aware of the responsibility of acting correctly. Their behavior affects their image and their ability to attract more students and obtain more financial resources.

Following several other studies (Gallego *et al.*, 2011; Siboni, Sordo, & Pazzi, 2013), institution size is measured by the number of students and teachers of each HEIs.

From the above, we propose the following hypothesis:

H1 *There will be a positive relationship between the size of institution and SD in Portuguese HEIs*

3.2 Institution type

The binary system of Portuguese higher education is characterized by the coexistence of Universities and Polytechnics (Lei n.º 62/2007 de 10 de setembro). Whereas the University system offers solid scientific education combining teaching and research, the Polytechnics provide more technical training that is closely linked to economic and industrial needs. Universities are one step ahead of Polytechnic Institutes with regards sustainability due to their nature, strategies and context; moreover, as Universities conduct more research, they are more aware of societal challenges like SD.

We therefore propose the following hypothesis:

H2 *There will be more SD practices in Universities than in the Polytechnics in Portugal*

3.3 Stage of implementation of SD in HEIs

We follow the terminology used by Rogers (1995) and Lozano (Lozano, 2006; Lozano, Lukman*, et al.*, 2013) for the stages of implementation of SD in HEIs, more specifically, laggards, late majority, early majority, early adopters, and innovators.

Most HEIs are in the first or early stages of implementing SD (e.g., Alonso-Almeida *et al.*, 2015; Ceulemans, I. Molderez, & Liedekerke, 2015; Garcíaa, Kevanyb, & Huisinghc, 2006; Leal Filho, 2010; Velazquez *et al.*, 2005; Waas *et al.*, 2010) and there were few examples of European HEIs in the advanced stages (Ceulemans *et al.*, 2015; Lozano, 2006; Lozano, Lukman*, et al.*, 2013). We therefore propose the following hypothesis:

H3 *The implementation of SD practices in Portuguese HEIs is in its early stages*

4. Research Methodology

4.1 Sample, Data collection and Procedures

To measure the level of SD information disclosed by Portuguese HEIs, a content analysis was made of all Portuguese public HEI websites, more specifically, the main institutional

website and not those of faculties, schools, or departments. We analyzed 34 Portuguese public HEIs, 20 of which are polytechnics and 14 universities.

Our study does not encompass private higher education institutions due to marked differences in funding (e.g., no public/governmental funding), as well as their different ability to attract students (e.g., more marketing driven or focused in specific regions).

Content analysis (Bardin, 2014; Krippendorff, 2013) is performed by classifying the information disclosed in various categories on different dimensions of SD practices. There are different ways of implementing it. The simplest form consists of detecting the presence or absence of SD practices in HEIs. Content analysis has been used successfully and it is advocated in the literature (Hasim, Pullen, & Sivam, 2011; Katiliūtė, Daunorienė, & Katkutė, 2014). Katiliūtė *et al.* (2014) use content analysis to identify SD information issues in 14 Lithuanian universities websites, Barth (2013) uses it for SD activities in 17 German Institutions, and Gallego *et al.* (2011) for the SD information in 70 Spanish universities.

The data collected included information that was publicly accessible and relevant documents in the HEIs' main websites (e.g., activity reports, sustainability reports, risk plans, and corruption management plans). The main websites of HEIs were examined in their entireity, with the following exceptions: (a) links to external websites; (b) websites of each faculty or school; and (c) long-term strategic plans, plans of activities, and budgets approved.

Data collection took place from 1 December 2014 to 28 February 2015, and each website was reviewed manually. To ensure the accuracy of coding, a strict step-by-step procedure was followed, each website was reviewed at least four times and dimensions and coding were established in order to avoid bias in the interpretation.

Before the data collection, we developed a coding system listing all the practices based on literature review. The practices were organized in four dimensions (Disterheft *et al.*, 2013; García & Vergara, 2000; Hass *et al.*, 2002; Khalil *et al.*, 2013; Leal Filho, 2015; Leal Filho, Manolas*, et al.*, 2015; Meadowcroft, 2007; Sammalisto *et al.*, 2015; Segalàs *et al.*, 2010; Sibbel, 2009; Waas *et al.*, 2011): environmental, economic, social/cultural, and

institutional/educational/political (see Table 1 above). Cultural practices were included in the social dimension, and the political and educational practices were included in the institutional dimension. The final coding system contains 124 practices of SD in HEIs, distributed as follows: environmental (27), economic (12), social/cultural (39) and institutional/educational/political (46).

A scoring system was used to analyze each dimension whereby one point was assigned for each SD practice identified on the institutional websites (e.g., 1: there is evidence; 0: there is no evidence). Disclosure scores for each HEI were not weighted, and it was assumed that each SD practice was equally important.

4.2 Data analysis

An overall index of SD practices (OI_i) was developed for each HEI. It includes an index for each dimension studied (environmental index, economic index, social/cultural index, institutional/educational/political index). We gave the same weighting to the four indices (see formula 1) because the literature considers each dimension to have the same importance to SD in HEIs (Leal Filho, Manolas*, et al.*, 2015; Lozano, 2011; Waas *et al.*, 2011).

Each index takes into account the total number of practices mentioned above (see Formula 2). All the formulas were converted into percentages by multiplying the results by 100%. The minimum value of OI_i is 0%, which means no SD practices are implemented in the HEI *i*, and the maximum value is 100% which means all the SD practices considered in the analysis were implemented in the i^{th} HEI: where

$$OI_i = 0.25EnI_i + 0.25EnI_i + 0.25SI_i + 0.25II_i \quad (1)$$

$$OI_i = 0.25\frac{PEn_i}{27}x100\% + 0.25\frac{PEc_i}{27}x100\% + 0.25\frac{PS_i}{27}x100\% + 0.25\frac{PI_i}{27}x100\% \quad (2)$$

Where:
OI_i – Overall index of SD practices disclosed in the website of the ith HEI (i=1, …, 34)
EnI_i – Environmental index of SD practices disclosed in the website of the ith HEI (i=1, …, 34)
EcI_i – Economic index of SD practices disclosed in the website of the ith HEI (i=1, …, 34)
SI_i – Social/cultural index of SD practices disclosed in the website of the ith HEI (i=1, …, 34)
II_i – Institutional/educational/political Index of SD practices disclosed in the website of the ith HEI (i=1, …, 34)
PEn_i – Sum of environmental SD practices disclosed in the website of the ith HEI (i=1, …, 34)
PEc_i – Sum of economic SD practices disclosed in the website of the ith HEI (i=1, …, 34)
PS_i – Sum of social/cultural SD practices disclosed in the website of the ith HEI (i=1, …, 34)
PI_i – Sum of institutional/educational/political SD practices disclosed in the website of the ith HEI (i=1, …, 34) of HEI i

Additionally, a cluster analysis was performed to identify the stage of implementation of SD in HEIs. We used the Ward method with the Squared Euclidean distance to calculate the clusters. Observation of the dendrogram defined the number of clusters.

5. Results

After computing the number of practices for each dimension and each HEI, we calculated the above-mentioned indices. The results are described in Table 2. The HEIs are ordered by overall index from the highest to the lowest value. For example, University of Minho has an overall index of 56% which means that they implement 56% of the SD practices considered in the study. A performance of 59% in the environmental, 67% in the economic, 62% in the social/cultural, and 35% in the institutional/educational/political dimensions contributes to this result.

Table 2 – Indexes of SD practices in Portuguese Public HEIs and Cluster Analysis results

HEI	Environmental Index	Economic Index	Social Index	Institutional Index	Overall Index	Type	Cluster
University of Minho	59%	67%	62%	35%	56%	U	1
University of Coimbra	59%	58%	59%	24%	50%	U	1
Polytechnic Institute of Leiria	33%	83%	62%	15%	48%	P	1
University of Trás-os-Montes and Alto Douro	48%	75%	44%	20%	47%	U	1
University of Lisboa	22%	67%	59%	22%	42%	U	1
University of Porto	19%	67%	62%	22%	42%	U	1
University of Aveiro	19%	50%	44%	33%	36%	U	1
Polytechnic Institute of Viana Castelo	26%	42%	41%	17%	32%	P	2
University of Beira Interior	0%	50%	51%	22%	31%	U	2
New University of Lisbon	0%	58%	36%	28%	31%	U	2
Nursing School of Porto	41%	58%	18%	4%	30%	P	2
Polytechnic Institute of Portalegre	4%	42%	38%	30%	29%	P	2
Polytechnic Institute of Guarda	0%	50%	46%	17%	28%	P	2
University of Évora	7%	50%	36%	15%	27%	U	2
Polytechnic Institute of Beja	4%	58%	31%	11%	26%	P	2
Polytechnic Institute of Coimbra	0%	50%	33%	15%	25%	P	2
Polytechnic Institute of Viseu	0%	50%	28%	9%	22%	P	3
Polytechnic Institute of Porto	0%	33%	36%	17%	22%	P	3
Polytechnic Institute of Lisboa	33%	25%	23%	4%	21%	P	3
University of Algarve	4%	25%	38%	15%	21%	U	3
University Institute of Lisbon (ISCTE-IUL)	0%	25%	28%	24%	19%	U	3
Polytechnic Institute of Santarém	7%	25%	31%	9%	18%	P	3
Polytechnic Institute of Bragança	4%	25%	21%	11%	15%	P	3
Polytechnic Institute of Castelo Branco	0%	25%	26%	9%	15%	P	3
University of Madeira	0%	17%	33%	9%	15%	U	3
Polytechnic Institute of Setúbal	0%	17%	26%	7%	12%	P	4
Coimbra Nursing School	0%	17%	21%	9%	11%	P	4
Polytechnic Institute of Cávado Ave	0%	17%	18%	7%	10%	P	4
Higher Institute for Nursing of Lisboa	0%	25%	15%	0%	10%	P	4
University of Azores	0%	8%	26%	4%	10%	U	4
Polytechnic Institute of Tomar	0%	17%	15%	4%	9%	P	4
University Aberta	0%	17%	3%	9%	7%	U	4
Estoril Higher Institute for Tourism and Hotel Studies	0%	8%	15%	2%	6%	P	4
Higher Nautical School	0%	8%	10%	4%	6%	P	4
Overall Mean of the Indexes	**11%**	**39%**	**33%**	**14%**	**24%**	**–**	**–**

Notes: U- University; P- Polytechnic. Clusters: 1- early adopters, 2 - early majority, 3 - late majority, 4 – laggards.

Approximately, 47% of HEIs present SD practices in all the categories considered. Fifty percent of HEIs present SD practices in three categories (Economics, Social/Cultural, and Institutional/Educational/Political). Just one HEI (0.03%) has practices in only two dimensions (Economic and Social/Cultural).

The Economic and Social dimensions of SD are the more formally communicated in the Portuguese HEIs with indices of 39% and 33%, respectively. The institutional dimension of SD has an index of 14%. The environmental dimension of SD is the (index equal to 11%) with the least formal communication.

To test the relationship between the HEI size and SD practices formally communicated on websites, we adopted the number of students of teaching staff in each HEI as a proxy for HEI size. This information was obtained from DGEEC - Direção-Geral de Estatística da Educação e Ciência (2015), namely (a) the number of students registered for the 2013/2014 academic year and (b) the number of teachers registered for the 2012/2013 academic year.

Figures 1 and 2 show the relationship between the number of students and teaching staff and the global SD index, respectively. There is a positive significant relationship between the HEI size and number of SD practices, measured both by the number of students ($b=0.0008$, $p<0.001$; $R^2=0.36$) and the number of teaching staff ($b=0.014$, $p<0.001$; $R^2=0.39$). The larger the HEI, the greater the number of SD practices reported on the websites. There is evidence supporting H1.

Figure 1– Students versus Overall SD Index

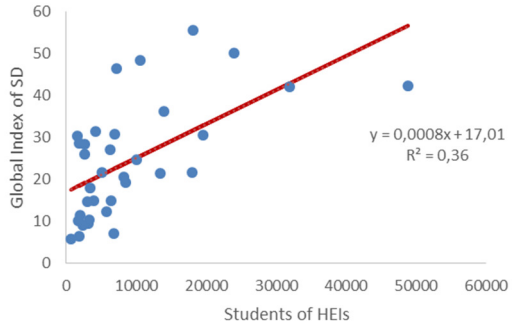
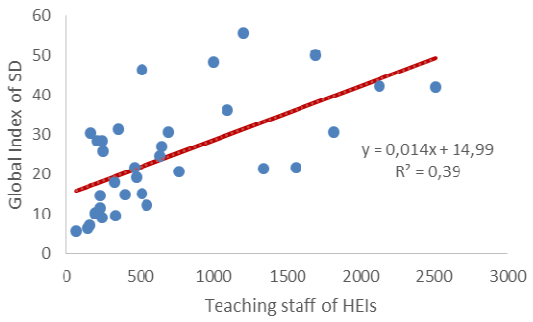


Figure 2–Teaching staff versus Overall SD Index



Results show that there is a difference in practices disclosed in Universities and Polytechnics. A higher percentage of SD practices was observed in Universities (overall index of SD = 31%) than in Polytechnics (overall index of SD = 20%) in all dimensions (Table 3). This evidence supports H2.

Table 3 – Overall SD index by type of HEI

	Mean of Universities' Overall Index	Mean of Polytechnics' Overall Index	Mean of Overall Index
Environmental Index	17%	8%	11%
Economic Index	45%	34%	39%
Social Index	42%	28%	33%
Institutional Index	20%	10%	14%
Overall SD Index	31%	20%	24%

The data analysis continued with a cluster analysis (for the overall SD index). Only four clusters emerge through observation of the dendrogram. As the maximum overall index obtained in the Portuguese HEIs was 56%, in practical terms, we considered that no HEIs are in the innovative stage of SD (Garcíaa *et al.*, 2006; Lozano, 2006; Lozano, Lukman, *et al.*, 2013; Rogers, 1995). In other words, there are HEIs only in the remaining four stages (laggards, late majority, early majority, and early adopter).

The Universities of Minho, Coimbra, Lisboa, Porto and Aveiro and of Trás-os-Montes and Alto Douro, and the Polytechnic of Leiria, were in cluster 1 (early adopters), and are the HEIs that develop the most practices in all dimensions. The overall SD index in this cluster ranges between 56% and 36%.

We find the Polytechnics of Viana do Castelo, Portalegre, Guarda, Beja, and Coimbra, the University of Beira Interior, New University of Lisbon, University of Évora, Nursing School of Porto in cluster 2 (early majority). We identified at least one less developed dimension in this group (in most cases, the environmental dimension). The overall SD index in this cluster ranges between 32% and 25%.

In cluster 3 (late majority) we find the Polytechnics of Viseu, Porto, Lisboa, Santarém, Castelo Branco and Bragança, ISCTE-University Institute of Lisbon, University of Algarve, and University of Madeira. The overall SD index in this cluster ranges between 22% and 15%.

The fourth and last cluster (laggards) is made up of the Polytechnics of Setubal, Cavado and Ave, Tomar, Nursing Schools of Coimbra and Lisboa, University of Azores, University Aberta, Nautical School, and Estoril Higher Institute for Tourism and Hotel Studies. The global SD index in this cluster ranges between 12% and 4%.

More than 50% of the HEIs are in early stages (laggards and late majority) of SD implementation. There is evidence to support H3.

6. Discussion

Larger HEIs are of great importance to society (Jorge *et al.*, 2015) and this work clearly indicates that the larger the HEIs, the more SD practices are reported on the websites. These results are consistent with Gallego *et al.* (2011) who also reported this size effect. Large institutions reach a wide audience and need to maintain a good image to attract and recruit students Gallego *et al.* (2011). The ongoing process of consortia among HEIs in Portugal will probably consolidate this trend.

When the results for Universities and Polytechnics are compared, it reveals a higher percentage of SD practices in Universities for all dimensions. This difference may be explained by the fact that the dual system of Polytechnics and Universities created different organizational and educational contexts that have led to different positions on disclosure policies and strategies. However, there may be some exceptions; for example, one of the polytechnics is in the adopter stage (cluster 1; Polytechnic Institute of Leiria).

All the Portuguese HEIs use webpages to disseminate SD practices. A similar scenario was reported in the Lithuanian HEIs by Katiliūtė *et al.* (2014). Some Portuguese HEIs webpages have specific sections for SD and Social Responsibility issues, although specific topics are not developed in most cases. Nevertheless, 47% of HEIs presented practices in the four SD dimensions and 50% in three of these dimensions; the Economic and Social dimensions of SD have the greatest weight, followed by the Institutional and Environmental dimensions. Some studies found the Environmental dimension had the most practices (Clugston & Calder, 1999; Lozano, 2011; Velazquez *et al.*, 2006), which is not the case in our study where Economic and Social dimensions predominate. As noted by Jorge *et al.* (2015, p. 9) "the slowing economy has affected higher education institutions, and they have had to cut budgets reducing expenditures", which has made the economic issues more relevant. However, Lozano (2011) stressed that the communication of the economic dimension might result from the analysis of the information available in HEIs' annual reports, the publication of which is mandatory. The evidence of more economic SD practices may therefore be due to the requirement to communicate rather than more "actual" practices in that dimension.

Katiliūtė *et al.* (2014) pointed out that it is relevant to HEIs' sustainability that the institutions' mission, vision, values institutional structure and kind of governance include SD topics and objectives. In this study, it is positive that most Portuguese HEIs (25 HEIs mission and vision statements clearly report SD issues) include SD in their mission statements and website information, which is line with the international trend (e.g., Alonso-Almeida *et al.*, 2015; Sedlacek, 2013). While Portuguese HEIs still have a long way to go before they have mainstream sustainability functions and practices, the development path is similar to that of other countries since most HEIs are in the early adopter stage (Alonso-Almeida *et al.*, 2015; Jorge *et al.*, 2015).

From this study, we conclude that Portuguese Public HEIs are predominantly at an early stage of SD and, based on their policies and strategies, SD seems to be incremental. Portuguese Public HEIs start by showing awareness through their communication in institutional documents or websites.

The University of Minho is an example of an institution that publishes sustainability reports, and has several SD practices implemented in their curricula and their campus. This HEIs can be classified as an SD early adopter. Only one HEI in this study published its sustainability reports using the GRI Framework (University of Minho). As stated by Alonso-Almeida *et al.* (2015), sustainability reports are a very useful tool to determine the stage of incorporation of SD in HEIs. Unfortunately, sustainability reporting is not a common practice in HEIs (e.g., Alonso-Almeida *et al.*, 2015; Disterheft *et al.*, 2012). Velazquez *et al.* (2005) reported that the greatest obstacles to SD in HEIs seem to be conservative organizational structure, the lack of awareness of HEIs community, and a lack of sustainability policies.

7. Conclusions

The main contribution of this study was the comprehensive analysis of the communication of SD practices or SD issues in HEI websites. Websites provide Portuguese HEIs with a platform to disclose their current SD practices and to communicate with their stakeholders.

We started by describing the content of the main websites of Public Portuguese HEIs regarding the four SD dimensions: (i) environmental, (ii) economic, (iii) social/cultural, and (iv) institutional/educational/political. Our findings reveal that the websites communicate mainly the economic and social/cultural practices. We observed a positive association between the communication of SD practices and (a) institution size, and (b) type of institution. More than 50% of the Portuguese HEIs are in the early stages of SD implementation and communication. Therefore, while the literature review revealed the importance of the environmental dimension in HEIs, often as greenwashing, our results show that Portuguese HEIs give more emphasis to the economic and social dimensions .

These results shed light on the role played by HEIs in SD and their social responsibility or "University social responsibility" (Godemann *et al.*, 2014, p. 221). However, effective SD and sustainability entails its inclusion in HEI agendas and strategies. It is important to promote SD in HEIs through best practices. As suggested by Lozano e Huisingh (2011), we consider that the long-term environmental/societal dimensions must be addressed along

with the economic dimensions because efforts focusing on solving short-term, unilateral problems or compartmentalized approaches can lead to societal problems.

By prioritizing sustainability issues in their agenda, Portuguese HEIs can improve their relationship with stakeholders (e.g., for international rankings, for funding, and to boost their image and competitiveness). However, despite the many guidelines on SD and the recognized role of HEIs in this field, the international economic situation and that of Portugal in particular, has probably hampered HEIs' commitment to these goals. Moreover, their day-to-day challenges leave them with little time to map out a medium and long-term strategy in which SD is a competitive advantage and they educate and inform society about sustainability.

Like Lozano (2006, p. 796), we hope that this study demonstrates that "the SD incorporation and institutionalization can be accelerated with multiplier effects, guided by the SD champion". As already noted, future research should focus on the barriers to implementing SD and the perception of HEI stakeholders and their commitment to SD.

CHAPTER 2

Conceptualization of sustainable higher education institutions, roles, barriers, and challenges for sustainability: An exploratory study in Portugal

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Abstract

Higher Education Institutions play an important role in the promotion of sustainability and an increasing number of stakeholders expect them to be sustainable organizations. However, this can only be achieved when barriers are faced and challenges overcome.

This exploratory study aims to investigate how the main stakeholders (leaders, faculty, staff, students, and external stakeholders) of Portuguese Public Higher Education Institutions perceive: the concepts of sustainability and sustainable higher education institutions, the role of higher education for sustainable development, and the barriers, challenges and obstacles to implementing sustainable initiatives in Portuguese Public Higher Education Institutions. Through a qualitative approach, using semi-structured interviews and content analysis procedures, this article explore the perspectives of twenty stakeholders from four Portuguese Public Higher Education Institutions. The results suggest that, although aware of the concept of sustainability, the different stakeholders are not familiar with the concept of sustainable higher education institutions. The lack of financial resources due to the decline in funding for higher education and falling numbers of Portuguese university students is perceived as the main barrier to sustainable development in higher education (i.e. practices are still associated with spending financial resources). This research highlights the importance of a conceptual and organizational change in higher education institutions, notably through identifying new sources of financing, more flexible organizational forms, more comprehensive mission statements, more tailored educational offers, life-long learning and commitment to internationalization, and more strategic human resource management. The paper contributes to the literature by reflecting on how higher education institutions can promote sustainability, how higher education for sustainable development is understood and can be improved in Portuguese Higher Education Institutions.

Keywords: *Higher Education for Sustainability Development; Higher Education; sustainability; Barriers; Challenges; Portugal.*

1. Introduction

Following the discussion of the role of Education for Sustainable Development (ESD), discussed at Agenda 21 (United Nations Conference on Environmental and Development, 1992), the 2nd World Summit on Sustainable Development in Johannesburg in 2002, and during the UN Decade of Education for Sustainable Development (UN-DESD, 2005-2014), the engagement of higher education institutions (HEIs) worldwide in sustainability increased. Moreover, the Nagoya Declaration reaffirmed this responsibility in 2014. The Nagoya Declaration enables the objectives set in Rio de Janeiro to be achieved through the HEIs by supporting the realignment of economic, social, cultural, environmental and education goals ("Nagoya Declaration on Higher Education for Sustainable Development," 2014). As Velazquez *et al.* (2006, p. 810) argued, "the progress towards the goals established in Rio de Janeiro has been slower than it was hoped" and the implementation of sustainability in HEIs has had its ups and downs (Velazquez *et al.*, 2005). The Nagoya Declaration could help change that situation. In this context, a growing number of studies have analyzed the contributions and experiences of HEIs worldwide to fostering sustainability.

HEI initiatives and activities of this kind take place in different areas (e.g., Fischer, Jenssen, & Tappeser, 2015; Lozano *et al.*, 2015): research, education, campus operations, community engagement/outreach, institutional framework, on-campus experiences, and assessment and reporting. On the other hand, they can be divided into different practices of sustainability (environmental, economic, social/cultural and institutional/educational/political) (Aleixo, Azeiteiro, & Leal, 2016; Lozano, 2011; Walter, Manolas, & Pace, 2015). Therefore, the HEIs play a catalytic role in societies' engagement with sustainability (Lehmann, Christensen, Thrane, & Jørgensen, 2009) and there are many bibliographic resources on the subject (see Barlett & Chase, 2013; Caeiro, Leal Filho, Jabbour, & Azeiteiro, 2013).

The Portuguese National Strategy for Development Education for the period 2010-2015 (IPAD, 2008) and the University Educators for Sustainable Development Project (UE4SD, 2014) have contributed to HEIs' commitment to sustainability in Portugal. The Portuguese National Strategy for Development Education contemplates guidelines (e.g., goals, activities and objectives) aimed at fostering this orientation in HEIs, and the UE4SD project led to the building of a network for sustainability in HEIs. Although sustainability in HEI has been studied for over twenty years, relatively little is known about the status of its implementation in the Portuguese HEIs. Few studies have investigated higher education for sustainable development (HESD) in Portugal (the 2016 study by Aleixo *et al.* is an exception), and none have addressed how sustainability is interpreted and implemented in Portuguese HEIs, the role of HESD, and the related challenges and obstacles they face.

In light of these gaps, this paper intends to answer to the following research question: What are the perceptions of the stakeholders in Portuguese HEIs with regards the conceptualization of sustainable higher education institutions (SHEIs), their roles, barriers and challenges? Our research followed Wright's research line (Elliott & Wright, 2013; Wright, 2010; Wright & Horst, 2013; Wright & Wilton, 2012) adapted to the context of Portuguese Tertiary Education and taking new groups of stakeholders into account. This research also sought to develop from the work of Aleixo *et al.* (2016).

Thus, the main objectives of this paper are: (a) to analyze how stakeholders of Portuguese HEIs understand the concepts of sustainability and SHEIs, (b) to understand the role played by Portuguese HEIs in fostering sustainability, (c) to identify the challenges and barriers to adopting a sustainability focused approach in Portuguese HEIs, and (d) to identify the main obstacles blocking sustainability initiatives in Portuguese HEIs.

The remainder of the article is structured as follows. Following the conceptualization of sustainability, SHEIs and the role of HESD, we discuss the barriers and challenges to sustainability in HEIs, as well as the drivers. The methods and the findings are then presented. Finally, after outlining the main conclusions, we present the limitations of the study as well as some avenues for future research.

2. Theoretical Framework

The theoretical framework of this study is based on sustainability (Clugston & Calder, 1999; Lozano, Lukman*, et al.*, 2013; Waas *et al.*, 2011), sustainability for HEIs (Barlett & Chase, 2013; Disterheft *et al.*, 2013; Kościelniak, 2014), and on the theory of stakeholders (Friedman & Miles, 2006).

2.1 Concept of sustainability, sustainable HEIs and the role of HESD

Although sustainability is now a familiar concept in contemporary society, many consider its interpretation as quite abstract (Lozano, 2008). As stated by Owens e Legere (2015), professionals continue to have an ambiguous understanding and definition of sustainability. In fact, the concept is characterized by various definitions and applications (White, 2013), and different perspectives, beliefs and values have an influence on the meaning attributed.

According to Leal Filho (2011), the lack of initiatives by HEIs is the result of misconceptions (e.g. sustainability is seen as too abstract a concept, it is too broad, there are no personnel to look after sustainable development). Waas *et al.* (2011), Wright (2010), and Wright e Horst (2013) also advocate that sustainability is not fully understood.

Lozano (2008) state that sustainability is now broadly defined as: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 45). While this is the most well-known definition, many others emerge. Lozano (2008) strives to clarify the concept by categorizing it from five different perspectives, namely (i) that of conventional economists, (ii) non-environmental degradation, (iii) integrational (encompassing economic, environmental and social aspects), (iv) inter-generational, and (v) holistic. The holistic perspective is the most complete because it comprises: (a) the integrational and the inter-generational perspectives, and (b) a balance between economic, environmental and social aspects as well as the short-, medium- and longer-term perspectives (Lozano, 2008). Moreover, the

understanding of the concept can be influenced by differences between cultures and countries (Khalil *et al.*, 2013).

A number of scholars claim that HEIs should already be better prepared to play a significant role in promoting SD (e.g., Amaral *et al.*, 2015; Godemann *et al.*, 2014; Wright, 2004, 2006, 2010) and Amaral *et al.* (2015, p. 156) suggest that HEIs should "lead by example". Stephens *et al.* (2008, p. 319) state that "a transition to a new pathway toward more sustainable practices and lifestyles is required". In this context, Stephens *et al.* (2008, p. 320) also note that HEIs can "catalyze and/or accelerate a societal transition toward sustainability".

This leads to the concept of SHEIs (e.g., Jorge *et al.*, 2015; Milutinovi & Nikoli, 2014; Wright & Horst, 2013). This paper considered the Velazquez *et al.* (2006, p. 3) definition of a SHEI, also known as a sustainable university. For this author a SHEI is "a HEI (…) that addresses, involves and promotes, on a regional or a global level, the minimization of negative environmental, economic, societal, and health effects generated in the use of their resources in order to fulfil its functions of teaching, research, outreach and partnership, and stewardship in ways to help society make the transition to sustainable life-styles". HEIs consider the issues of SD through all structural and organizational dimensions, infrastructure and energy related aspects, efficiency use of resources, by continuing strategic actions from education, research, knowledge transfer and stakeholders (partnerships and community).

HEIs are leading partners in global sustainability efforts. In order to achieve and promote sustainability, HEIs should be aware of the barriers to its implementation. This is addressed in the next section.

2.2 Barriers to Sustainability in HEIs

Most HEIs do not yet implement sustainability practices (e.g., Lozano, Lukman*, et al.*, 2013; Velazquez *et al.*, 2006; Velazquez *et al.*, 2005). There are barriers that affect actions fostering sustainability in HEIs, the most important of which are detailed below.

First, the ambiguity and complexity of the actual sustainability concept, which is seen as an abstract and complex topic (Leal Filho, 2000, 2011; Shriberg & Harris, 2012; Wright & Horst, 2013).

Second, the lack of financial resources and funding (Figueredo & Tsarenko, 2013; Shriberg & Harris, 2012; Waas *et al.*, 2012). Sustainability practices are still associated with financial investments and "Sustainability is not a first priority for many universities" (Velazquez *et al.*, 2005, p. 285).

Third, resistance to change associated to behaviors, practices or initiatives (Adams, 2013; Waas *et al.*, 2012; Weber & Duderstadt, 2012). Some university stakeholders do not want change, and others see sustainability as a theoretical model without practical implementation (Velazquez *et al.*, 2005).

Fourth, the organizational rigidity of the structure (conservative, traditional and conventional) (Verhulst & Lambrechts, 2015; Weber & Duderstadt, 2012) which can lead to: (a) "inefficient communication and shared information both top-down and bottom-up", (b) "barely open to new paradigms", and (c) "focus on short-term profit as a result of managerial thinking and policy making in HE" (Verhulst & Lambrechts, 2015, p. 3).

Fifth, the lack of commitment, engagement, awareness, interest, and involvement of faculty, students, staff, management and policy makers (Verhulst & Lambrechts, 2015; Waas *et al.*, 2012; Weber & Duderstadt, 2012). The leadership must support the introduction of sustainability in HEIs through changes in curricula, research, campus operations or through more strategic intervention. The success of sustainability in HEIs relies on this support from top management (Adams, 2013; Jorge *et al.*, 2015; Milutinovi & Nikoli, 2014).

Sixth, lack of training and specialization in sustainability (Jorge *et al.*, 2015; Verhulst & Lambrechts, 2015). Most faculty members have little specialized knowledge of sustainability, and some "are learning and teaching about sustainability at the same time" (Velazquez *et al.*, 2005, p. 386). Additionally, most academic staff have never received training on the topic.

The above barriers are also experienced by Portuguese HEIs especially the rigid organizational structure which is characterized by many hierarchical levels and high spatial distance between buildings of the same university or polytechnic. Also the lack of financial autonomy becomes an aggravating factor together with the lack of commitment, engagement, awareness, interest, and involvement of most stakeholders.

2.3 Challenges to and drivers of sustainability in HEIs

Based on the literature review and above-mentioned barriers to sustainability in HEIs, it is now necessary to identify the conditions that foster its development. This study sought to identify the challenges to and drivers of sustainability in HEIs. As suggested by the literature review, the challenges and drivers are intrinsically related to the barriers. For example, several studies have found the financial resources are not only a barrier but also as a driver or a challenge for SHEIs (Elliott & Wright, 2013).

Turning to the management of sustainability in HEIs, Adams (2013) highlights the importance of the following: (a) proactive leadership, (b) clear and consistent communication, (c) the inclusion of sustainability in the HEI strategy, (d) multidisciplinarity in research and courses, (e) engagement of students and staff, and (f) other initiatives that develop engagement in sustainability practices. For Barth (2013), the implementation process of sustainability is also driven by a flexible organizational structure based on on-going communication, support systems, and leadership.

On the other hand, Ferrer-Balas *et al.* (2008) and Sammalisto e Arvidsson (2005) mention that peer pressure from competing institutions and funding availability have fostered sustainability in HEIs. Verhulst e Lambrechts (2015) state that the integration of sustainability is driven by external and internal influences, and they consider individual commitment, external funding, and assessment of the current sustainability situation to be advantages for sustainability. Moreover, Adams (2013, p. 390) believes it is essential to address social, environmental and economic sustainability issues “by doing things differently and doing different things”.

Davis *et al.* (2009) believe that the successful implementation of sustainable practices and behaviors among employees depends on the existence of infrastructure to support this behavior. In this context, Mader, Scott, e Razak (2013) refer to engagement, alignment, governance and management, efficiency and collaboration as drivers for sustainability in HEIs.

The implementation of the United Nations Global Compact Principles (United Nations Global Compact, 2012) could also be a way of implementing sustainability in HEIs. The engagement of stakeholders, referred by several authors (e.g., Godemann *et al.*, 2014; Kościelniak, 2014; Verhulst & Lambrechts, 2015), could help in the application of the principles of sustainability.

Despite all the discussion about the strategies and drivers for Sustainability in HEIs, the engagement of all the participants in the concept is the major driver (e.g., Godemann *et al.*, 2014; Too & Bajracharya, 2015). Advances can only be made along the path towards sustainability with the engagement of HEI leaders (rectors, presidents, and directors), faculty (researchers and professors), students (students and alumni) and external entities (local or regional level).

2.4 Perceptions of key HEI stakeholders

The studies by Too e Bajracharya (2015), Jones *et al.* (2013), Sammalisto *et al.* (2015), and Figueredo e Tsarenko (2013) were the first to place importance on the stakeholders' perceptions. According to Leal Filho (2011), the goals of sustainability in HEIs can only be achieved once the attitudes of key stakeholders about sustainability are known. Cooperation with stakeholders should be part of the strategy towards sustainability (Stephens *et al.*, 2008). The key stakeholders of HEIs are:

- Leaders - Literature shows that leadership is fundamental in the HEIs' change process towards Sustainability (e.g., Clugston & Calder, 1999; Wright, 2010). Leaders play a decisive role in introducing sustainability, or not, as a key topic for HEIs (e.g., Grindsted, 2011);

- Faculty - Teaching faculty's perception of sustainability is crucial due to the role they play as teachers and researchers in the ESD (Christie, Miller, Cooke, & White, 2015), their influence in the future of sustainable societies (Wright, 2010), and also for organizational change (Barth & Rieckmann, 2012);
- Administrative staff - Staff can help leaders, faculty, and students to implement the sustainability practices in day-to-day life. For example, Jones et al. (2013) report that the development of green initiatives in HEIs must take into account the perceptions of administrative staff. Davis et al. (2009) highlight that although it is becoming a more familiar concept, the staff must be informed about the institution's strategies to implement sustainability, particularly regarding efficient technology, and incentives for energy efficiency;
- Students - Students are one of the most important stakeholders in the development of a more sustainable society (e.g., Robinson, 2012; Wachholz, Artz, & Chene, 2014; Zeegers & Clark, 2014). According to Figueredo e Tsarenko (2013), the interests of students in environmental issues influence their participation in sustainability programs. Also, the promotion of sustainability initiatives by HEIs is a way of facilitating students' participation in these kind of activity (Figueredo & Tsarenko, 2013);
- External stakeholders (local or regional) - As suggested by Waas et al. (2010), all actors in society should contribute to the transition to a sustainable world. Leal Filho (2011) also notes that HEIs should include not only the main stakeholders but also partnerships with government organizations, customers, research partners, and university services. For Karatzoglou (2013), HEIs are leaders in the coordination and promotion of the involvement of different social actors in the development of regional sustainability plans. This relationship with external stakeholders is mentioned as the third mission of HEIs (Kościelniak, 2014).

3. Methods

3.1 Nature of the study and interview questions

This exploratory study follows a qualitative approach, with semi-structured interviews (Bryman, 2012). It follows Wright's research line (Elliott & Wright, 2013; Wright, 2010; Wright & Horst, 2013; Wright & Wilton, 2012) and replicates their research questions (adapted for the Portuguese context). However, new groups of stakeholders are embraced (e.g., external stakeholders and administrative staff). The research questions are presented in table 4.

Table 4 – Interview questions applied in this study

Questions
1. When you hear the term sustainable development, what does this mean to you?
2. When you hear the term "sustainable University" or "sustainable Polytechnic institute" what does this mean to you?
3. For you, what role, if any, do you feel universities and polytechnic institutes in general should play in achieving sustainability?
4. Do you foresee different challenges in the future for sustainable development?
5. Do you foresee different barriers in the future for sustainable development?
6. What, if any, are the barriers that can prevent your Institution from engaging in sustainable initiatives?
7. In your opinion, what are the key issues facing this Institution over the next ten years?

Note: Adapted from Wright and Worst (2013), Wright and Wilton (2012) and Wright (2010).

3.2 Sample and procedures

A convenience sample of four Portuguese HEIs was selected (University of Aveiro, University of Coimbra, Polytechnic Institute of Leiria, and Polytechnic Institute of Santarém) taking into account the enrollment of the institutions in sustainability programs and projects (previously identified by Aleixo *et al.*, 2016), and filiations of the authors of this study. The sample includes two Universities and two Polytechnics in light of Portugal's dual system of higher education (which has 20 Polytechnics and 14 Universities). Two of these HEIs are partners in the UE4SD Consortium (University of Aveiro and Polytechnic Institute of Leiria), and three are among the "early adopters of sustainability" cluster in the study of Aleixo *et al.* (2016), and can be considered examples of Portuguese HEIs with good

sustainability practices. Although the fourth (Polytechnic Institute of Santarém) HEI is not in the UE4SD Consortium or in the early adopter cluster, it was selected as a case study because it could be facing barriers, challenges and obstacles that had already been overcome by leading HEIs. It is important to study HEIs that are seen as the best cases in the field, but also the ones that could have a long way to go before achieving that level of development.

Interviews were conducted in each HEI with five stakeholders (one leader, one faculty, one staff member, one student, and one external stakeholder), involving a total of 20 individuals. As noted by Fridlund and Hildingh (cited by Bengtsson, 2016, p. 10), "in qualitative studies, it is common that data are based on 1 to 30 informants". Due to the small sample size, results of the different groups of stakeholders are not compared.

The individuals were selected taking into account their importance as stakeholders in each HEI. Rectors or vice-rectors, presidents or vice-presidents of universities and polytechnics institutes, or the directors of research units or departments were considered leaders. Faculty encompassed the teachers with projects or studies in the sustainability area. Staff in our sample were those individuals whose duties involve project management, and institutional strategy, planning and development. Students selected for our sample were individuals representing the student body (e.g., associative leaders). The institutions with which HEIs have partnerships for national or regional strategic development were selected as external stakeholders; they are the typically involved in studies of this kind (e.g., Hancock & Nuttman, 2014). The stakeholders were selected from each institution, after taking into consideration the recommendations of experts on sustainability and the institutional leaders.

Each respondent was interviewed once in a face-to-face interview. The data was collected between October 11, 2014, and April 21, 2015. All interviews were audio-recorded and transcribed with the permission of the participants. Written consent had previously been obtained from all respondents regarding the use of the information collected. The interviews lasted on average 36.15 minutes (ranging from 15 to 90 minutes). In order to protect the confidentiality of the respondents, they were each given an alphanumeric

identification was: leaders (L), faculty (F), staff (Stf), students (Sdt), and external stakeholders (Es).

3.3 Data collection and content analysis

The data was collected through semi-structured interviews, and analyzed using content analysis procedures (Bardin, 2014; Krippendorff, 2013), adopting both a deductive and inductive code technique (Drisko & Maschi, 2016). A priori code was developed from previous studies and theory. This code was then adapted when analyzing the interviews, and changes made when necessary. The codes were organized into categories. Semantics were used for the registration process, and the phrase was adopted as the context unit. The codes and categories were enumerated through presence/absence criteria. The codes used from the beginning to the end of the analysis and the changes made were organized in a codebook (Saldana, 2009). To assess the reliability of the procedure, a sample of five interviews was independently coded by the second author of this paper. The codes and categories obtained were analyzed and a consensus obtained. MAXQDA software was used to organize and analyse the data. With this content analysis software, data was analyzed through a constant comparative method (Glaser & Strauss, 1967).

The results are organized into seven topics, one for each question, and exhibited in tables. Within each table, each category can be mentioned a maximum of 20 times (once per interviewee). A simple frequency count is used as the basis for this analysis.

4. Findings

4.1 Sustainability Concept

The participants were first asked what they understood by sustainability, and the main approaches to this concept are summarized at table 5. Seven (N=7) of the 20 respondents associated sustainability to the preservation and conservation of resources for future generations. A faculty member said that “we must guarantee that the use of resources does

not compromise the future use. We must live with the renewal of the cyclical resources that we have on earth" (F_2). For one student, sustainability "happens when we are able to use resources that we have today, allowing them to continue existing for future generations" (Est_3). An external stakeholder said "generally speaking, we can say that Sustainability Development (SD) implies that by developing in a particular way, we are not prejudicing development in the future" (Es_4).

Furthermore, six of the 20 respondents (N=6) have an integrational view of the concept, referring to the three pillars of sustainability: economic, environmental, and social. For example: "There are many incomplete definitions! I like the definition that embraces the environmental, social, and economic dimensions. Really, SD goes through this, through a balance that guarantees that all resources are sustainable" (F_3).

A few individuals continue to associate sustainability to just one or two dimensions (environmental or economic) (N=3).

Table 5 – Results of the interviews related to the sustainability concept

	Frequency
Preservation of natural resources for future generations (intergenerational view)	7
Environmental, economic and social dimensions	6
Environmental dimension	2
Environmental and economic dimensions	1

4.2 SHEI Concept

Regarding the SHEI concept, the respondents were asked about their understanding of the term and what it included (Table 6). In contrast to the sustainability concept, the majority of respondents had not heard of the SHEs concept.

In general, respondents do not feel that any Portuguese HEI can claim to the SHEI designation. However, they express their ideas about the concept. Seven of the 20 said that the SHEI concept corresponds to the long term survival of HEIs and it is linked to their economic sustainability. That not only means their continuity in time, but also strategic planning in order to circumvent and overcome the current challenges. One external

stakeholder referred: “A sustainable university is one that maintains itself the longest” (Es_2). For a faculty representative: “Organizations have to progressively adapt” (F_2).

Some respondents associate the SHEI concept to just one dimension of sustainability: the environmental (N= 5), the economic (N=2) or the institutional (N=2). For example, one member of staff said “A [SHEI is an] institution with a well-organized policy regarding the efficient use of its resources” (Stf_4). A different staff member also mentioned the issues related with “Ways to save energy and the use of water” (Stf_3).

Table 6 – Results of the interviews on the SHEI Concept

	Frequency
Long-term sustainability of the institutions	7
Environmental sustainability	5
Economic sustainability	2
Institutional sustainability	2
Integrated sustainability	2

4.3 Role of HESD

Respondents were unanimous in their belief that universities and polytechnics should play a decisive in pursuing sustainability (Table 7).

For a large number of the participants, HEIs have a responsibility to produce knowledge, disseminate information and motivate change towards sustainability (N=9), either because they promote the education and training of future employers or because they are “opinion leaders” who are likely to exercise their action on behalf of sustainability. To illustrate this, one student mentions that the role of HEIs: “is to train the students to become people that consider SD” (Est_3). A staff member also said: “if we want to promote SD, in fact, we have to train people to do so. Then, when they join the workforce of companies, they will reproduce these concerns in their activities” (Stf_3). An external stakeholder also argued: “Who produces knowledge in Portugal? It is the Universities and the labs associated to these institutions”, emphasizing the role that HEIs play in producing knowledge related with SD” (Es_2).

Five respondents mention that HEIs have a role to play in developing their region and even the country. These results may be related in some way to the role played by HEIs in disseminating knowledge and moving towards sustainability. Since this knowledge increases teaching, research, and project quality either in conjunction with or for the community, regional and national sustainability will also increase. One faculty member made the following comment in relation to this: "These are the institutions that should promote endogenous and exogenous sustainable growth" (F_4). According to one student: "The HEIs have a fundamental role in the community to which they belong" (E_4). One external stakeholder asserts: "I think that it is critical to have a university or a polytechnic in every region. There is always a younger population that ends up enrolling there. The level of education the population in that region will become higher" (Es_1).

Also, five of the respondents refer to the role of HEIs in teaching and in the curriculum (N=5). One staff member notes: "HEIs play a critical role, and they should include these topics in their curriculum" (Stf_3). According to a faculty member: "We must have specific training on these topics, specific offers for sustainable areas" (F_2).

Respondents also mention that HEIs play a role in: (a) the development of research and knowledge transfer (N=3), (b) the implementation of initiatives in the field (N=2) and (c) motivating commitment and participation in sustainability practices (N=1).

Table 7 – Results of the interviews on the role of HESD

	Frequency
Knowledge, dissemination and advances towards sustainability	9
Development in the region or country	5
Education/curricula	5
Research	3
Knowledge transfer	3
Campus initiatives	2
Commitment and participation	1

4.4 Barriers to sustainability in HEIs

The analysis continues by addressing the barriers and obstacles that HEIs face when it comes to their own sustainability (Table 8). Finance was one of the most frequently mentioned aspects by respondents (N = 10) and was referred to by all the different stakeholders. According to a faculty member "The first question is financial resources. This is more or less transversal across the entire higher public education system in Portugal" (F_2). One staff member notes: "Universities have the difficult task of finding money in the next few years for research, for mobility programs, and for extracurricular activities" (Stf_2).

Table 8 – Results of the interviews on the barriers to sustainability in HEIs

	Frequency
Financial factors	10
Difficulty in attracting students	6
Competitiveness	5
Mismatch between the needs of enterprises and labor market and the training offer of HEIs	2
Difficulty of retaining talent	2
Demographic factors of human resources	2
Absence of autonomy	2
Lack of integrated strategic planning	2
Lack of autonomy that characterizes public administration	1
Unequal opportunities between institutions	1
Difficulty of monitoring the innovation of enterprises	1
Socio-economic factors	1

The second most often mentioned barrier is the difficulty in attracting students (N=6). One external stakeholder asserted: "the birth rate is most important question. What I mean is the reduction in the number of students. This situation has been constant over the last few years, and it will get worse, because the birth rate is decreasing" (Es_4). According to a HEI leader: "There is a critical obstacle, which is the fall in the number of students, that has to do with multiple situations but it is mainly due to the decrease in the student population" (L_1).

Five of the respondents (N=5) also saw the inability to be more competitive, attract more students and raise more funds than other HEIs in the same or neighboring regions as a barrier. The polytechnics feel that universities can be more competitive in both fundraising and attracting customers (students). One faculty member said "Our biggest problem is that our recruitment field is small, and we have the competition of nearby universities, with older traditions than ours and that are more attractive" (F_1). Another noted "Having a very limited demographic basis compared to the other big centers is the most serious question. Moreover, another problem is that the industry around us is changing and becoming less competitive" (F_2). A different view was given by another faculty member: "The resources are concentrated in universities that are capable of getting the best project evaluations from FCT [Fundação para a Ciência e Tecnologia[2]] and also from Horizon 2020"[3] (F_4).

Another barrier is the mismatch between the needs of enterprises and labor market and the training offer from HEIs (N=2). The difficulty in retaining talent that HEIs are training, either because of the difficulties in hiring or because of immigration (N=2) is also mentioned as a barrier.

Regarding human resources, demographic factors resulting from progressive staff ageing and the difficulty in their employment (N=2) are mentioned as barriers. The lack of strategic planning (N=2) and of autonomy that characterizes public administration (N=1) are also identified as barriers to sustainability in HEIs.

The following barriers are also identified (N=1): (a) issues related to the legal and administrative constraints and the bureaucracy associated with these institutions; (b) the dichotomy between polytechnic and university systems mean institutions have unequal opportunities, (c) the difficulty of monitoring the innovation of enterprises, and (d) socio-economic factors associated with unemployment and emigration.

[2] FCT is the Portuguese national funding agency for science, research and technology.
[3] Horizon 2020 is the biggest European Union research and innovation program (European Commission, 2015).

4.5 Challenges and drivers for sustainability of HEIs

When asked about the challenges of HEIs in relation to sustainability, respondents referred most to the importance of empowering the community (Table 9; N=5). In this context, a faculty member argues that the sustainability of an HEI is obtained "by getting closer to the local community, by understanding what their needs are" (F_4). One leader mentioned: "Many people will have to requalify, they will have to upgrade their knowledge, and they will have to go back to school, maybe more than once" (L_3). For another Leader, the challenge will be "In the training, in the research, and in the innovation with partnerships with companies, in a way that allows knowledge to be transferred to companies, to help and enable the companies to innovate" (L_1).

Fundraising and funding is the second most often referred sustainability challenge HEIs (N=4), partly due to the dwindling of public funding for HEIs. According to one leader, the challenge nowadays is "To obtain the public's support. I have no doubt that Horizon 2020 and also Portugal 2020 [4], with their operational programs, are fundamental to train institutions" (L_1).

Two other respondents (N=2) also mentioned the importance of interdisciplinarity as a challenge for sustainability. This is becoming an area of concern in Portuguese HEIs. For example, a faculty member mentions that we need "HEIs that have good teachers with a vast interdisciplinary knowledge of the business reality of the regions where the HEIs are located" (F_4). For an external stakeholder, it is important "to bet more and more on team collaboration projects and to take advantage of the knowledge base. The departments cannot work alone, and this is what often happens" (Es_2).

Internationalization, culture exchange and the quality of training and research are also presented as challenges for the sustainability of HEIs (N=1), although less often.

[4] Portugal 2020 is a partnership agreement between the European Commission and Portugal related to funding.

Table 9 – Results of the interviews on the challenges and drivers of sustainability in HEIs

	Frequency
Community empowerment	5
Fundraising and funding	4
Interdisciplinary	2
R&D	1
Internationalization	1
Cultural exchange	1
Quality of training and research	1

4.6 Obstacles to sustainability initiatives

Regarding the obstacles that prevent HEIs from developing sustainability initiatives, a considerable part of the sample refers to the lack of financial resources (Table 10; N=9). One leader notes that, “with the situation that we have been facing in the last few years, investing has not been easy, and many of these solutions require investment.” (L_1).

For four respondents (N=4), the lack of information and communication is another obstacle (N=4). One leader said, “What I have found in the last few years is an enormous lack of knowledge of how this could be done. In fact, people look at this and don’t know what to do” (L_1). According to a faculty member “One of the main causes for our difficulty in introducing faster sustainable practices is the lack of information or the lack of training” (F_2).

For four of the respondents (N=4), the lack of human resources also contribute to HEIs' lack of initiative on this matter. One external stakeholder gave the following justification for this “Administrative control prevents universities from enriching themselves and hiring outside the campus” (Es_2).

Other obstacles presented by respondents include lack of commitment, initiative and participation, lack of time, wrong conceptualization of the sustainability concept, vertical and fragmented organizational structure, lack of instruments for sustainability, and resistance to change.

Table 10 – Results of the interviews on the obstacles to sustainability initiatives

	Frequency
Lack of financial resources	9
Lack of information and communication	4
Lack of human resources	4
Lack of commitment, initiatives and participation	2
Lack of time	2
Wrong conceptualization of sustainability	1
Vertical and fragmented organizational structure	1
Lack of instruments for sustainability	1
Resistance to change	1

4.7 Most relevant issues that will be faced by HEIs over the next 10 years

The respondents were asked to identify key issues facing their HEI over the next ten years. Table 11 provides the responses and demonstrates that fund-raising and financing (N=9) are the most common answers. For one leader, the main challenge "is the divestment of the state in higher training and in HEIs, as well as maintaining financial sustainability, namely generating resources that make HEIs less dependent on the state" (L_3). This idea is also shared by a faculty member: "There have been some financial constraints because of the public policies that are not the best. This will be a challenge now and for the future" (F_3).

Attracting national and foreigners' students is another great challenge for HEIs (N = 8), and one that is essential for their survival. In this context, one leader mentions, "The most pressing issue is the question of demand. By this I mean the students. This is maybe the biggest challenge that HEIs are going to have in the next few years" (L_3). On this topic, one student asserts: "Institutions have to internationalize and get students from abroad, namely from Portuguese speaking countries" (Est_4).

The following challenges were also mentioned: the transfer of knowledge (N=6) quality and excellence (N=5), internationalization (N=3), autonomy (N= 2), investment in R&D (N=2), the effective response to market needs (N=2). Just one mention was made of each of the

following challenges: the development of networks and partnerships (N=1), the development of interdisciplinarity (N=1), the motivation of human resources (N=1), strategic planning (N=1), the qualification of the faculty (N=1), and reorganization of the business structure of institutions (N=1).

Table 11 – Results of the interviews on relevant issues for future of HEIs

	Frequency
Fund-raising and financing	9
Attracting students and foreigners	8
Transfer of knowledge	6
Excellence and quality	5
Internationalization	3
Autonomy	2
Investment in R&D	2
Response to market needs	2
Development of networks and partnerships	1
Development of interdisciplinarity	1
Motivation of human resources	1
Long term strategic planning	1
Qualification of faculty members	1
Reorganization of the business structure of institutions	1

5. Discussion

Most of the interviewees largely agree with Brundtland's perception of the sustainability concept, namely: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). However, only some of the respondents see sustainability from the integrational perspective (Lozano, 2008), covering the three sustainability pillars (environmental, social, economic). Therefore, these findings do not confirm a holistic view of sustainability (Beynaghi *et al.*, 2014; Ferrer-Balas *et al.*, 2008; Godemann *et al.*, 2014). Although the three most common dimensions of sustainability are mentioned by respondents, new dimensions such as the institution (Lozano, 2010, 2011; Walter *et al.*, 2015) are not. There

is a better understanding of sustainability nowadays, which might be explained by frequent references to it in the media and the fact that it has become a fashionable concept.

The integration of sustainability in HEIs is not so well understood. Most respondents did not know the term SHEI and even classified Portuguese HEIs as far from being considered examples of the concept. The perception that there are no SHEIs in Portugal is in line with results from other countries (Kościelniak, 2014; Velazquez *et al.*, 2006; Velazquez *et al.*, 2005). The respondents related the SHEI concept to an institution's lifetime i.e. a long living institution is a sustainable one; this result was not obtained in the previous works by Wright (Wright & Horst, 2013; Wright & Wilton, 2012). However, as in Wright's study, the stakeholders in this study consider that the SHEI concept embraces the physical operations of the campus related to environmental sustainability (Wright, 2010; Wright & Wilton, 2012).

As in the studies by Wright (Wright, 2010; Wright & Horst, 2013; Wright & Wilton, 2012), herein all respondents believe HEIs play a role in the pursuit of a sustainable future. HEIs are seen in this study as making a significant contribution through the universities' role in knowledge production, research, development, and dissemination on sustainability. This is in line with the conclusions of Godemann *et al.* (2014): HEIs have a social responsibility for sustainability, designated by "university social responsibility".

Taking into account these results, HEIs must teach sustainability as a transformational organizational change that should include the concepts of ESD, inter and transdisciplinarity in teaching, a whole-institution approach, and the importance of networking (Michelsen, 2016), and referred by Thomas (2016, p. 58) as a "Clearly transformational change is the sort of broad change relevant to ESD". HEIs have a role to play in creating praxis-oriented transformative learning and experiments, where research, education, learning and capacity-building is blended to resolve sustainability issues identified by stakeholders (Wals, Tassone, Hampson, & Jonathan, 2016).

Our results are in line with the reflections made by Walter *et al.* (2015): to meet future challenges, the HEIs should allow formal flexibility, non-formal and informal education for

sustainability and identify opportunities in the green economy; additionally, the government should increase the financial support of HEIs with good performance on sustainability issues. However, the economic crisis in Portugal has had an impact as it resulted in slashing HEI funding (González-Gaudiano, Meira-Cartea, & Martínez-Fernández, 2016).

Regarding the barriers in HESD, the respondents identified (a) the financial factors, (b) the difficulty in attracting students, and (c) the competitiveness between the institutions (particularly universities versus polytechnics). The lack of funding and the falling number of students in Portuguese HEIs are presumably among the biggest barriers generally perceived in many Portuguese public universities and these issues affect the HESD in Portugal. According to González-Gaudiano *et al.* (2016), the financial issues and lack of understanding and commitment from senior management are seen as the barriers to implementing sustainability in HEIs. Due to these barriers, HEIs focus on short-term decisions to respond to commodification, and follow a neoliberal vision and the market demands of higher education (González-Gaudiano *et al.*, 2016) to attract funds and students. Other barriers are the resistance in academic and management structures, linked to a compartmentalized structure that persists in most HEIs (González-Gaudiano *et al.*, 2016).

Finance is seen as the main obstacle to promoting initiatives for SHEIs or sustainability. Other obstacles relate to the lack of human resources for the development of sustainability initiatives, information and communication about sustainability, time availability, commitment, initiatives, and participation. Other obstacles are linked to the concept of sustainability, lack of instruments for sustainability, resistance to change and the organizational structure of HEIs. Financial factors and student attraction seem to be the major future challenges for Portuguese HEIs, a tendency already observed in studies carried out in other countries (Elliott & Wright, 2013; Wright, 2010; Wright & Horst, 2013; Wright & Wilton, 2012). Moreover, the current economic crisis plays an important role in financial issues and strategies (González-Gaudiano *et al.*, 2016). In light of the above, it is essential to take note of the good practices and networking, and as stated by Velazquez *et al.* (2006): good practices could function as a benchmarking process for sustainability.

For the stakeholders of the four HEIs consulted, the main issues over the next 10 years are (a) the fund-raising and financing, (b) attracting national and international students, (c) knowledge transfer, (d) quality, and (e) internationalization. These challenges may be interrelated because, for example, knowledge transfer can be used by institutions to raise funds and to publicize the quality of the institution and thus respond to the issue of attracting students. Internationalization is another way of solving these issues through partnerships with other HEIs and the attraction of international students. These results are in line with those of previous studies (e.g., Wright & Horst, 2013).

The findings of this study highlight the importance of change in HEIs, notably through the use of new ways of funding, more flexible organizational forms, a more comprehensive mission, narrowing the gap between polytechnic and university education, a more tailored educational offer and life-long commitment to internationalization, and more strategic human resource management. This is in keeping with suggestions made by different authors on the challenges facing HEIs (Beynaghi *et al.*, 2014; Figueredo & Tsarenko, 2013). In this scope, the financial instrument Horizon 2020 (European Commission, 2015) could help address the specific challenges for the future facing higher education in the Portuguese context. The Horizon 2020 funds could provide an important step for HESD, based on the Europe 2020 strategy that sets out three mutually reinforcing priorities, namely: (i) Smart growth: developing an economy based on knowledge and innovation; (ii) Sustainable growth: promoting a more efficient economy in terms of resource use, that is greener and more competitive and (iii) Inclusive growth: fostering an economy with high employment delivering social and territorial cohesion.

6. Conclusions and future perspectives

The present article reviews how higher education institutions could promote sustainability, the main concepts underlying this subject, and the way HESD is understood and could be improved in Portuguese HEIs.

Although sustainability is a broader concept, this exploratory Portuguese study suggests that the SHEI concept is still mostly associated to the survival of institutions and to the environmental dimension of sustainability. Despite the fact that different stakeholders, from leaders to students, present a clear vision of the role of Portuguese HEIs, current issues such as socio-economic factors, demographics of students and competitiveness prevail when Portuguese HEIs develop their strategies and priorities. It is therefore important to have access to national and international good practices and networking, as well as to examples of the implementation of sustainability in HEIs because this could provide important clues about how Portuguese HEIs could meet the challenges relating to: competitiveness, funding, the number of student enrolments, institutional partnerships, and the quality and excellence of teaching and researching.

As in other countries, the evidence obtained suggests that there is slow movement towards and few strategies for the implementation of sustainability in Portuguese HEIs, at least among the participants in this study. Even though the different stakeholders (internal and external) have a greater awareness about sustainability, there is no clear strategy about its promotion in HEIs. Given the current and significant cut in the state budget for education, some of the activities in the sustainability area in HEIs are at risk, namely the initiatives on HEI campuses, for example, making infrastructures more efficient.

Sustainability initiatives in education, research, operations and the external community could help HEIs to respond to a number of challenges such as attracting funding, reducing costs, promoting more effective management, and meeting societal challenges. A holistic sustainability vision will respond to the needs of the community and companies, as the region and the HEI themselves become increasingly attractive to students.

Finally, raising more funding, attracting more students, transferring knowledge, promoting quality and excellence, and increasing the internationalization of HEIs seem to be the most prominent issues for the future of Portuguese HEIs. However, none of the above will be possible unless the leaders of HEIs and the main stakeholders are committed to participating in a strategic plan for organizational change, balanced stakeholder expectations and HEIs goals – institutional commitment.

Regarding governance and sustainability in HEIs, Horizon 2020 (European Commission, 2015) is an important financial instrument for the sustainability of HEIs and, in conjunction with their (internal and external) stakeholders, they should be made aware of the need to harness this instrument for the systematic promotion of sustainability in HEIs. This instrument could serve two purposes: to support the implementation of sustainability in HEIs and also address the constraints identified in relation to conducting research, improving infrastructure and the development of new skills in their employees and students.

The paper has one main limitation: the convenience sample does not allow the results to be generalized to the Portuguese Higher Education system as a whole. This exploratory study should be seen as a first step in a large set of other studies assessing the implementation of HESD in Portugal. Future studies should consider all or a representative sample of Portuguese HEIs, as well as information for a more quantitative analysis. The results of the present study should be seen as an input for future and more holistic studies.

Further research should be done to identify sustainability practices already being implemented in Portuguese HEIs, particularly taking into account: (a) the four pillars of sustainability (economic, environmental, social, and institutional; Waas *et al.*, 2011) and (b) the core activities of HEIs (education, research, operations and community engagement; Fischer *et al.*, 2015).

CHAPTER 3

UN Decade of Education for Sustainable Development: Perceptions of Higher Education Institution's Stakeholders

Reference: Aleixo, A.M., Azeiteiro, U. & Leal, S. (2017). UN Decade of Education for Sustainable Development: Perceptions of Higher Education Institution's Stakeholders. In W. Leal Filho, U.M. Azeiteiro, F. Alves, P. Molltan-Hill (Eds.), *Handbook of Theory and Practice of Sustainable Development in Higher Education* (Volume 4, pp.417-428, in the series "World Sustainable Development Series). Berlin: Springer. DOI 10.1007/978-3-319-47877-7. Available at: https://link.springer.com/chapter/10.1007/978-3-319-47877-7_28

Abstract

The purpose of this study is to investigate how the main stakeholders of Portuguese Higher Education Institutions (HEIs) perceive the commitment of HEIs related to: (a) teaching sustainable development (SD) across all courses, (b) encouraging research and dissemination of SD knowledge, (c) implementing green campuses and supporting local sustainability efforts, and (d) engaging and sharing information with international networks (as defined in Higher Education Sustainability Initiative, United Nations).

Through a qualitative approach (semi-structured interviews and content analysis), we explore the perspectives of twenty stakeholders from four Portuguese public HEIs (leaders, faculty, staff, students, and external stakeholders).

The results show that all stakeholders see teaching SD across all courses as a necessity, but they have different visions about how to implement it. Concerning the research and dissemination of SD knowledge, they defend that both should be encouraged and transversal to all HEIs. About implementing green campuses and supporting local sustainability efforts, stakeholders agree that is important, but the practical results, in the Portuguese HEIs analyzed, fail to achieve an acceptable degree. As a long-term objective, the motivation for engaging and sharing information with international networks is latent.

Keywords *UN Decade of Education for Sustainable Development, Education for Sustainable Development, Sustainability, Portuguese Higher Education Institutions*

1. Introduction

The focus of the UN Decade of Education for Sustainable Development (UN-DESD) is "a world where everyone has the opportunity to benefit from education and learn the values, behaviour and lifestyles required for a sustainable future and for positive societal transformation" (UNESCO, 2005a, p. 11). To help reach these goals, Higher Education Institutions (HEIs) must contribute for Education for Sustainable Development (ESD) and learn with the participation of its main stakeholders.

At the end of UN-DESD (2005-2014), it is pertinent to assess if Portuguese HEIs are implementing practices that promote Sustainable Development (SD), namely those that are seen as "good practices" (UNESCO, UN-DESA, UNEP, Global Compact, and UNU). These good practices are promoted by international initiatives (for example, the Higher Education Sustainability Initiative) and can be looked upon as a guide on what HEIs should do. Such initiatives help to achieve the UN-DESD (2005-2014) objectives.

This work explores the perceptions that key stakeholders have about the importance of SD integration in HEIs' systems regarding the following aspects: (a) teaching SD across all disciplines of study, (b) encouraging research and dissemination of SD knowledge, (c) implementing green campuses, (d) supporting local sustainability efforts, and (e) engaging and sharing information with international networks. HEIs have a role to play in achieving "The future we want" (United Nations, 2012) during the next decade (2014-2025). As stated by Beynaghi *et al.* (2014), the UN-DESD should continue after completion of the initial decade (2005-2014). Therefore, this study intends to assess if the stakeholders consider the main areas of intervention of HEIs in the domain of SD pertinent, and reflects on how SD can be implemented in Portuguese HEIs.

The relevance of this work is based on the fact that empirical knowledge in this field in Portuguese HEIs' context is scarce (Aleixo *et al.*, 2016). A qualitative analysis was conducted through semi-structured interviews. The sample embraces twenty stakeholders of four Portuguese HEIs, including leaders, faculty, staff members, students, and members of society.

This paper is a part of an ongoing, cross-sectional research project that aims to investigate: (a) the amount of SD practices formally communicated in the websites of the Portuguese HEIs (Aleixo *et al.*, 2016), (b) the stakeholders perceptions about the conceptualization of SD, Sustainable Higher Education Institutions (SHEIs) and the role of HEIs in the promotion of SD, as well as about the barriers, challenges, and drivers to SD in HEIs, (c) the SD practices adopted and implemented in the Portuguese HEIs.

With this in mind, we structure the paper as follows. We start by clarifying the importance of the UN-DESD in HEIs, then we define who the main stakeholders in HEIs are, and later we reflect on ways of integrating SD in HEIs. In the end, we present the main conclusions, the study's limitations, and suggest avenues for future research.

2. Theoretical Framework

2.1 The Decade of Education for Sustainable Development in HEIs

As stated by UNESCO (2005b, p. 27) "Education is held to be central to sustainability". In this context, the UN-DESD has seven strategies to achieve it, which are the following: (a) vision-building and advocacy, (b) consultation and ownership, (c) partnership and networks, (d) capacity-building and training, (e) research and innovation, (f) use of Information and Communication Technologies (ICTs), and (g) monitoring and evaluation (UNESCO, 2005b, p. 17).

Recognizing the role of education in the change of mentalities and attitudes related to SD, the United Nations General Assembly, in December of 2002, adopted the Resolution 57/254, and from there started the UN-DESD for 2005-2014 (Wals, 2014). As stated by Wals (2014, p. 8) "the DESD seeks to provide an opportunity to promote a vision of a more sustainable and just global community through different forms of education, public awareness and training activities".

For UNESCO (2006), Higher Education has a particular role in the promotion of SD through learning, research, and leadership. In this context, "higher education should emphasize experiential, inquiry-based, problem-solving, interdisciplinary systems approaches and

critical thinking. Curricula need to be developed, including contents, materials and tools such as case studies and identification of best practices" (UNESCO, 2006, p. 23).

As stated by Sammalisto *et al.* (2015), the role of HEIs in ESD has been encouraged by several declaration and initiatives. Amongst these initiatives and declarations, we could list the following: The Higher Education Sustainability Initiative, the Rio+20 Treaty on Higher Education, Talloires, Earth Charter, and the Declaration of University Leaders for a Sustainable Future.

As stated by Leal Filho (2015, p. 4), ESD is the "Educational process characterized by approaches and methods aimed at fostering awareness about the issues pertaining sustainable development". Moreover, this process is not only about environmental issues but — through interdisciplinary thinking — it is also about social, political, economic and ecological issues.

2.2 Main stakeholders for the ESD in HEIs

There are several stakeholders that can influence the ESD, namely: faculty, staff, leaders, students, and external stakeholders. The faculty and staff are the changeable agents who can and will engage in the ESD (Sammalisto *et al.*, 2015). Additionally, leaders, faculty and staff are the stakeholders who could improve the ESD in HEIs' activities (Sammalisto *et al.*, 2015). In the campus context, there was an increased participation of students in environmental initiatives (Figueredo & Tsarenko, 2013) and, consequently, students are also SD key stakeholders (Nejati & Nejati, 2013). External stakeholders are equally relevant regarding the ESD because HEIs establish partnerships with them for research, services, and regional development.

2.3 Integration of SD in HEIs

Several authors defend the integration of SD into HEIs' systems (for example, Alonso-Almeida *et al.*, 2015; Cortese, 2003; Disterheft *et al.*, 2013; Jorge *et al.*, 2015; Kościelniak,

2014; Leal Filho, 2011, 2015; Lozano, 2010; Nejati & Nejati, 2013; Waas *et al.*, 2010). Several authors claimed this integration into the whole system: curricula (education), research, campus operations, community outreach and partnerships, and assessment and reporting. As stated by Alonso-Almeida *et al.* (2015) the development of SD in HEIs means not only statements but also actions. Cebrian, Grace, e Humphris (2015) advocate the connection of the whole system and not its compartmentalization.

For Sibbel (2009, p. 75) the challenge for HEIs is to redesign curricula to "prepare graduates with the necessary knowledge and values, a capacity for critical thinking and the motivation to deal with the multitude of diverse problems associated with non-sustainable states". Several authors defend the integration of the SD concept in the curricula for the development of new skills, values, attitudes and competencies (e.g., Popescu & Beleau, 2014). In this context and as stated by Jorge *et al.* (2015) the integration of operations and curricula should be integrated into mainstream HEIs.

Wyness e Sterling (2015) argue that the curriculum review needs to undertake the agenda of sustainability in HEIs. For the authors, this happens if there is an institutional commitment, staff knowledge, and motivation. According to Lozano (2010) the introduction of the SD concept in the curricula could help HEIs to develop a further balanced academic system in synergistic, interdisciplinary and holistic terms, thus increasing the probability of students participating in the construction of a more sustainable society.

For Waas *et al.* (2010), the research on SD should have various levels (from the local to the global scale), various time perspectives (from the short to the long term), different SD dimensions (economic, environmental, social and institutional), and all the academic group should share full responsibility. HEIs have the responsibility to encourage SD research and the development of new tools and models for a SD world (for example,Popescu & Beleau, 2014).

Regarding community outreach and partnerships, one must consider the relationships between HEIs and enterprises and other institutions. Alonso-Almeida *et al.* (2015)

identified HEIs' contributions to the social and economic development of the community as engagement or outreach.

For Jongbloed *et al.* (2008) there are three institutional barriers which interact with HEIs: (a) the determination of the research agenda and education offering; (b) the internal reward structure, and (c) the lack of an entrepreneurial culture. As stated by Jongbloed *et al.* (2008), despite the continued lack of knowledge about what HEIs can provide to enterprises, the development of these partnerships can result in new research, development of new products, relationship strengthening, obtaining patents, and solving technical problems. These partnerships with enterprises intend to obtain funds for research (equipment, human resources, and others) and to enable research testing (Jongbloed *et al.*, 2008). Besides these aspects, partnerships, services and collaborations with the community also represent improved relationships with local authorities and civil society.

In what concerns assessment and reporting, Alonso-Almeida *et al.* (2015) argue that only some HEIs publish sustainability reports under the Global Reporting Initiative (GRI) Framework. Several authors argue about the scarce HEIs' reports regarding SD (for example, Alonso-Almeida *et al.*, 2015; Disterheft *et al.*, 2013). Nevertheless, Alonso-Almeida *et al.* (2015) report the importance of GRI framework in terms of social impact.

In the campus context, and about the integration of SD in HEIs, Krizek, Newport, White, e Townsend (2012) suggest four campus phases: (a) grassroots, (b) executive acceptance of the business case for sustainability, (c) visionary campus leaders, and (d) fully self-actualized and integrated campus community. In this scope, the social changes are identified by Stephens *et al.* (2008) regarding three different levels: (a) strategic; (b) tactical and (c) operational. The first refers to the definition and development of a strategic societal vision and long-term goals, the second to coalitions and cooperation among stakeholders, and the third to the implementation of changes through the curricula, research, campus operations and societal teaching for specific challenges.

3. Methods

3.1 Research questions

The study's aims were achieved through a qualitative research design. As an instrument of data collection, semi-structured interviews were used. The interviews were designed to measure the stakeholders' understanding and concerns about several activities and practices for SD in HEIs: (a) teaching the concepts of SD, (b) encouragement of research on SD issues, (c) green and environmentally friendly campuses, (d) cooperation between HEIs, local authorities and civil society to promote more sustainable communities, and (e) committing to results and actions through international structures. The interview guide is in Table 12.

Table 12 – Interview Guide

1. Do you consider that HEIs should teach the concepts of sustainable development to undergraduates and/or graduates (master's, doctoral) of its various faculties/schools? If yes: a. Why? b. How should this be formalized/implemented?
2. Do you consider that HEIs should encourage research on sustainable development issues? a. How can this be implemented or encouraged?
3. Do you consider that HEIs should implement efforts to make the campuses greener, e.g., environmentally friendly? a. How could this be implemented or encouraged? b. Should these decisions be centralized or decentralized?
4. Do you consider that HEIs should work with local authorities and civil society to promote more sustainable communities? a. In your institution's context in what way could this be implemented? b. Who should take this initiative?
5. Do you consider that HEIs must commit to results and actions through international structures? a. What are the benefits that might arise from this involvement?
6. In addition to the above, what other practices or measures could be implemented by Portuguese HEIs in order to promote sustainable development and/or become sustainable HEIs?

3.2 Sample and procedures

In Portugal there are 34 public HEIs (of which 20 are polytechnics and 14 universities). For this study's purposes, four HEIs were selected (the University of Aveiro, the University of Coimbra, the Polytechnic Institute of Leiria, and the Polytechnic Institute of Santarém). We opted for a convenience sample due to: (a) easier access to the required stakeholders for intervening, and (b) geographic proximity. In each HEI, we interviewed five stakeholders (one leader, one faculty member, one staff member, one student, and one external stakeholder), involving a total of 20 individuals. As Fridlund and Hildingh pointed out (cited by Bengtsson, 2016, p. 10), "in qualitative studies, it is common that data are based on 1 to 30 informants".

All participants were invited to participate in the study through personal contacts and email messages. Each respondent was interviewed once, through a face-to-face interview. All interviews were audio-recorded after obtaining written consents.

A content analysis methodology was used for the interviews. The data was analysed by implementing the four main stages identified by Bengtsson (2016): decontextualisation, recontextualisation, categorisation, and compilation. As suggested in the literature, each stage was repeatedly performed to maintain the quality and trustworthiness of the analysis.

4. Discussion

The following sections present the analyses of the data and are organized according to the questions asked in the interview process.

4.1 Teaching the concepts of SD

Regarding the teaching of SD in HEIs' curricula, all respondents agree about its importance (N=20). Some of the interviewers also referred the need of teaching this subject in the

context of families, in the lower levels of education, and throughout life. As a faculty member said: “You have to be involved in everything. Moreover, it has to begin at home with the parents when the children are born and afterwards in pre-school, primary school and so on” (F_1).

In what concerns the best way to teach SD concepts, one staff member mentioned “We should teach and acquire a base knowledge of what SD is, how the first foundations for participatory citizenship and responsibilities should be. However, these questions could be diluted in different subjects, not only in a specific topic about SD” (Stf_4). In this context, some respondents referred to SD as a topic that should be introduced in curricula in a transversal way. One staff member said “A university does not only have a formal curriculum, and it does not only have the mission of giving formal education. It should also educate citizens and adults. It is the university’s civic spirit. In a less formal sense, the word sustainability has always to be there. Not always in a specific technical way, or in a particular technical area, but in a transversal way” (Stf_2).

Other stakeholders, namely external stakeholders and leaders, also agree about the introduction of SD in courses and disciplines in a transversal way. An external stakeholder said: “I think that this should be transversal to all courses. It is this culture that has to be transmitted from kindergarten to higher education, where obviously it needs to be adapted to each domain, but that is transversal to all the university’s domains” (Es_2). For a leader, “Sometimes we might not be able to justify changing a certain curricular course specifically to teach SD. However, in other cases, we can justify it. It all depends on the courses. Nevertheless, the concept should be transversal to all curricular units, all the courses, all education levels” (L_4).

Students and faculty members defend that SD should be taught through concrete actions. For a student, practice is the best way to achieve SD goals: “I think that the best way to implement these new ideas (…) is to put them into practice” (Sdt_4). A faculty member defends this same view: “Each course should include practical actions that could involve the students’ participation” (F_4).

The common idea to all respondents is the importance of introducing SD in all courses and subjects in a transversal way, not only theoretically, but also through practical actions on campus.

4.2 Encouragement of research on SD issues

This section addresses the importance of research on SD topics. As with education, all respondents agree on the promotion of SD issues (N=20). However, for some respondents, research should be done in all study areas, while for others there are subjects where it is more pertinent to investigate the topic than others. For instance, social sciences, engineering, and environmental areas are the ones more often mentioned. Other respondents mention that, taking into account the new framework of Horizon 2020 (European Commission, 2015), the research on SD is critical and almost mandatory.

The main stakeholders agree on the need to do research in a strategic way and involving partnerships within the community, namely with companies. A faculty member: "HEIs should promote the investigation of SD issues, namely through synergies with the business community, and also promote partnerships with universities, NGOs and the business community" (F_4). For a staff member: "HEIs should, without a doubt, take care to encourage research on SD issues, and we do not need leaders to do it, because all financed projects have, at the moment, that component. For example, Horizonte 2020 has what it is called the "Cross-cutting issues", the so-called transversal themes, and SD is transversal. It fits everything" (Stf_3).

Despite the importance given to interdisciplinarity in recent times, there are constraints related to the change of mentality. Many of these constraints are associated with some professors who do not conceive this relationship, particularly when it comes to expanding the role of SD in society. Some professors express difficulties in understanding the need for promoting SD in all courses and training areas. Therefore, attitudes can condition such joint actions on behalf of SD and on behalf of the creation of HEIs that are sustainable and more open to society.

4.3 Green and environmentally friendly campuses

When asked about the necessity for green and environmentally friendly campuses, all respondents considered that HEIs must have this concern (N=20). The interviewees reported different practices and initiatives that SHEIs could implement. However, the practices listed and considered as significant by stakeholders, in the majority of cases, were not sufficiently developed. Stakeholders believe that the encouragement for sustainable campuses should come from above and be centralized in all schools, as in these examples:

- "There must be a strategy coming from the central services and the responsibility to implement it should be given to the organic units", a staff member said (Stf_4).

- "Yes, I think that the responsibility and the coordination of initiatives should come from the central services, but each department should be given the autonomy to implement them and to motivate all stakeholders", said a student (Sdt_1).

Respondents agree with the initiative, mentioning the cost savings that this could bring. An external stakeholder, for example, says that "with the development of our society it is fundamental to adopt SD practices to sustain our planet, and this will be very important in the medium and long term where there is a need to have these worries. Moreover, I can say that the majority of these worries are compatible with economic development. "If I save energy, reduce waste production and water waste, I am lowering costs of my business" (Es_3). "The interaction with the natural environment is not a cost, it is an investment", said a faculty member (F_4).

There seems to be a tendency for believing that the adoption of green and environmentally friendly campuses result in cost savings. However, the lack of action regarding these initiatives is equally noted, and it is justified by the lack of financial and human resources.

4.4 Cooperation between HEIs, local authorities and civil society to promote more sustainable communities

The respondents agree about the need of cooperation between HEIs, local authorities, and civil society regarding SD. When questioned about who should take the initiative, most interviewees stated that any of those parties can take the first step (N=13). For a faculty member, “We all have to take the initiative as soon as we see the opportunity. Also, when we see an opportunity or a problem that needs to be solved, we can’t wait for others.” (F_1). For a staff member: “All can take the initiative. The initiative can come from stakeholders or from institutions, to raise awareness, to encourage, to show a more efficient solution in a sustainable point of view.” (Stf_4).

However, two interviewees (N=2) reported that the initiative should come from HEIs, and one other believes that it should start in local and/or civil authorities. One leader mentions, “I think that universities should have the initiative as much as possible” (L_2).

4.5 Commitment to results and actions through international structures

Regarding the commitment of HEIs through international structures, all sample (N=20) agrees about its importance. However, the respondents also referred that this commitment should be translated into day-to-day practices and not only into signed documents.

The various stakeholders mentioned the advantages of joining these structures. They can benefit from the network, as well as from the positive image they share and from the benchmarking of best practices.

As stated by an external stakeholder “I think that the interchange of experiences, ideas and concepts brings us closer to our goals” (Es_1). Moreover, for a leader, “I think that we can have access to good practices in international terms. We learn a lot with benchmarking, so all this sharing between HEIs is always very important. Because many times, it is with the knowledge of other realities that we can progress in our institution” (L_3).

As argued by Leal Filho, Manolas*, et al.* (2015) the exchange of experience at an international level is very important. The international organizations and rules "can be used as anchors eliciting action by constituencies" (Leal Filho, Manolas*, et al.*, 2015). Moreover, as proposed by Kamal e Asmuss (2013), benchmarking can be a tool for assessing and tracking sustainability in HEIs, and also a way for HEIs to learn how to implement it.

5. Conclusion

We first conclude that SD is recognized as being very important to HEIs and society, but it still has not yet entered HEIs' system and activities, as other studies already pointed out (Aleixo *et al.*, 2016; Kościelniak, 2014). The interviewees agreed about teaching the concept of SD, encouraging SD issues research, green and environmental friendly campuses, cooperation between HEIs and local authorities and civil society, and their commitment to results and actions. Despite all stakeholders being unanimous in accepting the importance of the ESD, in the opinion of the interviewed stakeholders, there are no formal and strategical declarations encouraging its implementation. In practice, there does not seem to exist many initiatives in HEIs, except for research and community outreach through partnerships and development services to companies and institutions. This evidence might be explained by financial necessity, and by the emphasis on funded projects related to the societal issue. The introduction of the SD concept in the curriculum and the development of initiatives on campuses could allow further integration of the concept in the regular activities of the Portuguese HEIs.

Faced with the new UN-DESD (2014-2025) it becomes essential to identify HEIs' strategies regarding SD. It is essential to introduce SD in HEIs, in all activities, through a "top down" process, starting with planned activities from the governing body, and then involving all stakeholders.

This research contributes to a better understanding of what some Portuguese HEIs are doing in what concerns SD education. It has no pretension to represent the institutional

view of the HEIs considered in the sample regarding the theme, and even less the Portuguese panorama about it.

The paper has two main limitations. Firstly, the study can suffer from social desirability bias because the interviewees might have felt impelled to answer what they consider to be the "right answer" (that is, what is socially expected), instead of what they effectively think. This problem can occur with higher probability with leaders and faculty members. Future studies might ask about what is already being done in HEIs concerning SD issues, and ask for evidence. Secondly, the convenience sample does not permit the generalization of results to all the Portuguese higher education system. Future studies should consider all Portuguese HEIs, or a representative sample of it, as well as information that could be analysed in a more quantitative way. The results of the present study should be seen as an input for future, and more holistic studies.

CHAPTER 4

The Implementation of Sustainability Practices in Portuguese Higher Education Institutions

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Abstract

Purpose – The main aim of this work is to analyze the current state of implementation of sustainability development (SD) in Portuguese Higher Education Institutions (HEIs).

Design/methodology/approach – A questionnaire was developed to measure the level of implementation of SD practices in HEIs as well as the number of rankings, certifications, declarations of these institutions. The questionnaire was sent by e-mail to all rectors, presidents, directors of faculties, departments and schools of Portuguese universities and polytechnics. A sample of 53 leaders was obtained.

Findings – Portuguese HEIs are mainly engaged in the social dimension of sustainability. The economic dimension emerges in second place and the institutional in third; the environmental dimension is the least developed. Except for a few specific topics (e.g., related to research on SD, and the offer of degree courses in SD), there are no significant differences between universities and polytechnics in the implementation of SD practices. Only 11% of HEIs are innovators in the implementation of SD practices, and the majority of HEIs have implemented less than 34% of the SD practices studied.

Research limitations/implications – This research has a national scope and the results should be interpreted only in the Portuguese context. Future studies should include a larger range of institutional actors within the faculty.

Practical Implication – This study provides valuable insights and theoretical and methodological guidance for future implementation processes supporting the transition to sustainability in HEIs.

Originality/value – This is the first study conducted in Portuguese HEIs with the aim of determining their efforts to implement and promote sustainability.

Keywords Sustainable Development; Higher Education for Sustainable Development; Sustainability Higher Education Institutions; Whole institution approach; Leadership for sustainability; Portugal

Paper type Research paper

1. Introduction

In the last decades, the number of initiatives, charters and declarations to promote Sustainable Development (SD) has significantly increased (beginning in 1972 with the Stockholm Conference (UNEP, 1972). The role played by Higher Education Institutions (HEIs) in the promotion of SD has been recognized as vital (e.g., Lozano, 2006, 2010, 2011; Lozano, Lozano, Mulder, Huisingh, & Waas, 2013). More specifically, they have become more active in education, research, campus operations, community outreach, and assessment and reporting activities (e.g., Cortese, 2003; Lozano, 2006); they have integrated SD dimensions (environmental, social and cultural, economic, and institutional, education and political dimensions) (see for this purpose Aleixo *et al.*, 2016; Lozano *et al.*, 2015) and show increasing commitment to SD (through adhesion to declarations and commitment to charters - agreements and declarations/statements, and effective implementation of initiatives and practices for SD). Lozano (2006, 2010, 2011) and Lozano, Lukman*, et al.* (2013) have long taken an interest in the subject of SD and its implementation in HEIs. HEIs are developing sustainability practices as part of their intervention and Hopwood *et al.* (2005) state that it is essential to map them. However, SD measures can only be fully implemented if SD has been accepted by everyone in the institution (Lozano, Lozano*, et al.*, 2013).

Lozano *et al.* (2015) performed a worldwide survey about the commitment to and implementation of sustainable development in higher education; 80% of their responses were from European HEIs, and most of the professionals that answered the survey came from a network of colleagues interested in implementing SD throughout their HEIs. Jorge *et al.* (2015) studied the perceptions of rectors, senior management faculty and administrative staff about the implementation of sustainability practices in Spanish universities (a similar geographical and historical-cultural context to this study). Lozano *et al.* (2015) and Jorge *et al.* (2015) pointed out the need to study this issue in other national contexts (notably Portugal), and to include not only rectors and senior management in surveys but also other middle management staff at HEIs, such as directors of departments,

faculties or schools, in both universities and polytechnics. Following the four essential SD dimensions (Aleixo *et al.*, 2016; Lozano, 2011) is also an innovative approach to studying SD practices that complements studies addressing the traditional SD areas (e.g., education, research, campus operations and community outreach).

The purpose of this study is to fill the research gap on the perceptions of leaders of Portuguese universities and polytechnics in relation to SD initiatives, projects and practices implemented in their institutions. Taking into account the growing interest of HEIs worldwide in SD, the research question is: Are Portuguese universities and polytechnics implementing SD practices? This work is the first attempt to fill this gap in the literature in the Portuguese context.

This research that is aligned with the work of Lozano *et al.* (2015) and Jorge *et al.* (2015) has the following main objectives: (1) to describe the degree of implementation of sustainability practices in Portuguese HEIs in the environmental, economic, social and institutional dimensions of SD; (2) to analyze whether there are differences between the implementation of SD practices in polytechnics and universities; (3) to examine any differences between the implementation of SD practices reported by rectors/presidents (central services) versus directors of departments, faculties or schools (decentralized services); (4) to identify the rankings, certifications and declarations in the SD domain adhered to by Portuguese HEIs; and (5)to study the stage of SD implementation in Portuguese HEIs.

Regarding the research specifically on Portuguese public HEIs, the findings contribute to a better understanding of sustainability projects, practices and strategies implemented by Portuguese HEIs, and also provide a better understanding of the stage of SD implementation in these institutions. In addition, they will allow SD practices in Portuguese public polytechnics and universities to be compared as well as those of central and decentralized services.

2. Theoretical background and literature review

2.1 Implementation of SD in HEIs

In the last few years, some relevant studies have been conducted on HEIs' engagement in implementing SD practices (Cebrian *et al.*, 2015; Hancock & Nuttman, 2014; Sammalisto *et al.*, 2015; Too & Bajracharya, 2015). There are also examples of SD practices in different dimensions (e.g., environmental, economic, social and institutional) worldwide, and integrated in the core activities of HEIs (e.g., education, research, operation, commitment engagement and governance/culture (Fischer *et al.*, 2015).

With regards SD in HEIs, while some researchers claim that SD is implemented in all HEI systems (Cortese, 2003; Lozano, 2006; Lozano, Lukman*, et al.*, 2013), it is recognized that a holistic approach has not been taken because actions have been compartmentalized and applied in only one or two dimensions of the education system (Lozano *et al.*, 2015).

2.2 Dimensions of SD in HEIs

Three pillars of dimensions of SD have been identified in the literature (e.g., Amaral *et al.*, 2015; Godemann *et al.*, 2014; Sammalisto *et al.*, 2015; Waas *et al.*, 2011): economic, social and environmental. However, it is increasingly common to find other SD pillars, notably institutional (e.g., Disterheft *et al.*, 2013; Leal Filho, Manolas*, et al.*, 2015; Lozano, 2008) and cultural (e.g., Disterheft *et al.*, 2013; Leal Filho, Manolas*, et al.*, 2015; Lozano, 2008). Meanwhile, four dimensions of SD have also been proposed for sustainability practices and the implementation of SD in HEIs (e.g., Aleixo *et al.*, 2016; Alonso-Almeida *et al.*, 2015; Jorge *et al.*, 2015; Lozano, 2011), more specifically, environmental, economic, social/cultural, and institutional/educational/political.

The economic dimension of SD involves economic viability and addresses economic needs (e.g., concern about economic performance, plans to improve energy efficiency and budget for practices promoting SD). The environmental dimension of SD proposes the integration of environmental concerns into the organization's strategy (e.g., construction of sustainable buildings on campus, separation of waste and its forwarding for recycling, and

equipment to generate renewable energy). The social and cultural dimension of SD refers to actions either by an organization's human resources or the surrounding community (e.g., policies promoting equality and diversity, developing and participating in recreational, cultural or sports activities, concerns and initiatives for social inclusion, and cultural or scientific initiatives targeting the outside community). The institutional, educational and political dimension of SD refers to how institutions shape their behavior and values, and how different stakeholders perceive the approach to and objectives of SD (e.g., SD included in the HEI mission, vision and values; concern with ethical issues; and HEI has curricular units on SD). Table 13 summarizes the main SD practices in HEIs.

Table 13 – Dimensions and practices of sustainable development in HEIs

Dimensions	Practices
Environmental	Declarations and actions related with HEIs' involvement in environmental issues and resource scarcity (environment and management of natural resources; prevention of pollution; protection of environment and biodiversity; restoration of natural habitats; ecological footprint; non-renewable resources; depletion of materials; degradation).
Economic	Declarations and actions related to the direct economic impact and financial sustainability of HEIs (financial situation; results; efficiency).
Social/Cultural	Declarations and explanations on policies and procedures concerning human rights (labor practices and decent work; human rights; quality of life, occupational health and safety; the equity dimension; training of employees, involvement in social issues and action within HEI community).
Institutional/Educational/Political	Declarations and statements on the HEI views, values, strategy, transparency in governance and ethical commitments. Also declarations, charters and partnerships on national and international criteria for promoting sustainable development. Practices in education, research, university operations (e.g., certifications), community outreach and assessment and reporting were also considered.

Note: Adapted from Aleixo et al. (2016)

2.3 SD Activities in HEIs

Cortese (2003) refers to four SD activities in HEIs (education, research, campus operations and community outreach, whereas Lozano (2006) proposes the addition of the communication and disclosure of SD practices as a fifth activity (Lozano, 2006, 2011; Lozano, Lozano*, et al.*, 2013; Lozano, Lukman*, et al.*, 2013). This fifth activity involves the HEIs' communication with the different stakeholders through education, research,

operations on campus, community outreach and raising awareness in the community (e.g., evaluation and reports of the SD). The activities related to SD education should include the revision of learning outcomes and curriculum reformulation (Disterheft, Caeiro, Leal Filho, & Azeiteiro, 2016) and the introduction of SD concepts as a subject in the curriculum of all disciplines and courses in HEIs, as well as workshops, conferences and seminars about SD.

The research activities encourage research on SD issues addressing societal challenges, as well as interdisciplinary research groups for a new approach in a sustainable manner (Popescu & Beleau, 2014). On campus activities relate to green campus initiatives and campaigns, with the focus on operational improvements (Disterheft *et al.*, 2016). Community outreach covers activities in which HEIs are involved with regional and local development, and with the civil society to foster a more livable, socially inclusive and resource-efficient environment (Popescu & Beleau, 2014).

2.4 Declarations, assessment tools, certifications and rankings of SD in HEIs

As stated by Jorge *et al.* (2015), HEI leaders should show their commitment to sustainability by signing HEI declarations (e.g., United National Compact – Principles for Responsible Management Education). For White (2013), the sustainability of institutions entails the adoption of measurable and manageable objectives. Sustainability assessment tools (e.g., AASHE – The Association for the Advancement of Sustainability in Higher Education) could play a strategic role in developing a holistic and systemic approach to sustainability, as well as a vital facilitator for the move towards sustainability; they would also provide a normative standard by training the understanding of Sustainable Higher Education Institutions (SHEIs) (Fischer *et al.*, 2015). HEIs could also implement changes in the quality, environment and social responsibility processes, improving their performance, and ultimately obtain certifications, notably: Quality Management Systems (ISO 9001), Environmental Managements Systems (EMS), or Social Responsibility Standards (SA8000 and ISO 26000), or Social Responsibility Standards certifiable in each country and already adopted by some HEIs (see Disterheft *et al.*, 2012). In recent years, there has also been increasing discussion about the importance and contributions of HEI rankings (and how

that can be a distinguishing parameter/or advantage for institutions). As a result, social responsibility, the impact and quality of scientific research, academic excellence and sustainability have become key aspects to distinguish HEIs and determine their prestige. In this regard, the Academic Ranking of World Universities was the first international ranking system dating back to 2003 (Moura & Moura, 2013). Even though there are now over 33 rankings for higher education institutions (Shin & Toutkoushian, 2011), few Portuguese HEIs are found in them. Green Metric, an initiative of the Universitas Indonesia, is the only known ranking for SD (Gómez, Sáez-Navarrete, Lioi, & Marzuca, 2014).

Popescu e Beleau (2014, p. 100) note that there is no single path or instrument in general use for the implementation of SD values or to evaluate the results. They therefore argue that "elaborating unitary models could help improving the effectiveness of university approach for SD, and controlling the implementation of the programs developed at international, regional and national levels".

2.5 Stages of SD in HEIs

Rogers' theory on the adaptation and diffusion of innovation (Rogers, 1995) has been used within the framework of the SD intervention and behavior of the main HEI stakeholders (administrators, faculty and students) namely by Lozano (2006) and Lozano, Lukman*, et al.* (2013). There are five stages of implementing SD (see Lozano, 2006; Lozano, Lukman*, et al.*, 2013): (i) innovators, (ii) early adopters, (iii) early majority, (iv) late majority, and (v) laggards. Assuming that Rogers' theory on adaptation and diffusion of innovation (Rogers, 1995) is a suitable theoretical model for the study of factors influencing the adoption of SD practices in HEIs, and following Lozano (2006) and Lozano, Lukman*, et al.* (2013), we propose an interpretative model for the phases of implementation of SD in HEIs and adjust Rogers' terminology to the different stages or phases of implementation (the five stages are defined in Table 14). Whereas SD is well integrated and developed in HEIs that are in the innovator stage, there is a higher level of resistance to change in the later stages, notably in the late majority and the laggard stages. This categorization was used in a preliminary study by Aleixo *et al.* (2016).

Table 14 –Classification of stages of SD in HEIs based on Rogers' theory

Adopter category	Definition
Innovators	Innovator are willing to take the risk of adopting SD in all the institution's system. Can present themselves as an institution of prestige/quality with a more stable financial situation that conducts more relevant SD research and belongs to a network of HEIs (probably also innovators) interested in the SD area, notably foreign institutions. These HEIs are committed to sustainability on a long-term basis by means of SD policies and projects, certifications and staff dedicated to the area (Leal Filho, 2010). These HEIs adopt most SD practices immediately or as fast as they can (immediate adoption).
Early adopters	Show great resemblance to innovators, but are more discreet in adopting SD in the HEI. Most senior staff of the HEI see SD as very important and strategic, but the urgency in implementing it is less evident. Nevertheless, compared with the following phases, they adopt most of the SD projects and practices in the short-term (short-term adoption).
Early majority	Although the time taken by these HEIs to adopt SD varies, it is significantly longer than the innovators and early adopters. Have some reservations, which only change after knowing the advantages of adhering to SD in HEI. For HEIs in this stage, instrumental reasons are the main motivation to adopt SD practices. HEIs tend to take some time to adopt these practices (medium-term adoption).
Late majority	The HEIs in this phase only adopt an innovation after most HEIs have already adopted it and are very skeptical about innovations. HEIs tend to take long time to adopt these practices (long-term adoption).
Laggards	They are the last to adopt SD. These HEIs typically have an aversion to change and to considering SD important and a priority for their HEI. The principles of SD are not universally understood, there are no significant efforts nor systematic projects to promote SD (Leal Filho, 2010). These HEIs do the minimum related to SD (the last to adopt).

Note: Elaborated with insights from Rogers (1995), Lozano (2006) and Leal Filho (2010).

According to Jorge *et al.* (2015, p. 43), the rectors and senior management of Spanish HEIs do not believe sustainability practices are strongly implemented, and they also suggest leadership plays an important role as a "driver when the leader sees transformation as a way to leave his or her legacy to the organization". Taking the five stages of implementation of sustainability as reference, they state that the sustainability champions are often observed as "innovators". In addition, the results of Aleixo *et al.* (2016) showed that the Portuguese Public HEIs are predominantly in the early stages (laggards and late majority) of SD.

3. Methods

3.1 Survey design and procedures

A questionnaire was developed to collect data from HEI leaders on the implementation of SD practices in their institutions. The HEIs' certifications and declarations on SD matters as well as the international rankings in which they participate were also addressed in the questionnaire.

The first step of the questionnaire design involved an extensive literature review and the study of the previous surveys on the theme (e.g., Disterheft *et al.*, 2013; Fischer *et al.*, 2015; Lozano *et al.*, 2015), with the aim of producing a list of items to assess the implementation of SD practices. The abovementioned four dimensions of SD in HEIs was used as the framework to organize the items (see section 2.2.). The core activities of HEIs (e.g., education, research, operations, and community engagement; Fischer *et al.*, 2015) were also considered in each SD dimension. The main assessment tools for sustainability in HEIs was also considered in this process: (i) AISHE – Auditing instrument for sustainability in higher education; (ii) GASU – Graphical Assessment for Sustainability in Universities; (iii) CSAF – Campus Sustainability Assessment Framework; (iv) STAUNCH – Sustainability Tool for Assessing Universities´ Curricula Holistically; (v) CITE/AMB – Network of Science, Technology Innovation and Environmental Education in Latin America; (vi) DUK – German Commission for UNESCO; (vii) GMID – Graz Model for Integrative Development, and (viii) STARS – Sustainability Tracking, Assessment and Rating System.

The first list of items was reviewed: (a) to minimize redundancies and similar items; (b) to ensure that all relevant practices were considered; (c) to equilibrate the weight of HEIs' different core activities (e.g., traditionally the weight of on-campus practices is higher than the weight attributed to others, particularly education and research activities (Fischer *et al.*, 2015) in each SD dimension.

The survey addressed the following questions:

- The first section sought to determine the practices, initiatives and projects in the environmental dimension and had 13 items. For example, one item: “In my

university, polytechnic, faculty, department or school, there is at least one project that promotes the construction of sustainable buildings on campus". The Cronbach Alpha of this dimension is 0.86;

- The second section sought to determine the practices, initiatives and projects in economic dimension and had 11 items. For example, one item is: "In my university, polytechnic, faculty, department or school, there is at least one project that demonstrates concern about its economic performance". The Cronbach Alpha of this dimension is 0.76;
- The third section sought to determine the practices, initiatives and projects in the social and cultural dimension and had 23 items. For example, one item is: "In my university, polytechnic, faculty, department or school, there is at least one project that fosters the reconciliation of professional and personal life". The Cronbach Alpha of this dimension is 0.89;
- The fourth section sought to determine the practices, initiatives and projects in institutional, educational and political dimension and had 30 items. For example, one item is: "In my university, polytechnic, faculty, department or school, the SD concerns are included in the mission, vision and values of the HEI". The Cronbach Alpha of this dimension is 0.96;
- The fifth section sought to indicate which rankings, certifications and declarations the HEIs had adhered to;
- The sixth section asks for some demographic information about the respondents (e.g., position held, seniority in the position held).

In the first four sections respondents were asked to report the degree to which the practices, initiatives or projects were implemented in the university, polytechnic, faculty, department or school assessed. The five options of response where: (1) not implemented, not designed and not relevant to our HEI; (2) not implemented, not designed but relevant to our HEI; (3) there is at least one project in the SD area, but only in the project stage; (4) there is at least one project in the SD area and it is being implemented; (5) there is at least one project in the SD area and it is already fully implemented.

Cognitive interviews (Miller, 2014) were conducted with ten respondents to pre-test the questionnaire (to get feedback). Cognitive interviews are one of the most recommended pre-testing methods for self-administered questionnaires (Mohorko & Hlebec, 2016). The pre-test sample includes one vice-president, one vice-director, one head of the president's office, one administrator of social service, one director of library services, two research and development technicians, one human research technician, one teacher, and one director of administrative services department. The pretest was conducted face-to-face. After answering the questionnaire, the respondents provided information about the questions (Miller, 2014). The main objectives of the pretest were to identify interpretative errors, analyze the pertinence of the items for HEIs, detect question problems and assess the options of response (from 1 to 5). For instance, it was mentioned that some issues are mandatory for HEIs, e.g. institutional information, accountability, anti-corruption policies; these items were therefore deleted from the questionnaire. The assessment scale was also tested and was improved with the feedback obtained. Following the pretest, the survey was restructured in light of the feedback received. It was then sent to the HEIs. An email invitation was sent to each participant following confirmation of the email address of the institution's leaders (university rectors, polytechnic presidents, and directors of departments, faculties or schools). The first email requesting participation in the study was sent on 1st June 2016. A reminder was sent on 15th June followed by a phone call. On 1st July, a further reminder was sent. This phase was completed between June and July 2016. The questionnaire required approximately fifteen minutes to compete all items. The LimeSurvey software (https://www.limesurvey.org/) was used to develop and administer the questionnaire. Tokens were introduced for each participant to encourage people to answer the questionnaire.

3.2 Sample

According to DGES - Direcção Geral do Ensino Superior (2015), in 2015 the Portuguese network of public HEIs was made up of fourteen universities, twenty polytechnic institutes, and eight Military and Police Higher Education schools. However, this study considered only

the universities and polytechnics; we decided not to include the Military and Police Higher Education schools because they are an HEI subsystem and have specificities that can influence the decision-making loop. Therefore, the questionnaires targeted the leaders of Public Portuguese HEIs (rectors or presidents of each Portuguese public HEIs, and the directors of departments, faculties or schools). The survey was sent to 239 leaders, 34 of whom were rectors or presidents of HEIs and 205 directors of departments, faculties or schools. The sample includes 53 leaders, 18 (34%) of whom are rectors or presidents, and 35 (66%) are directors of departments, faculties or schools (see Table 15). The overall response rate of the study is 22.2%.

Table 15 – Sample distribution

	Rectors or presidents		**Directors of departments, faculties or schools**		**Total**	
	N	%	N	%	N	%
Polytechnics	14	26.4%	22	41.5%	36	67.9%
Universities	4	7.5%	13	0	17	32.1%
Total	18	34.0%	35	66.0%	53	100.0%

3.3 Leaders' seniority

Respondents were also asked about their seniority in the job. The analysis of the HEI leaders' seniority revealed most were in 1 and 5 year group; this applied to both rectors/presidents (N = 10), and directors of departments, faculties, and schools (N = 23).

Table 16 – Leaders' seniority

	Rectors or presidents		**Directors of departments, faculties or schools**		**Total**	
	N	%	N	%	N	%
Less than 1 year	6	33.33%	4	11.43%	10	18.87%
1 a 5	10	55.56%	23	65.71%	33	62.26%
6 a 10	2	11.11%	5	14.29%	7	13.21%
More than 10 years	0	0.00%	3	16.67%	3	5.66%
Total	18	100.00%	35	100.00%	53	100.00%

3.4 Statistical analysis

Descriptive statistics were used to describe the degree of implementation of SD practices in Portuguese HEIs, namely, frequency distribution tables and the mode (central tendency estimate). The Fisher's exact test was used (considering a significance level of 5%) to analyze whether there were differences between the implementation of SD practices by polytechnics and universities, and between the information provided by rectors/presidents (central services) and by directors of departments, faculties or schools (decentralized services).

Two procedures were implemented to study the stage of SD implementation in the Portuguese HEIs. First, scores for the four SD dimensions were calculated through the mean of the responses for each dimension (factor analysis was not used in this procedure due to the small sample size). Second, a cluster analysis was used to "classify" the HEIs in the different stages of SD implementation. The cluster analysis is suitable for this propose because it "classifies objects (e.g., respondents, …) so that each object is similar to others in the cluster based on a set of selected characteristics" (Hair, Black, Babin, Anderson, & Tatham, 2006, p. 559). The cluster analysis was performed with the complete-linkage method and the Squared Euclidean distance (other methods and distance measures were also tested). The number of clusters was obtained from observation of the dendrogram.

4. Results

This chapter is organized in five descriptive sections. The first section presents the results from the implementation of SD practices, initiatives or projects in HEIs according to the four dimensions of SD (environmental, economic, social and cultural, and institutional, educational and political). The second section describes the differences in the implementation of SD between polytechnics and universities. This is followed by the differences between the implementation of SD practices according to rectors/presidents (central administration) and directors of departments, faculties and schools (decentralized services and organizational units) in the third section. Section four describes the adherence

of Portuguese HEIs to international rankings, certifications and the signature of declarations on SD and/or Education for Sustainable Development (ESD). Finally, the last section presents the stages of SD implementation practices in the Portuguese HEIs.

4.1 Implementations of SD practices, initiatives or projects in HEIs

4.1.1. Environmental dimension

Table 17 presents the absolute and relative frequencies of the responses to items related to the environmental dimension. The practice most recognized by respondents as implemented in campus operations is separation of waste and its forwarding for recycling (e.g., paper, plastic, metal, oils, and batteries) with 50.9% of HEIs having implemented it fully. The second most implemented environmental practice/project is the existence of plans to reduce the production of waste (e.g., paper, plastic, metal, oils, batteries), with 28.3% having implemented it fully, and 39.6% in the implementation phase.

The third most implemented practice/project (considering the statistical mode as informant) is the use of energy efficient equipment (e.g., efficient heaters, solar panels, energy saving light bulbs) with 18.9% having implemented it fully, and 34% in the implementation phase.

Regarding practices promoting efficient water consumption (e.g., taps with timer function, flushes with less water, making use of rainwater), 22.6% of the HEIs had already fully implemented them and 34% are in the implementation phase; on the other hand, 37.7% say that this practice is not implemented, not designed but relevant to their HEIs.

Table 17 – Implementation of SD practices, initiatives or projects in HEIs on environmental dimension of SD

Environmental Dimension	1		2		3		4		5		Fisher's Exact Test(*)	
	N	%	N	%	N	%	N	%	N	%	Universities vs. Polytechnics	Central vs. Decentralized services
A1. Promotes the construction of sustainable buildings on campus	5	9.4	17	32.1	11	20.8	10	18.9	10	18.9	0.441	0.991
A2. Promotes the conservation of biodiversity on and around the campus	4	7.5	17	32.1	9	17	14	26.4	9	17	0.960	0.981
A3. Promotes environmental volunteering activities	3	5.7	19	35.8	12	22.6	10	18.9	9	17	0.408	0.039
A4. Promotes the separation of waste and its forwarding for recycling (e.g., paper, plastic, metal, oils, batteries)	1	1.9	4	7.5	6	11.3	15	28.3	27	50.9	0.501	0.603
A5. Makes plans to reduce the production of waste (e.g., paper, plastic, metal, oils, batteries)	1	1.9	11	20.8	5	9.4	21	39.6	15	28.3	0.159	0.501
A6. Promotes practices to reduce water consumption (e.g., taps with timer function, flushes with less water, making use of rainwater)	1	1.9	20	37.7	7	13.2	13	24.5	12	22.6	0.310	0.578
A7. Uses equipment to generate renewable energy (e.g., sun, wind, waves)	4	7.5	21	39.6	9	17	6	11.3	13	24.5	0.230	0.164
A8. Uses energy efficient equipment (e.g., efficient heaters, solar panels, energy saving light bulbs)	5	9.4	13	24.5	7	13.2	18	34	10	18.9	0.872	0.075
A9. Promotes the reuse of materials	3	5.7	18	34	8	15.1	13	24.5	11	20.8	0.291	0.380
A10. Encourages the reduction of greenhouse gases	4	7.5	30	56.6	8	15.1	3	5.7	8	15.1	0.309	0.887
A11. Encourages the use of sustainable transport for commuting to campus (e.g., bicycle, public transport, electric vehicles)	5	9.4	20	37.7	9	17	12	22.6	7	13.2	0.548	0.735
A12. Promotes the use of ecological brands	7	13.2	28	52.8	6	11.3	5	9.4	7	13.2	0.536	0.119
A13. Purchases organic food for on campus preparation	8	15.1	33	62.3	5	9.4	3	5.7	4	7.5	0.566	0.514

Notes: 1 – Not implemented, not planned and not relevant, 2 – Not implemented, not planned but relevant, 3 – Yes there is, but only in the planning phase, 4 – Yes there is, but only in the implementation phase and 5 – Yes there is and it is fully implemented. (*) Exact Sig. (2-sided).

The following practices were mentioned by the majority as not implement, not planned but relevant for HEIs: purchasing organic food for on campus preparation (62.3%), followed by

encouraging the reduction of greenhouse gases (56.6%), promoting the use of ecological brands (52.8%), using equipment to generate renewable energy (e.g., sun, wind, waves; 39.6%), encouraging the use of sustainable transport for commuting to campus (e.g., bicycle, public transport, electric vehicles; 37.7%), promoting environmental volunteering activities (35.8%), promoting the reuse of materials (34%), finally promoting the construction of sustainable buildings on campus and the conservation of biodiversity on and around the campus (both with 32.1%). These results reflect the importance that these themes present for the leaders of the institutions, although they are still not considered strategic.

Lastly, a minority of leaders stated the following were not implemented, not planned and not relevant practices: purchasing organic food for on campus preparation (15.1%) and to promoting the use of ecological brands (13.2%).

4.1.2. Economic dimension

Regarding the absolute and relative frequencies of the responses to the economic dimension (table 18) two practices are most recognized by respondents that have been implemented, namely promoting the provision of services to the community, with 73.6% of HEIs having fully implemented this, followed by the promotion of cost reduction in all activities, with 71.1%. The next two most recognized economic practices are demonstrating concern about their economic performance, with 54.7%, and competing in national and international projects to be self-financed, with 50.9% of full implementation.

The following economic practices are in the implementation phase in the majority of HEIs (and have already been implemented in several HEIs): fostering the management and improvement of processes (43.4% in the implementation phase) and making plans to improve their energy efficiency (34% in the implementation phase).

Regarding practices that promote the purchase of food products from local/regional suppliers, these are fully implemented in 28.3% of HEIs and are in the implementation phase in 22.6% of HEIs; in contrast, 28.3% say that this practice is not implemented, not

designed but relevant to their HEIs, and 13.2% say that this practice is not even relevant for HEIs.

The least implemented economic practices in Portuguese HEIs are: having a budget for practices promoting SD, having a shop/space for the sale of products produced on campus and benefiting from donations and private funding (e.g., Alumni, companies, organizations). For instance, a minority of leaders mentioned that they had not implemented or planned to have a shop/space for the sale of products produced on campus and it was not a relevant practice (22.6%).

Table 18 – Implementation of SD practices, initiatives or projects in HEIs in the economic dimension of SD

Economic Dimension	1		2		3		4		5		Fisher's Exact Test(*)	
	N	%	N	%	N	%	N	%	N	%	Universities vs. Polytechnics	Central vs. Decentralized services
E1. Demonstrates concern about its economic performance	0	0	3	5.7	11	20.8	10	18.9	29	54.7	0.839	0.575
E2. Makes plans to improves its energy efficiency	1	1.9	9	17	10	18.9	18	34	15	28.3	0.969	0.759
E3. Fosters the management and improvement of processes	2	3.8	2	3.8	6	11.3	23	43.4	20	37.7	0.147	0.664
E4. Competes in national and international projects to be self-financed	0	0	8	15.1	6	11.3	12	22.6	27	50.9	0.181	0.670
E5. Promotes the provision of services to the community	0	0	5	9.4	2	3.8	7	13.2	39	73.6	0.234	0.849
E6. Promotes the purchasing of food products from local/regional suppliers	7	13.2	15	28.3	4	7.5	12	22.6	15	28.3	0.125	0.543
E7 Develops supplier selection criteria for the promotion of fair trade	7	13.2	20	37.7	6	11.3	8	15.1	12	22.6	0.434	0.487
E8. Always promotes cost reduction in all its activities	0	0	3	5.7	1	1.9	11	20.8	38	71.7	0.235	0.785
E9. Benefits from donations and private funding (e.g., Alumni, companies, organizations)	8	15.1	22	41.5	8	15.1	9	17	6	11.3	0.004	0.077
E10. Has a shop/space for the sale of products produced on campus	12	22.6	22	41.5	7	13.2	6	11.3	6	11.3	0.332	0.323
E11. Has a budget for practices promoting SD	6	11.3	32	60.4	7	13.2	5	9.4	3	5.7	0.208	0.882

Notes: 1 – Not implemented, not planned and not relevant, 2 – Not implemented, not planned but relevant, 3 – Yes there is, but only in the planning phase, 4 – Yes there is, but only in the implementation phase and 5 – Yes there is and it is fully implemented. (*) Exact Sig. (2-sided)

4.1.3. Social and cultural dimension

Table 19 presents the absolute and relative frequencies of the responses to items related to the social and cultural dimension.

Table 19 –Implementation of SD practices, initiatives or projects in HEIs in the social and cultural dimension of SD

Social and Cultural Dimension	1		2		3		4		5		Fisher's Exact Test(*)	
	N	%	N	%	N	%	N	%	N	%	Universities vs. Polytechnics	Central vs. Decentralized services
S1. Promotes good practices in human resources management	0	0	4	7.5	6	11.3	13	24.5	30	56.6	0.785	0.559
S2. Fosters policies promoting equality and diversity	1	1.9	6	11.3	5	9.4	10	18.9	31	58.5	0.857	0.668
S3. Offers benefits and incentives to employees (e.g. for birthdays)	2	3.8	13	24.5	2	3.8	11	20.8	25	47.2	0.739	0.326
S4. Fosters the reconciliation of professional and personal life	2	3.8	10	18.9	4	7.5	18	34	19	35.8	0.594	0.241
S5. Offers child support systems for employees' children	4	7.5	25	47.2	4	7.5	10	18.9	10	18.9	0.178	0.739
S6. Fosters the professional and personal development and valorization of employees (e.g. vocational training, academic training)	0	0	3	5.7	3	5.7	6	11.3	41	77.4	0.253	0.597
S7. Has a canteen and food service	0	0	1	1.9	1	1.9	3	5.7	48	90.6	0.215	0.803
S8. Promotes initiatives and activities for the development of a healthy lifestyle	2	3.8	9	17	7	13.2	18	34	17	32.1	0.798	0.546
S9. Offers occupational health services (e.g. medical services for all the academic community)	4	7.5	12	22.6	2	3.8	5	9.4	30	56.6	0.467	0.228
S10. Offers student residence services	3	5.7	3	5.7	1	1.9	4	7.5	42	79.2	0.450	0.609
S11. Promotes the employability of students and graduates and insertion in the labor market (e.g. Employment Portal; Services and Office for Work Placements and Professional Guidance)	0	0	1	1.9	3	5.7	13	24.5	36	67.9	1.000	0.923

Social and Cultural Dimension	1		2		3		4		5		Fisher's Exact Test(*)	
	N	%	N	%	N	%	N	%	N	%	Universities vs. Polytechnics	Central vs. Decentralized services
S12. Promotes Ex-Student networks (e.g., Alumni Network; Employment Observatory; Professional Insertion Observatory; Ex-Students Association)	1	1.9	4	7.5	8	15.1	12	22.6	28	52.8	0.609	0,290
S13. Offers financial and non-financial support and incentive programs to students in addition to the standard services	1	1.9	12	22.6	4	7.5	7	13.2	29	54.7	0.545	0.748
S14. Offers student support services (e.g. pedagogical, psychological, student reception and integration support)	0	0	1	1.9	2	3.8	8	15.1	42	79.2	1.000	0.249
S15. Promotes training activities in transversal skills for students, not mandatory in course curricula (Soft skills)	1	1.9	1	1.9	3	5.7	12	22.6	36	67.9	0.411	0.119
S16. Fosters the sharing of installations, facilities and human resources	2	3.8	0	0	2	3.8	8	15.1	41	77.4	0.634	0.296
S17. Promotes cultural or scientific initiatives targeting the outside community (e.g., open day, science week)	0	0	0	0	1	1.9	7	13.2	45	84.9	0.188	0.790
S18. Develops and participates in recreational, cultural or sports activities (e.g. sports events)	0	0	4	7.5	1	1.9	8	15.1	40	75.5	0.667	0.787
S19. Fosters the promotion of the cultural and artistic heritage	1	1.9	1	1.9	4	7.5	11	20.8	36	67.9	0.792	0.414
S20. Has on-campus community vegetable gardens	13	24.5	17	32.1	6	11.3	7	13.2	10	18.9	0.881	0.015
S21. Fosters concern and initiatives for social inclusion	1	1.9	5	9.4	3	5.7	15	28.3	29	54.7	0.199	0.816
S22. Provides suitable access and installations for the disabled	1	1.9	2	3.8	4	7.5	12	22.6	34	64.2	0.749	0.329
S23. Promotes social solidarity initiatives	0	0	2	3.8	6	11.3	11	20.8	34	64.2	0.614	0.956

Notes: 1 – Not implemented, not planned and not relevant, 2 – Not implemented, not planned but relevant, 3 – Yes there is, but only in the planning phase, 4 – Yes there is, but only in the implementation phase and 5 – Yes there is and it is fully implemented. (*) Exact Sig. (2-sided)

Results suggest a high degree of implementation of the SD social and cultural practices with HEIs making a great effort with regards SD. More than 75% of HEIs referred the following

practices as being fully implemented: fostering the professional and personal development and valorization of employees (e.g., vocational training, academic training); having a canteen and food service; offering students residence services; offering students support services (e.g., pedagogical, psychological, student reception and integration support); fostering the sharing of installations, facilities and human resources; promoting cultural or scientific initiatives targeting the outside community (e.g., open day, science week); and developing and participating in recreational, cultural or sports activities (e.g., sports events).

Few practices are mentioned as not relevant for HEIs. Having on-campus community vegetable gardens is the exception and was mentioned by only 24.5% of the HEIs.

4.1.4. Institutional, educational and political dimension

The institutional, educational and political dimension of SD in HEIs included items such as: SD included in the HEIs' mission, vision and values, strategic plans for SD, communicating SD activities, promoting the education of lecturers and professors in SD, and optative or mandatory curricula units on SD. The results of this dimension (Table 20) show great dispersion, with the same item having high levels of implementation in some HEIs and low level/no implementation in others. Nevertheless, the results of Table 20 clearly demonstrate that HEIs are concerned about ethical issues (e.g., code of ethics or code of behavior, ethics commission), and have transdisciplinary research units/centers; both these practices are fully implemented in 54.7% of HEIs. The majority of HEIs also encourage the development of systemic and holistic thinking in teaching and research, these practices are implemented in 50.9% of HEIs. More than 40% of the HEIs fully implement practices related with the inclusion of SD questions in the mission, vision and values of the HEIs (49.1%), offering optative curricular units on SD in some courses (45.3%), having scientific publications in the area of SD (45.3%), including SD concerns in the strategic plans and objectives (43.4%), and offering post-graduations, masters or doctorates in the SD area (41.5%).

The following topics have a lower level of full implementation and yet have implementation percentages above 35%: organizing seminars or workshops on SD (39.6%), conducting R&D projects on SD (39.6%), and communicating SD activities (37.7%).

Next come practices that, although not implemented, not planned but considered relevant by most HEIs, are already implemented or at least in the implementation stage in a considerable number of other HEIs. This is the case of mandatory curricular units on SD in some courses (39.6% not implemented, not planned but relevant/ 34% fully implemented), having degrees in the area of SD (32.1%/28.3%), promoting the development of technologies and registering patents in the area of SD (34%/32.1%), promoting student participation in on-campus SD activities (24.5%/22.6%), SD is taken into account in the institution's quality and evaluation procedures (26.4%/22.6%).

Although not implemented or planned, leaders consider it relevant to have mandatory curricular units on SD in all courses (50.9%) and a department responsible for SD in the organization chart (50.9%). In terms of SD communication, publishing sustainability reports is also considered relevant even though this is not implemented or projected (49.1%). Given the aims of this research and subsequent discussion of results, it should be noted that there were high response frequencies on the not implemented, not planned but relevant option in questions such as optative curricular units on SD in all courses (49.1%), organizing courses in partnership with other educational institutions in the area of SD (45.3%), having an SD research unit/center (43.4%), having human resources whose work is to promote SD (41.5%), developing formal regional, national or international partnerships with a view to promoting SD (39.6%), organizing seminars or workshops on SD (39.6%), conducting projects with other higher education institutions in the area of SD (35.8%), promoting education on SD for teachers (34%), belonging to national and/or international networks for SD (e.g., UES4D), and promoting participation of (teaching and non-teaching) staff in on-campus SD activities .

A minority of practices were considered not relevant for HEIs; these are mainly related with having degrees, curricular units, or research units in the SD area.

Table 20 – Implementation of SD practices, initiatives or projects in HEIs in institutional, educational and political dimension of SD

Institutional, Educational and Political Dimension	1		2		3		4		5		Fisher's Exact Test(*)	
	N	%	N	%	N	%	N	%	N	%	Universities vs. Polytechnics	Central vs. Decentralized services
I1. SD questions are included in the mission, vision and values of the HEI	1	1.9	6	11.3	3	5.7	17	32.1	26	49.1	0.925	0.659
I2. The strategic plans and objectives include concerns about SD	1	1.9	4	7.5	4	7.5	21	39.6	23	43.4	0.670	0.597
I3. Communicates SD activities	1	1.9	6	11.3	8	15.1	18	34	20	37.7	0.900	0.847
I4. Publishes sustainability reports	1	1.9	26	49.1	16	30.2	6	11.3	4	7.5	0.514	0.726
I5. Demonstrates concern about ethical issues (e.g., code of ethics or code of behavior, ethics commission)	1	1.9	6	11.3	4	7.5	13	24.5	29	54.7	0.910	0.538
I6. Promotes education on SD for teachers	3	5.7	18	34	13	24.5	8	15.5	11	20.8	0.947	0.968
I7. Organizes courses in partnership with other educational institutions in the area of SD	4	7.5	24	45.3	9	17	4	7.5	12	22.6	0.835	0.667
I8. There are optative curricular units on SD in some courses	6	11.3	16	30.2	3	5.7	4	7.5	24	45.3	0.123	0.666
I9. There are optative curricular units on SD in all courses	13	24.5	26	49.1	7	13.2	3	5.7	4	7.5	0.407	0.886
I10. There are mandatory curricular units on SD in some courses	6	11.3	21	39.6	5	9.4	3	5.7	18	34	0.546	0.264
I11. There are mandatory curricular units on SD in all courses	17	32.1	27	50.9	3	5.7	4	7.5	2	3.8	0.774	0.978
I12. There are degrees in the area of SD	16	30.2	17	32.1	3	5.7	2	3.8	15	28.3	0.021	0.777
I13. There are post-graduations, masters or doctorates in the area of SD	13	24.5	16	30.2	1	1.9	1	1.9	22	41.5	0.053	0.410
I14. Encourages the development of systemic and holistic thinking in teaching and research	2	3.8	6	11.3	8	15.1	10	18.9	27	50.9	0.608	0.804
I15. Enables students, professors and staff to do exchange programs in the area of SD	6	11.3	15	28.3	6	11.3	9	17	17	32.1	0.218	0.620
I16. There is an SD research unit/center	12	22.6	23	43.4	5	9.4	4	7.5	9	17	0.001	0.639
I17. There are transdisciplinary research units/centers	5	9.4	6	11.3	3	5.7	10	18.9	29	54.7	0.170	0.671
I18. Has scientific publications in the area of SD	8	15.1	13	24.5	4	7.5	4	7.5	24	45.3	0.040	0.525
I19. Organizes seminars or workshops on SD	6	11.3	14	26.4	8	15.1	4	7.5	21	39.6	0.021	0.434

Institutional, Educational and Political Dimension	1		2		3		4		5		Fisher's Exact Test(*)	
	N	%	N	%	N	%	N	%	N	%	Universities vs. Polytechnics	Central vs. Decentralized services
I20. There is a multidisciplinary structure to promote research and education in sustainability	7	13.2	21	39.6	5	9.4	8	15.1	12	22.6	0.016	0.709
I21. Conducts R&D projects on SD	7	7	14	26.4	7	13.2	4	7.5	21	39.6	0.041	0.913
I22. Promotes the development of technologies and registers patents in the area of SD	7	7	18	34	7	13.2	4	7.5	17	32.1	0.004	0.847
I23. Belongs to national and/or international networks for SD (e.g., UES4D)	10	10	17	32.1	8	15.1	7	13.2	11	20.8	0.085	0.931
I24 Has a department responsible for SD in Its organization chart	12	12	27	50.9	6	11.3	4	7.5	4	7.5	0.544	0.792
I25. Its organization chart includes human resources whose work is to promote SD	13	13	22	41.5	6	17	4	7.5	5	9.4	0.666	0.767
I26. Promotes student participation in on-campus SD activities	4	4	13	24.5	11	20.8	13	24.5	12	22.6	0.127	0.648
I27. Promotes participation of (teaching and non-teaching) staff in on-campus SD activities	4	4	16	30.2	8	15.1	14	26.4	11	20.8	0.084	0.744
I28. SD is taken into account in the institution's quality and evaluation procedures	5	5	14)	26.4	12	22.6	10	18.9	12	22.6	0.162	0.582
I29. Conducts projects with other higher education institutions in the area of SD	4	4	19	35.8	6	11.3	11	20.8	13	24.5	0.164	0.281
I30. Develops formal regional, national or international partnerships with a view to promoting SD	4	4	21	39.6	4	7.5	9	17	15	28.3	0.061	0.933

Notes: 1 – Not implemented, not planned and not relevant, 2 – Not implemented, not planned but relevant, 3 – Yes there is, but only in the planning phase, 4 – Yes there is, but only in the implementation phase and 5 – Yes there is and it is fully implemented. (*) Exact Sig. (2-sided).

4.2 Differences between polytechnics and universities in the implementation of SD practices

In the majority of the SD practices, there are no significant differences between universities and polytechnics (see the Fisher's Exact Test on the tables above). However, there are eight practices that emerge with significant differences (p-value<0.05) between institutions, one from the economic dimension and seven from the institutional, educational and political dimension. Table 21 presents the answers for this practices in each kind of institution.

Table 21– Differences between polytechnics and universities in the implementation of SD practices (for practices with significant statistical differences)

SD practices		Type of higher education institution			
		Polytechnic		University	
		N	%	N	%
E9 Benefits from donations and private funding (e.g., Alumni, companies, organizations)	1	5	13.9%	3	17.6%
	2	20	55.6%	2	11.8%
	3	6	16.7%	2	11.8%
	4	3	8.3%	6	35.3%
	5	2	5.6%	4	23.5%
I12 There are degrees in the area of sustainable development	1	14	38.9%	2	11.8%
	2	12	33.3%	5	29.4%
	3	3	8.3%	0	0.0%
	4	0	0.0%	2	11.8%
	5	7	19.4%	8	47.1%
I16 There is a sustainable development research unit/center	1	9	25.0%	3	17.6%
	2	19	52.8%	4	23.5%
	3	5	13.9%	0	0.0%
	4	2	5.6%	2	11.8%
	5	1	2.8%	8	47.1%
I18 Has scientific publications in the area of sustainable development	1	7	19.4%	1	5.9%
	2	11	30.6%	2	11.8%
	3	3	8.3%	1	5.9%
	4	4	11.1%	0	0.0%
	5	11	30.6%	13	76.5%
I19 Organizes seminars or workshops on sustainable development	1	5	13.9%	1	5.9%
	2	13	36.1%	1	5.9%
	3	6	16.7%	2	11.8%
	4	3	8.3%	1	5.9%
	5	9	25.0%	12	70.6%
I20 There is a multidisciplinary structure to promote research and education in sustainability	1	6	16.7%	1	5.9%
	2	17	47.2%	4	23.5%
	3	5	13.9%	0	0.0%
	4	3	8.3%	5	29.4%
	5	5	13.9%	7	41.2%
I21 Conducts R&D projects on sustainable development	1	6	16.7%	1	5.9%
	2	12	33.3%	2	11.8%
	3	6	16.7%	1	5.9%
	4	3	8.3%	1	5.9%
	5	9	25.0%	12	70.6%
I22 Promotes the development of technologies and registers patents in the area of sustainable development	1	6	16.7%	1	5.9%
	2	16	44.4%	2	11.8%
	3	6	16.7%	1	5.9%
	4	2	5.6%	2	11.8%
	5	6	16.7%	11	64.7%

Note: 1 – Not implemented, not planned and not relevant, 2 – Not implemented, not planned but relevant, 3 – Yes there is, but only in the planning phase, 4 – Yes there is, but only in the implementation phase and 5 – Yes there is and it is fully implemented.

It is possible to observe that while universities are already benefiting from donations and private funding, or are in the phase of implementing this kind of project, polytechnics are delaying such projects or are having difficulties in implementing them (some even state that this practice is not relevant). The existence of degrees in the SD area, having a research unit/center on SD, having publications on SD, organizing seminars or workshops on SD, and the development of technologies and the registration of patents in the SD area are implemented much more (or in the phase of implementation) in universities than in the polytechnics. Some polytechnics even state that some practices are not relevant (e.g., 14 polytechnics mentioned that it is not relevant to have a degree in the SD area).

4.3 Differences between the way rectors/presidents (central services) and directors of departments, faculties or schools (decentralized services) interpret the implementation of SD practices

In most SD practices, there are no significant differences between the vision of the central services (rectors or presidents) and that of the decentralized services (directors of departments, faculties or schools). However, there are two practices with significant differences (p-value<0.05), one from the environmental dimension and the other from the social and cultural dimension. Table 22 presents the answers regarding these practices in each level of analysis.

The differences emerge in practices related to the promotion of environmental volunteering activities and the existence of on-campus community vegetable gardens. Although there are significant differences between levels of analysis (centralized *vs* decentralized services), the pattern of responses is irregular. Nevertheless, it is possible to observe that the promotion of environmental volunteering activities is implemented more (or is in the implementation phase) in the departments, faculties or schools. Regarding on-campus community vegetable gardens, the central services of universities/polytechnics mention that this practice is being planned or implemented; however, several departments, faculties or schools are not in that phase and some say it is not relevant (on

the other hand, seven departments, faculties or schools mentioned they had already implemented it).

Table 22 – Differences between rectors/presidents (central services) and directors of departments, faculties or schools (decentralized services) on the implementation of SD practices (for practices with significant statistical differences)

SD practices		Central services (rectors/presidentes)		Decentralized services (directors of departments, faculties or schools)	
		N	%	N	%
A3 Promotes environmental volunteering activities	1	0	0.0%	3	8.6%
	2	7	38.9%	12	34.3%
	3	8	44.4%	4	11.4%
	4	1	5.6%	9	25.7%
	5	2	11.1%	7	20.0%
S20 Has on-campus community vegetable gardens	1	4	22.2%	9	25.7%
	2	2	11.1%	15	42.9%
	3	5	27.8%	1	2.9%
	4	4	22.2%	3	8.6%
	5	3	16.7%	7	20.0%

4.4 Rankings, certifications and declarations

In relation to rankings (Table 23), 43.4% referred that the HEI belongs to some national or international ranking (44.4% for rectors or presidents and 42.9% for directors of faculties, departments and schools). Overall and based on the 23 HEIs that belong to at least one ranking, HEIs belong mainly to the following rankings: U-Multirank (82.6%), Scimago (34.8%), and the Times Higher Education (26.1%).

As for certifications, 20 (37.7%) of the respondents stated that their HEI has at least one certification (Table 24). The Quality Management System ISO 9001 is the most recognized in the certifications listed, with 16 (80%) HEIs being certified. Only a few HEIs have certifications in more specific areas: two HEIs in a Management System for Social Responsibility (NP-4469-1:2008 that take into account the ISO 26000), one HEI in the Environmental Management System (ISO 14001), one HEI in the Food Management

Systems (ISO 22000), and another in the Information Security Management System (ISO 27001).

Table 23 – Rankings

Rankings		N	%
HEI belongs to some national or international ranking	No	30	56.6%
	Yes	23	43.4%
R1 Belongs to the Greenmetric of World Universities (GreenMetric)	No	22	95.7%
	Yes	1	4.3%
R2 Belongs to the Times Higher Educations (THE)	No	17	73.9%
	Yes	6	26.1%
R3 Belongs to the Leiden	No	19	82.6%
	Yes	4	17.4%
R4 Belongs to the Global Research University Profile	No	22	95.7%
	Yes	1	4.3%
R5 Belongs to the Scimago	No	15	65.2%
	Yes	8	34.8%
R6 Belongs to the U-Multirank	No	4	17.4%
	Yes	19	82.6%
R7 Belongs to the Quacquareli Symonds - University World Rankings (QS)	No	21	91.3%
	Yes	2	8.7%
R8 Belongs to the QS World University Rankings	No	20	87.0%
	Yes	3	13.0%
R9 Belongs to the Webmetrics	No	18	78.3%
	Yes	5	21.7%
R10 Belongs to the Shangai Academic Ranking of World Universities (ARWU)	No	19	82.6%
	Yes	4	17.4%

No HEI reported being certified by the following: Graphical Assessment of Sustainability in Universities System; Community Eco-management and Audit Schemes; Monitoring and Evaluation System for Social Responsibility; Energy Management System; and Sustainable Events System or FSC Certification (Forests for all forever).

In addition these certifications, two respondents reported having certification from the Agency for Assessment and Accreditation of Higher Education in Portugal (A3ES).

Table 24 – Certifications

Certifications		N	%
HEI has at least one certification	0 No	33	62.3%
	1 Yes	20	37.7%
C1 Graphical Assessment of Sustainability in Universities System (GASU)	No	20	100.0%
C2 Quality Management System (ISO 9001)	No	4	20.0%
	Yes	16	80.0%
C3 Environmental Management System (ISO 14001)	No	19	95.0%
	Yes	1	5.0%
C4 Community Eco-management and Audit Scheme (EMAS)	No	20	100.0%
C5 Monitoring and Evaluation System for Social Responsibility	No	20	100.0%
C6 Management System for Social Responsibility (NP-4469-1:2008 and/or ISO 26000)	No	18	90.0%
	Yes	2	10.0%
C7 Energy Management System (ISO 50001)	No	20	100.0%
C8 Food Management Systems (ISO 22000)	No	19	95.0%
	Yes	1	5.0%
C9 Sustainable Events System (ISO 20121)	No	20	100.0%
C10 Information Security Management System (ISO 27001)	No	19	95.0%
	Yes	1	5.0%
C11 FSC Certification	No	20	100.0%

Only six HEIs (11.3%; Table 25) signed declarations for SD or EDS. Regarding the declarations presented in the questionnaire, the results showed that only two HEIs (33.3%) belong to the Group of Reflection and Support for Corporate Citizenship (GRACE) and the National Network of Social Responsibility of Organizations (RSO.PT).

Table 25 – Declaration for SD or EDS

Declarations		N	%
The HEI signed at least one declaration for SD or ESD	No	47	88.7%
	Yes	6	11.3%
D1 Signed the PRiME Principles (PRiME)	No	5	83.3%
	Yes	1	16.7%
D2 Belongs to Group of Reflection and Support for Corporate Citizenship (GRACE)	No	4	66.7%
	Yes	2	33.3%
D3 Belongs to National Network of Social Responsibility of Organizations (RSO.PT)	No	4	66.7%
	Yes	2	33.3%
D4 Belongs to Copernicus letter	No	6	100.0%
D5 Belongs to UE4SD	No	5	83.3%
	Yes	1	16.7%

4.5 The stages of SD implementation practices in the Portuguese HEIs

As mentioned in section 3.4, scores were calculated for each of the SD dimensions. A cluster analysis was performed for the four SD scores. Five clusters/groups were extracted through

the observation of the dendrogram, and then compared in terms of implementation practices (Table 26). The Kruskal-Wallis H-test was used to compare the five groups. There are significant differences between groups (p-value<0.05), which suggests a real difference in SD practices implemented in the HEIs' groups.

Table 26 – Groups emerging from the cluster analysis

		Group 1	Group 2	Group 3	Group 4	Group 5	Kruskal Wallis Test
		n=6 (11%)	n=10 (19%)	n=25 (47%)	n=7 (13%)	n=5 (9%)	Asymp. Sig.
Environmental dimension (mean)		3.95	3.96	2.92	2.41	2.31	0.000
Economic dimension (mean)		4.39	3.96	3.35	3.47	2.69	0.000
Social and cultural dimension (mean)		4.70	4.54	4.33	3.65	3.21	0.000
Institutional, educational and political dimension (mean)		4.51	3.46	2.89	3.67	1.77	0.000
Number of fully implemented SD practices in each HEI (maximum: 77)	Mean	52.67	35.70	26.28	24.00	11.40	
	Median	46.50	35.50	28.00	23.00	11.00	
	Mode	40	33	19	8	6	
Number of certifications held by HEIs (*)	0	4	6	14	5	4	
	1	2	3	9	1	1	
	2	0	1	2	0	0	
	3	0	0	0	1	0	
Number of rankings to which HEIs belong (*)	0	1	4	16	5	4	
	1	1	3	5	0	1	
	2	2	2	2	1	0	
	3	0	0	1	1	0	
	4	1	0	1	0	0	
	5	0	1	0	0	0	
	10	1	0	0	0	0	
Number of declarations signed on SD (*)	0	5	10	23	5	4	
	1	1	0	2	1	1	
	3	0	0	0	1	0	
Stage of SD implementation proposed		**Innovative**	**Early adopters**	**Early majority**	**Late majority**	**Laggards**	
Number of Polytechnics		2 (4%)	8 (15%)	18 (34%)	4 (8%)	4 (8%)	
Number of Universities		4 (8%)	2 (4%)	7 (13%)	3 (6%)	1 (2%)	
Number of HEIs centralized services		4 (8%)	3 (6%)	7 (13%)	2 (4%)	2 (4%)	
Number of faculties, schools and departments		2 (4%)	7 (13%)	18 (34%)	5 (9%)	3 (6%)	

Notes: (*) open-ended answers were also considered (e.g., A3ES certification).

In the first group, six (11%) HEIs (four universities, two polytechnics) have already fully implemented a high level of SD practices (on average 52.67 SD practices were implemented out of a maximum of 77 listed). This group of HEIs has the highest levels of SD practices implemented in the economic, social and institutional areas; the environmental dimension also shows a good performance (Table 26 and Figure 3). Five of these six HEIs belong to at least one ranking related with SD. Despite this good performance in SD practices, projects, and rankings, just two institutions have certifications and only one has signed a declaration related to SD. In the group of Portuguese HEIs under analysis, these could be seen as the "innovators" in the implementation of SD practices.

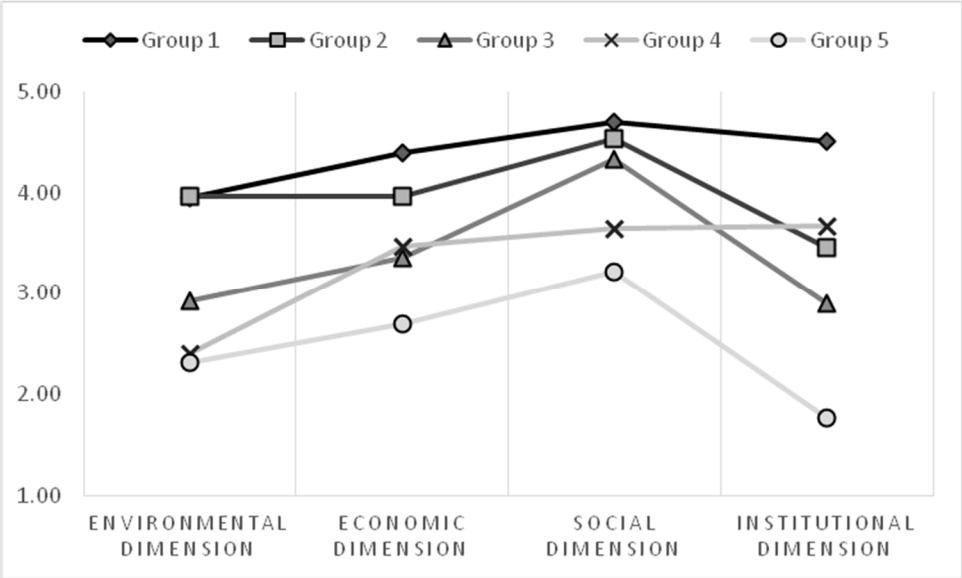
In the second group, ten (19%) HEIs (two universities and eight polytechnics) have fully implemented almost 50% of the SD practices listed. These HEIs show a very good performance in the social dimension, and a good performance in the environmental, economic and institutional dimensions. In this group 40% of the HEIs have at least one certification and 60% belong to at least one SD ranking, but none signed declarations in the SD area. This group could be seen as the "early adopters" of SD practices in HEIs.

In the third group, 25 (47%) HEIs (seven universities and 18 polytechnics) have fully implemented on average 34% of the SD practices listed. In these HEIs, the social dimension is well developed, the economic dimension is reasonably developed, and the environmental and institutional dimensions have considerable weaknesses. Nevertheless, eleven HEIs are certified, nine belong to at least one ranking, and two signed declarations related with SD. This group could be interpreted as the "early majority" in terms of SD implementation practices.

In the fourth group, seven (13%) HEIs (three universities and four polytechnics) have fully implemented about 30% of SD practices listed. This group is similar to group 3 in the performance of the economic and institutional dimensions, but has a poorer performance in the environmental and social dimensions. Two HEIs have at least one certification, two belong to at least one ranking and two signed at least one SD declaration. This group could be interpreted as the "late majority" in terms of SD implementation practices.

In the fifth and last group, 5 (9%) HEIs (one university and four polytechnics) have fully implemented an average of only about 15% of the SD practices listed. This group has the lowest levels of SD practices implemented in all the SD dimensions. The institutional dimension has the lowest level of implemented practices. Out of these institutions, one HEI has a certification, belong to a ranking and signed a SD declaration (which seems a contradiction). In terms of the implementation of the SD practices, these HEIs could be seen as the "laggards".

Figure 3 – Means per group for each SD dimension



The implementation phases of SD practices seem to be independent of the type of institution (university or polytechnic) and independent of the level of analysis (central services versus faculties, departments and schools).

5. Discussion

According to Lukman, Krajnc, e Glavic (2010, p. 621), "the implication of environmental issues has received little or no attention at all, although many universities are monitoring their environmental footprint". In fact, there is still much to be done in the environmental dimension of SD practices. Results indicate that most institutions are starting planning but

only issues relating to waste separation, recycling and waste reduction plans are being fully implemented.

Regarding the economic dimension of SD practices, institutions report practices such as cost-cutting in all their activities, as well as the promotion of increased self-financing through services to the community and competing for national and international projects. Results suggest that institutions are still trying to overcome the financial difficulties faced in recent years, so are strengthening their policy of reducing costs in their activities, and also incrementing and diversifying alternatives to assure economic sustainability, notably promoting fundraising at the national and international level by competing for research projects.

In terms of the social dimension of SD, practices related to the management and valorization of human resources are positive; this is also the case of services (social, cultural and recreational) that the Institutions make available to the academic community and the surrounding communities.

In the institutional dimension of SD, the leaders revealed their institutions have already started to include SD in communications. HEIs seek to communicate SD in institutional terms through their mission, vision and values, strategic plans and objectives, as well as the SD activities and their concern about ethical issues.

This change can also be seen in research (research and transdisciplinary research units/centers) and teaching (e.g., encourages the development of systemic and holistic thinking in teaching). This could be a driver for change in SD and, as already stated by Lozano *et al.* (2015), an official commitment to SD.

The results thus strengthen the evidence already seen in Aleixo *et al.* (2016). Therefore, while the literature review acentuates the importance of the environmental dimension in HEIs, our results show that Portuguese HEIs give more emphasis to the economic and social dimensions.

In terms of rankings to which HEIs belong, the respondents' references to the adoption of U-Multirank were confirmed. Although membership of the U-Multirank is voluntary, the indicators depend on information that is external to the institutions and, as a result, there is a marked difference between polytechnics and universities. According to respondents from the group of rectors and presidents, only one HEI belongs to the Green Metric. However, Aleixo *et al.* (2016) found that at least two HEIs belong to this ranking. This may reveal top management of the faculties, departments and schools know little about these issues. According to Shi e Lai (2013, p. 60), the sustainability ranking systems could contribute to the HEI managers' adoption of SD because they "may help direct the attentions of university administrators towards sustainable development, thus expediting the process of integrating and institutionalizing sustainability into universities globally". As referred by Cebrian *et al.* (2015) and Lauder, Sari, Suwartha, e Tjahjono (2015), ranking HEIs in the area of sustainability could foster a holistic implementation of SD in HEIs, and the Green Metric is a convincing example. According to Cebrian *et al.* (2015) and Lauder *et al.* (2015), the Green Metric could be a tool to integrate sustainability assessment and reporting methods in HEIs. This is also suggested by Grindsted (2011), who states that the Green Metric is the first to reflect HEI behavior on sustainability.

The certifications and assessment tools indicated by the leaders of the Portuguese HEIs originate from corporations and organizational models and were not specific to HEIs (e.g., ISO 9001, GASU). In Disterheft *et al.* (2012), 47 European HEIs had this system on campus, namely in German HEIs; this is not confirmed in the Portuguese context. Although Portuguese HEIs are starting to have some certifications, they are mainly related to the Quality Management Systems (ISO 9001).

Regarding the signing of declarations for SD or ESD, respondents recognize statements such as RSO.PT (see http://cite.gov.pt/pt/acite/rsopt.html) and GRACE (see http://www.grace.pt/). However, although at least four Portuguese HEIs signed the UE4SD declaration (see http://www.ue4sd.eu/), only one institution mentioned it in this study. Jorge *et al.* (2015) defend that HEIs should show give priority to declarations such as the United Nations Global Compact - Principles for Responsible Management Education or the

College Sustainability rather than higher education declarations for SD or ESD and, they should foster the creation of research networks on sustainability in universities (e.g., Copernicus Alliance, Regional Center of Expertise on Education for Sustainable Developments). However, only one Portuguese HEIs signed the United Nations Global Compact - Principles for Responsible Management Education.

Based on the responses of interviewees, the HEIs' commitment to SD is perceived by a greater frequency in the level of the certifications adopted, followed by membership to national and international rankings. There is no institutional commitment for SD or ESD and some misinformation is found about the HEIs' activities and strategies to meet these SD goals. The results were not as expected. HEIs with high SD implementation practices were expected to have more certifications and adhere to more rankings and commitment statements on SD or EDS, but this is not what the results revealed. They denote a compartmentalized implementation of SD in HEIs that is aligned with the findings of Lozano *et al.* (2015) whom results showed that SD in HEIs has been compartmentalized and is not considered holistically. However, and contrarily to Lozano, Lukman*, et al.* (2013), this study defends that there is not a strong relationship between SD commitment, implementation and the signing of declarations.

It is argued by Jorge *et al.* (2015, pp. 42-43) that leadership plays a fundamental role in the implementation of sustainability practices by HEIs, and "*leadership may also be a driver when the leader sees transformation as a way to leave his or her legacy to the organisation*". Thus, and as advocated by different authors (e.g., Alonso-Almeida *et al.*, 2015; Jorge *et al.*, 2015; Lozano, 2006) *Innovators* can play a critical role as agents of change and drivers of innovation in their organizations and other leaders may follow through a process of imitation (understood as a competitive advantage).

There are no significant differences between institutions from the two subsystems (polytechnic and university) in 90% of the SD practices analyzed; this suggests that both are aware of their responsibility in relation to SD, and have begun to take the first steps in this direction. More practices had been implemented by universities with regards to their capacity to obtain donations and private funds, conducting research or having scientific

publications in SD, as well as offering degrees, seminars and workshops in the area of SD. Moreover, as universities have PhD programs (that polytechnics in Portugal are not allowed to have) and are traditionally more orientated to research than polytechnics, the differences in the scientific publications in the area of SD and related topics come as no surprise. However, in Aleixo *et al.* (2016), Universities revealed a higher percentage of SD practices in all dimensions. Nevertheless, the results also show that SD implementation can vary within each university and polytechnic; this confirms the importance of leadership, in this case of the director of departments, faculties or schools.

The results of the cluster analysis also indicate real differences in the implementation of SD practices in the groups of HEIs. At least 6 HEIs have already fully implemented a high level of practices in the economic, social and institutional dimensions. It can also be seen that, generally speaking, practices related to the environmental dimension have a lower level of implementation than the others.

HEIs can respond to the challenges of the 21st century by implementing sustainability in their system and subsystem activities, practices and projects. They can foster SD by setting an example, incorporating on-campus initiatives and educating current and future generations to cope with sustainability challenges.

6. Conclusion, limitations and directions for future research

This work examines how HEIs can promote sustainability through its different dimensions. Portuguese HEIs are beginning to place importance on all SD dimensions and to include it in their strategic plans, communication strategies and policies. However, most practices associated with these dimensions are still in the planning phase. These findings are in line with the state of the art that shows that the SD concept is still associated with the economic sustainability of institutions (economic dimension). The environmental dimension is essentially related to recycling, waste management and planning. Even though HEI leaders frequently refer to the relevance of including SD in the institutions' curriculum, research and communication, it is neither planned nor implemented. HEIs' role in SD and the

promotion of sustainability is critical and the accomplishment of such goals is dependent on the efforts of HEI leaders. HEIs worldwide are responding to this call for leadership by integrating sustainability issues in education, research, operations, and outreach and collaboration with the community. HEIs need to recognize their responsibility to empower their students with skills to address the problems of society for future wellbeing. Their leaders must ensure that staff, faculty and students are able to balance costs and benefits in the four SD dimensions and to foster the sustainability of both the HEI itself and the world with the aim of leading the next generation to global sustainability.

The following limitations have been identified: due to the large size of the organizations and even geographical spread, there may be situations where leaders are not aware of practices and projects implemented. In addition, the central services and vice versa may be unaware of some of the projects and practices implemented in colleges, departments and schools because the respondent did not have access to the information (although this should not be the case). And finally, some of the institutions known as having an excellent SD performance in Portugal did not participate.

Future research should include other stakeholders (e.g., professors, administrative staff, and students) in the survey, as well as analyze their perceptions of the implementation of practices in the various dimensions of sustainability.

FINAL REFLECTIONS AND CONCLUSIONS

1. Main Conclusions

The findings of this doctoral research will strengthen how SD is present in each HEI and furthers the understanding of the level of implementation, namely in Portugal where sustainability studies in public HEIs are still scarce. Portuguese HEIs are in the embryonic phase of implementing and institutionalizing SD dimensions in all their activities and the different stakeholders are not familiar with the SHEI concept. The aim of this study was to make a meaningful contribution to the implementation of change.

While the results of this thesis clearly demonstrate that SD is recognized as being very important to HEIs and society, it is not yet institutionalized; moreover funding and student numbers are perceived as the main barriers to its implementation in the Portuguese HEIs. They urgently need to identify SD strategies so that SD can be introduced in all HEI activities through a "top down" process starting with planned activities from the governing bodies; all stakeholders should be involved in promoting conceptual and organizational change in HEIs through the inclusion of strategies for implementing sustainability. Without institutionalizing policies for implementing Sustainability, it is impossible to successfully overcome barriers and foster the perception of SD as a main driver of innovation.

For greater clarity, the main conclusions of this research are organized into four subsections.

Subsection 1: In response to our first research question and considering the first and second specific goals of the thesis (i.e., to identify the SD practices adopted by Portuguese public HEIs and formally communicated through the institutional websites; and to compare the SD practices adopted by Portuguese HEIs by size, type, and stage of implementation), it was found that although SD practices are actively communicated by the majority of HEIs, they vary considerably from one HEI to another. Overall, SD is still in its early stages in Portuguese HEIs. The results suggest that while most HEIs communicate their SD practices through institutional websites, some are better classified in terms of the incorporation, diffusion and institutionalization of SD. The following HEIs had the best classification when considering the SD practices adopted and formally communicated through the institutional

websites: The University of Minho, the University of Coimbra, the Polytechnic Institute of Leiria, the University of Trás-os-Montes and Alto Douro, the University of Lisbon, the University of Porto and the University of Aveiro. There is also a positive association between the communication of SD practices and the institution size, and the type of institution (a higher percentage of SD practices was observed in universities).

Subsection 2: In response to the second research question and to the third, fourth and fifth specific objectives (i.e., to analyze how stakeholders of Portuguese HEIs understand the concepts of sustainability and SHEIs; to understand the role played by Portuguese HEIs in fostering sustainability; and to identify the challenges and barriers to adopting a sustainability focused approach in Portuguese HEIs), the results suggest that although the different stakeholders are aware of the concept of sustainability, they are not familiar with the SHEI concept. The lack of financial resources due to the decline in funding for higher education and falling numbers of Portuguese university students is perceived as the main barrier to sustainable development in higher education (i.e. SD practices are still associated with spending financial resources). This research highlights the importance of a conceptual and organizational change in higher education institutions, notably through identifying new sources of financing, more flexible organizational forms, more comprehensive mission statements, more tailored educational offers, life-long learning and commitment to internationalization, and more strategic human resource management.

Subsection 3: In response to the third research question and to the sixth and seventh specific objectives (to assess whether the stakeholders consider the main intervention areas of HEIs in the SD domain to be pertinent, and to reflect on how SD can be implemented in Portuguese HEIs; and to explain the perceptions of key stakeholders about the importance of teaching sustainability across all curricular disciplines, encouraging research and dissemination of sustainability knowledge, implementing green campuses, supporting local sustainability efforts, and engaging and sharing information with international networks), the results show that all stakeholders recognize the need to teach sustainability in all courses, but they have different visions about how this should be achieved. They defend that research on sustainability and the dissemination of this

knowledge should be encouraged and transversal to all HEIs. Stakeholders agree in theory that it is important to implement green campuses and support local sustainability efforts but the practical results achieved in the Portuguese HEIs analysed are very limited. As a long-term objective, involvement in and sharing information with international networks should be encouraged.

Subsection 4: In response to the fourth, fifth and sixth research questions and to the seventh specific objective (i.e., to describe the degree of implementation of sustainability practices in Portuguese HEIs in the environmental, economic, social and institutional dimensions of SD), the results show that Portuguese HEIs are now recognizing the importance of SD dimensions and including it in their strategic plans, communication strategies and policies. However, most practices associated with these dimensions are still in the planning phase. Similarly, it is also pointed out in the literature that this concept continues to be associated with the economic sustainability of institutions (economic dimension). The environmental dimensions essentially involve recycling, waste management and planning. HEI leaders refer most often to the inclusion of SD in the institutions' curriculum, research and communication as totally relevant, although this is neither planned nor implemented. HEIs play a critical role in developing SD and promoting sustainability and these goals cannot be achieved with the commitment of institutional leaders. HEIs worldwide are responding to this call for leadership by integrating sustainability issues in education, research, operations and outreach and collaboration with the community. HEIs need to recognize their responsibility to empower students with skills to address the problems of society for future wellbeing. Leaders of HEIs must develop the capacity of their staff, faculty and students to balance the four dimension of SD in a cost-effective way that furthers sustainability in their own HEI and the world, and thus lead the next generation to global sustainability.

2. Limitations of the study

A limitation of the first study (chapter 1) stems from the fact that the information was extracted only from main HEI websites; however, schools, faculties and departments may

have other practices that are not disclosed/reported in the institutional website. Thus, the actual practice of the institution characterized here may be either better or worse than those identified; nevertheless, the study was designed to evaluate the various communications regarding SD made by HEIs. A further limitation concerns the site dynamics (static website without updates limits this research approach).

In the second study (chapters 2 and 3), the methodological decision to use a convenience sample is the main limitation as it does not allow the results to be generalized to the Portuguese HEIs system as a whole. However, the exploratory study should be seen as a first step leading to many other studies assessing the implementation of HESD in Portugal. Future studies should consider all or a representative sample of Portuguese HEIs, as well as information for a more quantitative analysis. Another limitation of this study is that there may be a social desirability bias because interviewees might have given what they felt was the "right answer" (i.e., what is socially expected) rather than what they actually thought. The probability of this occurring with leaders and faculty members is particularly high. Future studies might ask about what the HEIs are already doing with regards SD issues, and ask for evidence.

In the third study (chapter 4), the limitations were due to the large size and also geographical spread of the organizations as this may lead to situations where leaders are unaware of all the practices and projects implemented. Moreover, the central services may not have known about some projects and practices being implemented in faculties, colleges, departments and schools, and reciprocally, the faculties, colleges, departments and schools may not have known about the central services, i.e. the respondent did not have access to the information even though this should not be the case. A final limitation is that some Portuguese institutions that are known for their excellent SD performance did not participate in the study.

3. Future research

With regard to SD practices adopted by Portuguese public HEIs and formally communicated through the institutional websites, future research should include not only the information obtained from the main HEI websites, but also that of the schools, faculties and department's websites.

In relation to the second study and in the context of the qualitative analysis, future studies should consider all Portuguese HEIs, or a representative sample, as well as information that could be subjected to a more quantitative analysis.

In terms of the degree of implementation of sustainability practices in Portuguese HEIs, future research and future surveys and samples should include other stakeholders (e.g., professors, administrative staff, and students) and their perceptions of the implementation of practices in the various sustainability dimensions and activities.

POSTFACE

My study toward a doctoral degree successfully accomplished my goal of promoting the subject in academia; more specifically, it highlighted the implementation, incorporation and institutionalization of SD and the need to overcome financial restrictions so as to find innovative solutions to make our present and future more sustainable. HEI plays a crucial role in ensuring a sustainable future and there should be an explicit policy goal of developing sustainability through SHEIs.

My contribution to a sustainable future addresses the sustainability challenges faced by HEIs. The institutionalization of SD in the Portuguese HEIs system puts sustainability into practice (community members and organizations, business).

Although sustainability issues are institutionalized by the actors involved in the strategic and political debate and are found in their discourse, sustainability processes are not yet fully integrated or implemented in Portuguese HEIs.

My goal was to contribute to change and the promotion of sustainability (which inherently entails change) in HEIs (SHEIs), overcoming barriers to creativity and innovation and bringing stakeholders together for SD in HEIs.

I conclude with an excerpt from Amaral et al. (2015: 166):

> "Universities can and should play a key role in turning society sustainable through their power to teach and generate world leaders and their capability to perform research activities to enable a sustainable future. Broadly speaking, a sustainable university should "walk the talk" in regard to its sustainability agenda, i.e. it should teach the concept and philosophy of SD to their students, but it should also be able to embrace the concept within day-to-day organizational management".

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APPENDIX

APPENDIX A

Interview script (chapter 2 and 3) and consent form

Guião de Entrevista

UNIVERSIDADE ABERTA

Instituições de Ensino Superior Sustentáveis: Perceções das principais partes interessadas e resposta ao desafio lançado pelas Nações Unidas sobre Desenvolvimento Sustentável

Doutoranda: Ana Marta Aleixo Figueiras dos Santos

Orientador: Professor Doutor Ulisses Miranda Azeiteiro (Universidade Aberta)

Coorientadora: Professora Doutora Susana Leal (Instituto Politécnico de Santarém)

Nota Biográfica e Contactos

Ana Marta Aleixo Figueiras dos Santos é estudante no doutoramento de Sustentabilidade Social e Desenvolvimento e membro do Centro de Investigação em Gestão para a Sustentabilidade, do Instituto Politécnico de Leiria. É licenciada em Relações Humanas e Comunicação no Trabalho pelo Instituto Politécnico de Leiria, e Mestre em Gestão, especialização em Gestão de Recursos Humanos, pela Universidade de Évora.

Desde os seus primeiros estudos, despertou interesse para a temática social, nomeadamente a relacionada com as Instituições de Ensino Superior e suas relações com os seus diferentes *stakeholders* quer ao nível da responsabilidade social quer ao nível do desenvolvimento sustentável.

Trabalha há 6 anos como colaboradora técnica no Gabinete de Projetos do Instituto Politécnico de Leiria.

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Objetivos do Trabalho

Este estudo tem por principal objetivo estudar a conceptualização de Desenvolvimento Sustentável (DS) no âmbito das Instituições de Ensino Superior (i.e., Instituições de Ensino Superior

Sustentáveis), e perceber qual a resposta dada pelas Instituições de Ensino Superior (IES) portuguesas ao desafio lançado pelas Nações Unidas sobre o tema.

Introdução à entrevista

Vimos convidá-lo a participar numa investigação desenvolvida por Ana Marta Santos, estudante no doutoramento de Sustentabilidade Social e Desenvolvimento da Universidade Aberta.

Esta investigação pretende estudar a conceptualização de Desenvolvimento Sustentável no âmbito das Instituições de Ensino Superior (i.e., Instituições de Ensino Superior Sustentáveis), e perceber qual a resposta dada pelas Instituições de Ensino Superior portuguesas ao desafio lançado pelas Nações Unidas sobre o tema.

Participam no estudo as principais partes interessadas de quatro Instituições de Ensino Superior portuguesas, a saber: dirigentes, professores, colaboradores, estudantes e entidades externas.

A participação no estudo é voluntária, pelo que a entrevista poderá ser interrompida em qualquer momento.

Para assegurar o rigor de análise dos dados, é desejável proceder à gravação áudio da entrevista.

Os dados recolhidos poderão ser utilizados em futuras investigações sobre a sustentabilidade no Ensino Superior. No entanto, é garantida a confidencialidade dos mesmos.

Se tiver alguma questão sobre esta investigação, poderá contactar diretamente a investigadora Ana Marta Santos (anamartaafsantos@gmail.com, 96 518 38 86) ou os seus orientadores Ulisses Miranda Azeiteiro (ulisses.azeiteiro@uab.pt) e Susana Leal (susana.leal@esg.ipsantarem.pt).

Consentimento Informado

Li a explicação sobre a investigação. Foi-me dada oportunidade de discutir o assunto e as minhas questões foram explicadas. Deste modo, venho por este meio consentir a minha participação no estudo, bem como a gravação da entrevista em áudio.

Tomei ainda conhecimento de que a minha participação é voluntária e que sou livre para abandonar a entrevista a qualquer momento.

Dou consentimento ao investigador para usar citações nas suas investigações, bem como para o uso dos dados em investigações futuras sobre a sustentabilidade do Ensino Superior

Assinatura do **Investigador**	Assinatura do **Participante**
Data	Data

Questões

1ª Parte

1. Em sua opinião, quais são as questões mais relevantes que esta universidade/este instituto politécnico terá que enfrentar nos próximos dez anos?

2. Quando ouve falar em desenvolvimento sustentável, o que é que este termo significa para si?

3. A seu ver, qual o papel que as universidades e politécnicos devem ter, se é que devem ter algum, no alcance da sustentabilidade?

4. Quando ouve o termo "universidade sustentável"/"politécnico sustentável", o que é que ele significa para si?

5. Quais os obstáculos, se é que existem, que possam impedir a universidade/politécnico de se envolver em iniciativas sustentáveis?

6. Que obstáculos e desafios prevê no futuro das IES no que se refere ao seu desenvolvimento sustentável?

7. **Dirigentes:** Considera ser plausível a sua Universidade/Politécnico passar a adotar, o desenvolvimento sustentável como eixo estratégico prioritário? Quais seriam as motivações para que isso acontecesse?

2ª Parte

8. Considera que as IES devem ter a preocupação de ensinar conceitos de desenvolvimento sustentável no âmbito dos cursos de licenciatura e/ou de pós-graduação (mestrados, doutoramentos) das suas diversas faculdades/escolas?
   Se sim:
   a. Porquê?
   b. Como é que essa preocupação deve ser formalizada/implementada?

9. Considera que as IES devem ter a preocupação de incentivar a investigação sobre questões de desenvolvimento sustentável?
    a. Como é que isso pode ser implementado ou incentivado?

10. Considera que as IES devem ter a preocupação de tornar os campus mais verdes, i.e., amigos do ambiente?
    a. De que modo é que isso pode ser implementado?
    b. Essas decisões devem ser centralizadas ou descentralizadas?

11. Considera que as IES devem trabalhar com as autoridades locais e a sociedade civil para promover comunidades mais sustentáveis?
    a. No contexto da sua instituição de que modo é que isso poderia ser implementado?
    b. Quem deve tomar esta iniciativa?

12. Considera que as IES devem comprometer-se com resultados e ações por meio de estruturas internacionais (exemplos: Década das Nações Unidas da Educação para o Desenvolvimento Sustentável, liderado pela UNESCO; a Universidade das Nações Unidas; o Impacto Académico da ONU; o Pacto Global; a iniciativa Princípios para Educação em Gestão Responsável apoiada pelas Nações Unidas; e o Programa Ambiental da ONU Educação Ambiental e iniciativas de formação)?
    a. Quais os benefícios que poderiam advir de tal envolvimento?

13. Para além do acima mencionado, que outras práticas ou medidas podiam ser implementadas pelas IES portuguesas para promoverem o desenvolvimento sustentável e/ou se tornarem IES sustentáveis?

14. Há alguma informação adicional que queira acrescentar?

Muito obrigada pela colaboração!

Guião de Entrevista

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Nota Biográfica e Contactos

Ana Marta Aleixo Figueiras dos Santos é estudante no doutoramento de Sustentabilidade Social e Desenvolvimento e membro do Centro de Investigação em Gestão para a Sustentabilidade, do Instituto Politécnico de Leiria. É licenciada em Relações Humanas e Comunicação no Trabalho pelo Instituto Politécnico de Leiria, e Mestre em Gestão, especialização em Gestão de Recursos Humanos, pela Universidade de Évora.

Desde os seus primeiros estudos, despertou interesse para a temática social, nomeadamente a relacionada com as Instituições de Ensino Superior e suas relações com os seus diferentes *stakeholders* quer ao nível da responsabilidade social quer ao nível do desenvolvimento sustentável.

Trabalha há 6 anos como colaboradora técnica no Gabinete de Projetos do Instituto Politécnico de Leiria.

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Objetivos do Trabalho

Este estudo tem por principal objetivo estudar a conceptualização de Desenvolvimento Sustentável (DS) no âmbito das Instituições de Ensino Superior (i.e., Instituições de Ensino Superior

Sustentáveis), e perceber qual a resposta dada pelas Instituições de Ensino Superior (IES) portuguesas ao desafio lançado pelas Nações Unidas sobre o tema.

Introdução à entrevista

Vimos convidá-lo a participar numa investigação desenvolvida por Ana Marta Santos, estudante no doutoramento de Sustentabilidade Social e Desenvolvimento da Universidade Aberta.

Esta investigação pretende estudar a conceptualização de Desenvolvimento Sustentável no âmbito das Instituições de Ensino Superior (i.e., Instituições de Ensino Superior Sustentáveis), e perceber qual a resposta dada pelas Instituições de Ensino Superior portuguesas ao desafio lançado pelas Nações Unidas sobre o tema.

Participam no estudo as principais partes interessadas de quatro Instituições de Ensino Superior portuguesas, a saber: dirigentes, professores, colaboradores, estudantes e entidades externas.

A participação no estudo é voluntária, pelo que a entrevista poderá ser interrompida em qualquer momento.

Para assegurar o rigor de análise dos dados, é desejável proceder à gravação áudio da entrevista.

Os dados recolhidos poderão ser utilizados em futuras investigações sobre a sustentabilidade no Ensino Superior. No entanto, é garantida a confidencialidade dos mesmos.

Se tiver alguma questão sobre esta investigação, poderá contactar diretamente a investigadora Ana Marta Santos (anamartaafsantos@gmail.com, 96 518 38 86) ou os seus orientadores Ulisses Miranda Azeiteiro (ulisses.azeiteiro@uab.pt) e Susana Leal (susana.leal@esg.ipsantarem.pt).

Consentimento Informado

Li a explicação sobre a investigação. Foi-me dada oportunidade de discutir o assunto e as minhas questões foram explicadas. Deste modo, venho por este meio consentir a minha participação no estudo, bem como a gravação da entrevista em áudio.

Tomei ainda conhecimento de que a minha participação é voluntária e que sou livre para abandonar a entrevista a qualquer momento.

Dou consentimento ao investigador para usar citações nas suas investigações, bem como para o uso dos dados em investigações futuras sobre a sustentabilidade do Ensino Superior.

Assinatura do **Investigador**	Assinatura do **Participante**
Data	Data

Questões

1ª Parte

15. Quando ouve falar em desenvolvimento sustentável, o que é que este termo significa para si?

16. A seu ver, qual o papel que as universidades e politécnicos devem ter, se é que devem ter algum, no alcance da sustentabilidade?

17. Quando ouve o termo "universidade sustentável"/"politécnico sustentável", o que é que ele significa para si?

18. Quais os obstáculos, se é que existem, que possam impedir a universidade/politécnico de se envolver em iniciativas sustentáveis?

19. Que obstáculos e desafios prevê no futuro das IES no que se refere ao seu desenvolvimento sustentável?

20. Acredita que a recente tendência das universidades verem os estudantes como "clientes" influencia a sustentabilidade no seu campus? Se sim, de que maneira?

2ª Parte

21. Considera que as IES devem ter a preocupação de ensinar conceitos de desenvolvimento sustentável no âmbito dos cursos de licenciatura e/ou de pós-graduação (mestrados, doutoramentos) das suas diversas faculdades/escolas?
    Se sim:
    a. Porquê?
    b. Como é que essa preocupação deve ser formalizada/implementada?

22. Considera que as IES devem ter a preocupação de incentivar a investigação sobre questões de desenvolvimento sustentável?
    a. Como é que isso pode ser implementado ou incentivado?

23. Considera que as IES devem ter a preocupação de tornar os campus mais verdes, i.e., amigos do ambiente?
    a. De que modo é que isso pode ser implementado?
    b. Essas decisões devem ser centralizadas ou descentralizadas?

24. Considera que as IES devem trabalhar com as autoridades locais e a sociedade civil para promover comunidades mais sustentáveis?
    a. No contexto da sua instituição de que modo é que isso poderia ser implementado?
    b. Quem deve tomar esta iniciativa?

25. Considera que as IES devem comprometer-se com resultados e ações por meio de estruturas internacionais (exemplos: Década das Nações Unidas da Educação para o Desenvolvimento Sustentável, liderado pela UNESCO; a Universidade das Nações Unidas; o Impacto Académico da ONU; o Pacto Global; a iniciativa Princípios para Educação em Gestão Responsável apoiada pelas Nações Unidas; e o Programa Ambiental da ONU Educação Ambiental e iniciativas de formação)?
    a. Quais os benefícios que poderiam advir de tal envolvimento?

26. Para além do acima mencionado, que outras práticas ou medidas podiam ser implementadas pelas IES portuguesas para promoverem o desenvolvimento sustentável e/ou se tornarem IES sustentáveis?

27. Em sua opinião, quais são as questões mais importantes que esta universidade/este instituto politécnico terá que enfrentar nos próximos dez anos?

28. Há alguma informação adicional que queira acrescentar?

Muito obrigada pela colaboração!

APPENDIX B

Support and enhance (chapter 2)

Appendix B.1: Number of studies have analyzed the contributions and experiences of HEIs worldwide to achieve SD

Country	References
Australia	Hancock e Nuttman (2014), Too e Bajracharya (2015), Rose, Ryan, e Desha (2015)
Austria	Sedlacek (2013), Leal Filho (2000)
Belgian	Verhulst e Lambrechts (2015)
Canada	Beringer *et al.* (2008), Fonseca, Macdonald, Dandy, e Valenti (2011)
Chile	Gómez *et al.* (2014)
China	Lo (2015), Niu, Jiang, e Li (2010), Li, Tan, e Rackes (2015)
Denmark	Leal Filho (2000), Lehmann *et al.* (2009)
France	Leal Filho (2000)
Germany	Leal Filho (2000), Lee e Schaltegger (2014)
India	Chhokar (2010), Ferrer-Balas *et al.* (2008), Castro e Jabbour (2013)
Italia	Leal Filho (2000), Vagnoni e Cavicchi (2015)
Japan	Ferrer-Balas *et al.* (2008), Kitamura e Hoshii (2010)
Mexico	Velazquez *et al.* (2006), Juarez-Najera, Dieleman, e Turpin-Marion (2006)
Netherlands	Leal Filho (2000), van Weenen (2000)
Philippines	Segovia e Galang (2002)
Poland	Kościelniak (2014)
Portugal	Leal Filho (2000)
Russia	Verbitskaya, Nosova, e Rodina (2002)
Spain	Ferrer-Balas *et al.* (2008), Ferrer-Balas, Bruno, Mingo, e Sans (2004), Jorge *et al.* (2015), Leal Filho (2000)
Sweden	Ferrer-Balas *et al.* (2008), Leal Filho (2000), Sammalisto *et al.* (2015)
Taiwan	Su e Chang (2010)
United Kingdom	Kagawa (2007), Leal Filho (2000), Lozano (2010), Wyness e Sterling (2015), Cebrian *et al.* (2015)
United State of America	Barber, Wilson, Venkatachalam, Cleaves, e Garnham (2014), Ferrer-Balas *et al.* (2008), López (2013), Owens e Legere (2015), Too e Bajracharya (2015)

Appendix B.2: Main barriers and obstacles for the SD in HEIs

BARRIERS AND OBSTACULES FOR SD IN HEIS	
Greenwashing and linking a fashion concept	Grindsted (2011), Leal Filho (2000)
Abstract, complexity and misconception topic	Leal Filho (2000), Waas *et al.* (2011), Wright e Horst (2013), Sibbel (2009), Velazquez *et al.* (2005), Waas *et al.* (2012), Verhulst e Lambrechts (2015)
Lack of training and specialization in sustainability	Jorge *et al.* (2015), Verhulst e Lambrechts (2015), Velazquez *et al.* (2005), Jorge *et al.* (2015), Waas *et al.* (2012)
Lack of time	Velazquez *et al.* (2005), Verhulst e Lambrechts (2015)
Economic and profit approach Mentality	Verhulst e Lambrechts (2015), Velazquez *et al.* (2005), Sibbel (2009), Leal Filho (2011)
"Territorialism"	Adams (2013)
Organizational rigidity structure (conservative, traditional and conventional)	Velazquez *et al.* (2005), Verhulst e Lambrechts (2015), Stephens *et al.* (2008), Weber e Duderstadt (2012), Waas *et al.* (2012)
Lack of information, communication and data access	Velazquez et al., 2005 Sibbel, 2009 Verhulst & Lambrechts, 2014
Resistance of change	Velazquez *et al.* (2005), Jorge *et al.* (2015), Verhulst e Lambrechts (2015), Adams (2013), Weber e Duderstadt (2012), Waas *et al.* (2012)
Too competitive	Leal Filho (2011)
Lack of human resources	Leal Filho (2011), Leal Filho (2000)
Lack of financial resources and funding	Davis *et al.* (2009), Elliott e Wright (2013), Jorge *et al.* (2015), Wright e Horst (2013), Velazquez *et al.* (2005), Waas *et al.* (2012), Verhulst e Lambrechts (2015)
Lack of commitment, engagement, awareness, interest, and involvement	Verhulst e Lambrechts (2015), Davis *et al.* (2009), Velazquez *et al.* (2005), Shriberg e Harris (2012), Waas *et al.* (2012), Weber e Duderstadt (2012)
Lack of infrastructure or physical place	Davis *et al.* (2009), Verhulst e Lambrechts (2015)
Lack of a holistic vision	Jorge *et al.* (2015), Milutinovi e Nikoli (2014), Disterheft *et al.* (2013),(Galpin, Whitttington, e Bell (2015); Lee *et al.*, 2013) , Lozano (2008)
"Machismo"	Velazquez *et al.* (2005)
Difficult to be efficient because the complex web of partly contradictory constraints and incentives set up by government, participants and funding agencies	Weber e Duderstadt (2012)
Lack of regulations and legislations	Velazquez *et al.* (2005), Verhulst e Lambrechts (2015)
Lack of performance indicators	Verhulst e Lambrechts (2015), Velazquez *et al.* (2005)
Theme has no scientific basis	Leal Filho (2011), Leal Filho (2000)
"Siloed thinking" (not sharing ideas)	Adams (2013)
Lack of interdisciplinary research	Velazquez *et al.* (2005), Godemann *et al.* (2014), Verhulst e Lambrechts (2015)
Lack of policies to promote sustainability campus	Verhulst e Lambrechts (2015), Velazquez *et al.* (2005)
Lack of leadership skills and innovation	Adams (2013), Jorge *et al.* (2015), Waas *et al.* (2012)
Technical problems	Verhulst e Lambrechts (2015)
Overcrowded curriculum	Verhulst e Lambrechts (2015)
Sustainable Development is not relevant to a certain courses or discipline	Verhulst e Lambrechts (2015)
Lack of incentive structure for an individual level	Ferrer-Balas *et al.* (2008)
Freedom of individual faculty members	Ferrer-Balas *et al.* (2008)
Lack of incentive structure (salary, promotion)	Ferrer-Balas *et al.* (2008)
Pressure from society	Ferrer-Balas *et al.* (2008)

Appendix B.3: Main challenges and drivers for the SD in HEIs

STRATEGIES, DRIVERS AND KEY FACTORS FOR SD FOR HEIS	
Psychological needs	Too e Bajracharya (2015)
Physical facilities	Too e Bajracharya (2015)
Personal motivations	Too e Bajracharya (2015)
Public perception	Too e Bajracharya (2015)
Price mechanisms and policies	Too e Bajracharya (2015)
Peer pressure from competing institutions	Ferrer-Balas *et al.* (2008), Sammalisto e Arvidsson (2005)
Funding availability strengthened the progress	Sammalisto e Arvidsson (2005), Ferrer-Balas *et al.* (2008)
Identification key stakeholders	Adams (2013)
Values and context	Leal Filho,2000, 2011
Visible support and proactive and visionary leadership	Adams (2013), Barth (2013), Ferrer-Balas *et al.* (2008)
Make connection, develop know-how and Knowledge	Adams (2013), Leal Filho (2000), Leal Filho (2011), Ferrer-Balas *et al.* (2008)
Inspire and empower others to keep sustainability/Sustainability Champions (Innovators)	Ferrer-Balas *et al.* (2008), Adams (2013)
Initiatives to involve and engagement of all participation	Barth (2013), Godemann *et al.* (2014), Mader *et al.* (2013), Leal Filho (2011), Adams (2013), Verhulst e Lambrechts (2015), Stephens *et al.* (2008)
Efficiency	Mader et al (2013)
Background and experience	Leal Filho (2000), Leal Filho (2011)
Infrastructure and system to support	Davis *et al.* (2009), Barth (2013)
Clear and consistent communication, on-going communication	Adams (2013), Barth (2013)
Inclusion in overall HEI strategy and plans	Adams (2013)
Interdisciplinary and Transdisciplinary	Lozano (2008), Kościelniak (2014), Stephens *et al.* (2008), Ferrer-Balas *et al.* (2008)
Understanding the concept of sustainability	Sibbel (2009)
Promoting diversity	Sibbel (2009)
Governance and management	Mader *et al.* (2013), Kościelniak (2014)
Be practical, alignment, action-oriented and continuity	Leal Filho (2011), Mader *et al.* (2013)
Holistic, collaboration and connections	Leal Filho (2011), Lozano (2008), Lozano (2010), Mader *et al.* (2013)
Synergistic	Lozano (2008)
Financial incentive/Availability of funding	Leal Filho (2000), Verhulst e Lambrechts (2015), Ferrer-Balas *et al.* (2008), Waas *et al.* (2012)
Redesign curricula and research	Sibbel (2009), Adams (2013)
Re-structured/innovative institution structure	Stephens *et al.* (2008)
Existence of coordination bodies and projects	Ferrer-Balas *et al.* (2008)
Networks of expertise	Ferrer-Balas *et al.* (2008)
Connectors with society	Ferrer-Balas *et al.* (2008)
Size of Higher Education Institutions	Ferrer-Balas *et al.* (2008)
Sources of funding	Ferrer-Balas *et al.* (2008)
Employment availability	Ferrer-Balas *et al.* (2008)
Coordination unit of project for the sustainability	Ferrer-Balas *et al.* (2008)
Pressures of peer institution	(Ferrer-Balas *et al.* (2008))

APPENDIX C

Questionnaire (Portuguese version)

Exmo. Senhor

Reitor da Universidade

Assunto: Pedido de colaboração - projeto de investigação sobre o Desenvolvimento Sustentável nas Instituições de Ensino Superior Portuguesas

Exmo. Senhor Reitor,

Serve a presente para solicitar a colaboração de V.ª Ex.ª no preenchimento de um questionário, desenvolvido no âmbito da minha tese de doutoramento em Sustentabilidade Social e Desenvolvimento da Universidade Aberta. Este projeto visa estudar as práticas promotoras do Desenvolvimento Sustentável implementadas nas Instituições de Ensino Superior Portuguesas.

A sua colaboração é essencial e ajudará na obtenção de uma melhor compreensão desta temática nas Instituições de Ensino Superior em Portugal. O questionário demora cerca de 10 minutos a ser preenchido e inclui, essencialmente, questões fechadas.

Todos os dados obtidos através do questionário serão analisados apenas pelo investigador e seus orientadores, pelo que os resultados não serão facultados a qualquer entidade terceira nem utilizados para outros fins que não os já explicitados. Os resultados deste projeto poderão também ser consultados pelos interessados, sem restrições, após a sua conclusão.

Se tiver alguma dúvida sobre o preenchimento do questionário ou sobre o projeto poderá contactar-me através do email anamartaafsantos@gmail.com ou do telefone **965 183 886**. Os orientadores da tese de doutoramento, Professor Doutor Ulisses Azeiteiro da Universidade Aberta (ulisses.azeiteiro@uab.pt) e Professora Doutora Susana Leal do Instituto Politécnico de Santarém (susana.leal@esg.ipsantarem.pt) estão igualmente disponíveis para prestar esclarecimentos sobre o estudo. Adicionalmente, anexo declaração dos orientadores que atestam a finalidade do questionário em anexo.

Obrigado pela sua colaboração!

Cumprimentos,
Ana Marta Aleixo

Questionário

Desenvolvimento Sustentável nas Instituições de Ensino Superior Portuguesas

Este questionário visa recolher dados no âmbito do Doutoramento em Sustentabilidade Social e Desenvolvimento a ser realizado na Universidade Aberta por Ana Marta Santos. Pretende-se investigar a implementação de projetos, práticas e iniciativas relacionadas com o Desenvolvimento Sustentável (DS) nas Instituições de Ensino Superior (IES) Portuguesas.

Seguidamente, são-lhe apresentados diversos projetos, práticas ou iniciativas que podem promover o Desenvolvimento Sustentável das Instituições de Ensino Superior. **Diga em que medida elas existem e estão implementadas, ou não, na /no Universidade/Instituto Politécnico que dirige**.

Na tabela seguinte, **coloque uma cruz à frente de cada afirmação**, tomando em consideração o grau de implementação/não implementação das práticas/iniciativas em causa.

Observação: No caso de existirem vários projetos, práticas ou iniciativas em curso, para cada tópico, pense no projeto com maior importância ou no que se encontra em fase mais avançada de implementação.

DIMENSÃO AMBIENTAL

Na minha Universidade/ Politécnico existe pelo menos um projeto, prática ou iniciativa que:	**Não implementado, não projetado e sem relevância**	**Não implementado, não projetado mas relevante**	**Sim, existe, mas apenas em fase de projeto**	**Sim, existe, mas ainda em fase de implementação**	**Sim, existe e está totalmente implementado**
Promove a construção de edifícios sustentáveis nos campi	☐	☐	☐	☐	☐
Promove a conservação da biodiversidade no campus e em seu redor	☐	☐	☐	☐	☐
Dinamiza ações de voluntariado ambiental	☐	☐	☐	☐	☐
Promove a separação e reencaminhamento para a reciclagem de resíduos (e.g., papel, plástico, metal, óleos, pilhas)	☐	☐	☐	☐	☐

Desenvolve planos para reduzir a produção de resíduos (e.g., papel, plástico, metal, óleos, pilhas)	☐	☐	☐	☐	☐
Promove a reutilização dos materiais	☐	☐	☐	☐	☐
Promove práticas para a redução do consumo de água (e.g., torneira com temporizador, autoclismos com redução de agua, aproveitamento agua pluvial)	☐	☐	☐	☐	☐
Utiliza equipamentos para a geração de energia renovável (e.g., sol, vento, ondas)	☐	☐	☐	☐	☐
Utiliza equipamentos eficientes do ponto de vista energético (e.g., aquecedores eficientes, painéis solares, lâmpadas economizadoras)	☐	☐	☐	☐	☐
Incentiva a redução dos gases com efeito de estufa	☐	☐	☐	☐	☐
Incentiva o uso de transporte sustentáveis nas deslocações para os campi (e.g., bicicleta, transportes públicos, veículos elétricos)	☐	☐	☐	☐	☐
Promove a adesão a rótulos ecológicos	☐	☐	☐	☐	☐
Adquire alimentos orgânicos para confeção nos seus campi	☐	☐	☐	☐	☐

Caso na sua IES existam outros projetos, práticas e iniciativas promotoras do DS da própria instituição, no que concerne à dimensão ambiental, e que não estejam listados acima, por favor indique-as no seguinte espaço:

DIMENSÃO ECONÓMICA

Na minha Universidade/ Politécnico: existe pelo menos um projeto, prática ou iniciativa que:	**Não implementado, não projetado e sem relevância**	**Não implementado, não projetado mas relevante**	**Sim, existe, mas apenas em fase de projeto**	**Sim, existe, mas ainda em fase de implementação**	**Sim, existe e está totalmente implementado**
Apresenta preocupações com o seu desempenho económico	☐	☐	☐	☐	☐
Desenvolve planos para melhorar a eficiência energética	☐	☐	☐	☐	☐
Promove a gestão e melhoria dos processos	☐	☐	☐	☐	☐
Concorre a projetos nacionais e internacionais para seu autofinanciamento	☐	☐	☐	☐	☐
Promove prestações de serviços à comunidade	☐	☐	☐	☐	☐
Promove a aquisição de produtos alimentadores a fornecedores locais/regionais	☐	☐	☐	☐	☐
Promove constantemente a redução de custos no âmbito de toda a sua atividade	☐	☐	☐	☐	☐
Beneficia de donativos e de fundos privados (e.g., Alumni, empresas, organizações)	☐	☐	☐	☐	☐
Dispõe de loja/espaço de venda produtos produzidos nos campi	☐	☐	☐	☐	☐
Existe orçamento afeto às práticas promotoras do desenvolvimento sustentável	☐	☐	☐	☐	☐

Caso na sua IES existam outros projetos, práticas e iniciativas promotoras do DS da própria instituição, no que concerne à dimensão económica, e que não estejam listadas acima, por favor indique-as no seguinte espaço:

DIMENSÃO SOCIAL E CULTURAL

Na minha Universidade/ Politécnico: existe pelo menos um projeto, prática ou iniciativa que:	**Não implementado, não projetado e sem relevância**	**Não implementado, não projetado mas relevante**	**Sim, existe, mas apenas em fase de projeto**	**Sim, existe, mas ainda em fase de implementação**	**Sim, existe e está totalmente implementado**
Promove boas práticas na gestão de recursos humanos	☐	☐	☐	☐	☐
Promove políticas promotoras da igualdade e da diversidade	☐	☐	☐	☐	☐
Promove benefícios e incentivos aos colaboradores (e.g., dia de aniversário)	☐	☐	☐	☐	☐
Promove a conciliação da vida profissional e pessoal	☐	☐	☐	☐	☐
Promove sistemas de apoio à infância para filhos de colaboradores	☐	☐	☐	☐	☐
Promove o desenvolvimento e a valorização pessoal e profissional dos colaboradores (e.g. formação profissional, formação académica)	☐	☐	☐	☐	☐
Apresenta serviços de refeitório e alimentação	☐	☐	☐	☐	☐
Apresenta serviços de residências de estudantes	☐	☐	☐	☐	☐
Apresenta programas de apoio e incentivo, financeiro e não financeira a estudante, para além dos convencionais	☐	☐	☐	☐	☐
Apresenta serviços de saúde ocupacional (e.g., serviços médicos para toda a comunidade académica)	☐	☐	☐	☐	☐
Promove iniciativas e atividades para o desenvolvimento de estilos de vida saudáveis	☐	☐	☐	☐	☐
Apresenta serviços de apoio ao estudante (e.g. apoio pedagógico, psicológico, acolhimento e integração do estudante)	☐	☐	☐	☐	☐
Promove a empregabilidade e a inserção no mercado de trabalho dos estudantes e diplomados (e.g. Portal de Emprego; Serviços e	☐	☐	☐	☐	☐

Gabinete de Estágios e Acompanhamento Profissional)					
Promove ações formação em competências transversais para estudantes, não obrigatórias nos planos de estudos (*Soft skills*)	☐	☐	☐	☐	☐
Dinamiza uma Rede de Antigos Estudantes (e.g., Rede Alumni; Observatório Emprego; Observatório Inserção Profissional; Associação Antigos Estudantes)	☐	☐	☐	☐	☐
Promove a partilha de instalações, equipamentos e recursos humanos	☐	☐	☐	☐	☐
Apresenta serviços de saúde ocupacional (e.g., serviços médicos para toda a comunidade académica)	☐	☐	☐	☐	☐
Promove iniciativas de caracter cultural ou cientifico direcionado para a comunidade externa (e.g., dia aberto, semana da ciência)	☐	☐	☐	☐	☐
Desenvolve e participa em ações recreativas, culturais ou desportivas (e.g., atividades desportivas)	☐	☐	☐	☐	☐
Desenvolve a promoção do património cultural e artístico	☐	☐	☐	☐	☐
Desenvolve preocupações e iniciativas para a inclusão social	☐	☐	☐	☐	☐
Promove iniciativas de solidariedade social	☐	☐	☐	☐	☐
Detém hortas comunitárias nos seus campi	☐	☐	☐	☐	☐
Disponibiliza acessos e instalações adequadas a pessoas com deficiência	☐	☐	☐	☐	☐

Caso na sua IES existam outros projetos, práticas e iniciativas promotoras do DS da própria instituição, na área social e cultural, e que não estejam listadas acima, por favor indique-as no seguinte espaço:

DIMENSÃO INSTITUTIONAL, EDUCACIONAL E POLITICA

Na/A minha Universidade/ Politécnico:	Não implementado, não projetado e sem relevância	Não implementado, não projetado mas relevante	Sim, existe, mas apenas em fase de projeto	Sim, existe, mas ainda em fase de implementação	Sim, existe e está totalmente implementado
As questões do desenvolvimento sustentável estão incluídas na missão, visão e valores da IES	☐	☐	☐	☐	☐
Os planos estratégicos e objetivos incluem preocupações com o desenvolvimento sustentável	☐	☐	☐	☐	☐
Publica relatórios de sustentabilidade	☐	☐	☐	☐	☐
Comunica as atividades de desenvolvimento sustentável	☐	☐	☐	☐	☐
Apresenta preocupações para com as questões éticas (e.g., código de ética ou código de conduta, comissão de ética)	☐	☐	☐	☐	☐
Promove a educação dos professores na área do desenvolvimento sustentável	☐	☐	☐	☐	☐
Desenvolve cursos em parceria com outras instituições de ensino na área do desenvolvimento sustentável	☐	☐	☐	☐	☐
Existem unidades curriculares optativas em desenvolvimento sustentável em alguns cursos	☐	☐	☐	☐	☐
Existem unidades curriculares optativas em desenvolvimento sustentável em todos os cursos	☐	☐	☐	☐	☐
Existem unidades curriculares obrigatórias em desenvolvimento sustentável em alguns cursos	☐	☐	☐	☐	☐
Existem unidades curriculares obrigatórias em desenvolvimento sustentável em todos os cursos	☐	☐	☐	☐	☐
Existem licenciaturas na área do desenvolvimento sustentável	☐	☐	☐	☐	☐
Existem pós-graduações, mestrados ou doutoramentos na área do desenvolvimento sustentável	☐	☐	☐	☐	☐
Suscita o desenvolvimento do pensamento sistémico e holístico no ensino e investigação	☐	☐	☐	☐	☐

Possibilita aos estudantes, professores e funcionários desenvolverem programas de intercâmbio no domínio do desenvolvimento sustentável	☐	☐	☐	☐	☐
Existe uma unidade/centro de investigação em desenvolvimento sustentável	☐	☐	☐	☐	☐
Existem unidades/centros de investigação de cariz transdisciplinar	☐	☐	☐	☐	☐
Apresenta publicações científicas na área do desenvolvimento sustentável	☐	☐	☐	☐	☐
Promove seminários ou workshops em desenvolvimento sustentável	☐	☐	☐	☐	☐
Existe uma estrutura multidisciplinar para promover a investigação e a educação em sustentabilidade	☐	☐	☐	☐	☐
Desenvolve projeto de I&D em desenvolvimento sustentável	☐	☐	☐	☐	☐
Promove o desenvolvimento de tecnologias e registo de patentes na área do desenvolvimento sustentável	☐	☐	☐	☐	☐
Promove a transferência de tecnologia, inovação e conhecimento (e.g., patentes, criação de empresas)	☐	☐	☐	☐	☐
Integra redes nacionais e/ou Internacionais para o desenvolvimento sustentável (e.g., UES4D)	☐	☐	☐	☐	☐
Apresenta no seu organograma um departamento responsável pelo desenvolvimento sustentável	☐	☐	☐	☐	☐
Apresenta no seu organograma recursos humanos afetos às funções de promoção do desenvolvimento sustentável	☐	☐	☐	☐	☐
Promove a participação de estudantes em atividades de desenvolvimento sustentável nos campi	☐	☐	☐	☐	☐
Promove a participação dos colaboradores (docentes e não docentes) em atividades de desenvolvimento sustentável nos campi	☐	☐	☐	☐	☐

O desenvolvimento sustentável é considerado nos procedimentos de qualidade e avaliação da instituição	☐	☐	☐	☐	☐
Desenvolve projetos em parceria com outras instituições de ensino superior na área do desenvolvimento sustentável	☐	☐	☐	☐	☐
Desenvolve parcerias formais ao nível regional, nacional ou internacional com vista a promover o desenvolvimento sustentável	☐	☐	☐	☐	☐

Caso na sua IES existam outros projetos, práticas e iniciativas promotoras do DS da própria instituição, na dimensão institucional, educacional e política, e que não estejam listadas acima, por favor indique-as no seguinte espaço:

RANKINGS, CERTIFICAÇÕES E DECLARAÇÕES EM QUE PARTCIPA?

5. A sua IES integra algum ranking nacional ou internacional?

Sim☐

Não☐

5.1. Se sim, qual ou quais? Por favor, selecione todas as que se aplicam:

Greenmetric of World Universities (GreenMetric) ☐

Times Higher Education (THE) ☐

Leiden ☐

Global Research University Profile ☐

Scimago ☐

U-Multirank ☐

Quacquareli Symonds – University World Ranking (QS)☐

QS World University Ranking☐

Webmetrics☐

Shangai Academic Ranking of World Universities (ARWU)☐

Outro: Clique aqui para introduzir texto.

6. A sua IES possui alguma certificação?

Sim ☐

Não ☐

6.1. Se sim, qual ou quais? Por favor, selecione todas as que se aplicam:

Sistema Graphical Assessment of Sustainability in Universities (GASU)☐

Sistema de Gestão da Qualidade (ISO 9001)☐

Sistema de Gestão Ambiental (ISO 14001)☐

Sistema Comunitário de Ecogestão e Auditora (EMAS)☐

Sistema de Monitorização e Avaliação da Responsabilidade Social Integral☐

Sistema de Gestão da Responsabilidade Social (NP 4469-1:2008 e/ou ISO 26000)☐

Sistema de Gestão da Energia (ISO 50001)☐

Sistema de Gestão Alimentar (ISO 22000)☐

Sistema de Eventos Sustentáveis (ISO 20121)☐

Sistema de Gestão de Segurança da Informação (ISO 27001)☐

Certificação FSC☐

Outro:Clique aqui para introduzir texto.

7. A sua IES assinou alguma declaração de compromisso para o desenvolvimento sustentável e/ou educação para o desenvolvimento sustentável?

Sim ☐

Não ☐

7.1. Se sim, qual ou quais? Por favor, selecione todas as que se aplicam:

Assinou os Princípios PRiME (Principles for Responsible Management Education) ☐

Integra o Grupo de Reflexão e Apoio à Cidadania Empresarial (GRACE) ☐

Integra a Rede Nacional d Responsabilidade Social das Organizações (RSO.PT) ☐

Integra a Carta Copernicus ☐

Integra a USD (University Educators for Sustainable Development) ☐

Outro: Clique aqui para introduzir texto.

CARACTERIZAÇÃO DO INQUIRIDO

Faculte-nos, por favor, alguns dados a seu respeito.

8. Cargo que ocupa na Universidade/Politécnico:

Reitor☐

Vice-Reitor☐

Presidente☐

Vice-Presidente☐

Outro:Clique aqui para introduzir texto.

9. Há quantos anos ocupa este cargo:

Menos de 1 ano☐

1☐

2☐

3☐

4☐

5☐

6☐

7☐

8☐

9☐

10☐

Mais de 10 anos☐

Nome das IES

Universidade do Minho

Universidade de Coimbra

Instituto Politécnico de Leiria

Universidade de Trás-os-Montes e Alto Douro

Universidade de Lisboa

Universidade do Porto

Universidade de Aveiro

Instituto Politécnico de Viana Castelo

Universidade da Beira Interior

Universidade Nova de Lisboa

Escola de Enfermagem do Porto

Instituto Politécnico de Portalegre

Escola de Enfermagem de Lisboa

Instituto Politécnico da Guarda

Universidade de Évora

Instituto Politécnico de Beja

Instituto Politécnico de Coimbra

Instituto Politécnico de Viseu

Instituto Politécnico do Porto

Instituto Politécnico de Lisboa

Universidade do Algarve

Instituto Universitário de Lisboa (ISCTE-IUL)

Instituto Politécnico de Santarem

Instituto Politécnico de Bragança

Instituto Politécnico de Castelo Branco

Universidade of Madeira

Instituto Politécnico de Setubal

Escola de Enfermagem de Coimbra

Instituto Politécnico de Cávado Ave

Higher Institute for Nursing of Lisboa

University of Azores

Instituto Politecnico de Tomar

Universidade Aberta

Escola Superior de Turismo e Hotelaria do Estoril

Escola Superior de Náutica

Obrigado pela sua colaboração

Ana Marta Aleixo

APPENDIX D

Questionnaire (English version)

Exmo. Senhor
Reitor da Universidade

Assunto: Pedido de colaboração - projeto de investigação sobre o Desenvolvimento Sustentável nas Instituições de Ensino Superior Portuguesas

Exmo. Senhor Reitor,

Serve a presente para solicitar a colaboração de V.ª Ex.ª no preenchimento de um questionário, desenvolvido no âmbito da minha tese de doutoramento em Sustentabilidade Social e Desenvolvimento da Universidade Aberta. Este projeto visa estudar as práticas promotoras do Desenvolvimento Sustentável implementadas nas Instituições de Ensino Superior Portuguesas.

A sua colaboração é essencial e ajudará na obtenção de uma melhor compreensão desta temática nas Instituições de Ensino Superior em Portugal. O questionário demora cerca de 10 minutos a ser preenchido e inclui, essencialmente, questões fechadas.

Todos os dados obtidos através do questionário serão analisados apenas pelo investigador e seus orientadores, pelo que os resultados não serão facultados a qualquer entidade terceira nem utilizados para outros fins que não os já explicitados. Os resultados deste projeto poderão também ser consultados pelos interessados, sem restrições, após a sua conclusão.

Se tiver alguma dúvida sobre o preenchimento do questionário ou sobre o projeto poderá contactar-me através do email anamartaafsantos@gmail.com ou do telefone **965 183 886**. Os orientadores da tese de doutoramento, Professor Doutor Ulisses Azeiteiro da Universidade Aberta (ulisses.azeiteiro@uab.pt) e Professora Doutora Susana Leal do Instituto Politécnico de Santarém (susana.leal@esg.ipsantarem.pt) estão igualmente disponíveis para prestar esclarecimentos sobre o estudo. Adicionalmente, anexo declaração dos orientadores que atestam a finalidade do questionário em anexo.

Obrigado pela sua colaboração!

Cumprimentos,
Ana Marta Aleixo

UNIVERSIDADE ABERTA
www.uab.pt

Questionnaire

Sustainable Development in Portuguese Higher Education Institutions

This questionnaire aims to collect data within the scope of the PhD in Social Sustainability and Development to be held at the University Aberta by Ana Marta Santos. The aim is to investigate the implementation of projects, practices and initiatives related to Sustainable Development (SD) in Portuguese Higher Education Institutions (HEIs).

Next, you will be presented with various projects, practices or initiatives that can promote the Sustainable Development of Higher Education Institutions.

Tell to what extent they exist and are implemented or not in / at University / Polytechnic Institute driving.

In the following table, place a cross at the front of each statement, taking into account the degree of implementation / non-implementation of the practices / initiatives in question.

Note: If there are multiple ongoing projects, practices or initiatives for each topic, think about the most important project or the most advanced phase of implementation.

ENVIRONMENTAL DIMENSION

In my University/ Polytechnic, there is at least one project, practice, initiative that:	**Not implemented, not planned and not relevant**	**Not implemented, not planned but relevant**	**Yes there is, but only in the planning phase**	**Yes there is, but only in the implementation phase**	**Yes there is and it is fully implemented**
Promotes the construction of sustainable buildings on campus	☐	☐	☐	☐	☐
Promotes the conservation of biodiversity on and around the campus	☐	☐	☐	☐	☐
Promotes environmental volunteering activities	☐	☐	☐	☐	☐
Promotes the separation of waste and its forwarding for recycling (e.g., paper, plastic, metal, oils, batteries)	☐	☐	☐	☐	☐

Makes plans to reduce the production of waste (e.g., paper, plastic, metal, oils, batteries)	☐	☐	☐	☐	☐
Promotes the reusing of materials	☐	☐	☐	☐	☐
Promotes practices to reduce water consumption (e.g., taps with timer function, flushes with less water, making use of rainwater)	☐	☐	☐	☐	☐
Uses equipment to generate renewable energy (e.g., sun, wind, waves)	☐	☐	☐	☐	☐
Uses energy efficient equipment (e.g., efficient heaters, solar panels, energy saving light bulbs)	☐	☐	☐	☐	☐
Encourages the reduction of green house gases	☐	☐	☐	☐	☐
Encourages the use of sustainable transport for commuting to campus (e.g., bicycle, public transport, electric vehicles)	☐	☐	☐	☐	☐
Promotes the use of ecological brands	☐	☐	☐	☐	☐
Purchases organic food for on campus preparation	☐	☐	☐	☐	☐

If there are other projects, practices and initiatives that promote the SD of the institution, in the institutional, educational and political dimension, and that are not listed above, please indicate them in the following space:

ECONOMIC DIMENSION

In my University/ Polytechnic, there is at least one project, practice, initiative that:	**Not implemented, not planned and not relevant**	**Not implemented, not planned but relevant**	**Yes there is, but only in the planning phase**	**Yes there is, but only in the implementation phase**	**Yes there is and it is fully implemented**
Demonstrates concern about its economic performance	☐	☐	☐	☐	☐
Makes plans to improves its energy efficiency	☐	☐	☐	☐	☐
Fosters the management and improvement of processes	☐	☐	☐	☐	☐
Competes in national and international projects to be self financed	☐	☐	☐	☐	☐
Promotes the provision of services to the community	☐	☐	☐	☐	☐
Promotes the purchasing of food products from local/regional suppliers	☐	☐	☐	☐	☐
Always promotes cost reduction in all its activities	☐	☐	☐	☐	☐
Benefits from donations and private funding (e.g., Alumni, companies, organizations)	☐	☐	☐	☐	☐
Has a shop/space for the sale of products produced on campus	☐	☐	☐	☐	☐
Has a budget for practices promoting sustainable development	☐	☐	☐	☐	☐

If there are other projects, practices and initiatives that promote the SD of the institution, in the institutional, educational and political dimension, and that are not listed above, please indicate them in the following space:

SOCIAL AND CULTURAL DIMENSION

In my University/ Polytechnic, there is at least one project, practice, initiative that:	**Not implemented, not planned and not relevant**	**Not implemented, not planned but relevant**	**Yes there is, but only in the planning phase**	**Yes there is, but only in the implementation phase**	**Yes there is and it is fully implemented**
Promotes good practices in human resources management	☐	☐	☐	☐	☐
Fosters policies promoting equality and diversity	☐	☐	☐	☐	☐
Offers benefits and incentives to employees (e.g. for birthdays)	☐	☐	☐	☐	☐
Fosters the reconciliation of professional and personal life	☐	☐	☐	☐	☐
Offers child support systems for employees' children	☐	☐	☐	☐	☐
Fosters the professional and personal development and valorization of employees (e.g. vocational training, academic training)	☐	☐	☐	☐	☐
Has a canteen and food service	☐	☐	☐	☐	☐
Offers student residence services	☐	☐	☐	☐	☐
Offers financial and non-financial support and incentive programs to students in addition to the standard services	☐	☐	☐	☐	☐
Offers occupational health services (e.g. medical services for all academic community)	☐	☐	☐	☐	☐
Promotes initiatives and activities for the development of a healthy lifestyle	☐	☐	☐	☐	☐
Offers student support services (e.g. pedagogical, psychological, student reception and integration support)	☐	☐	☐	☐	☐
Promotes employability and insertion in the labour market of students and graduates (e.g. Employment Portal; Services and	☐	☐	☐	☐	☐

Office for Work Placements and Professional Guidance)					
Promotes training activities in transversal skills for students, not mandatory in course curricula (*Soft skills*)	☐	☐	☐	☐	☐
Promotes Ex-Students networks (e.g., Alumni Network; Employment Observatory; Professional Insertion Observatory; Ex-Students Association)	☐	☐	☐	☐	☐
Fosters the sharing of installations, facilities and human resources	☐	☐	☐	☐	☐
Offers occupational health services (e.g. medical services for all academic community)	☐	☐	☐	☐	☐
Promotes cultural or scientific initiatives targeting the outside community (e.g., open day, science week)	☐	☐	☐	☐	☐
Develops and participates in recreational, cultural or sports activities (e.g. sports events)	☐	☐	☐	☐	☐
Fosters the promotion of the cultural and artistic heritage	☐	☐	☐	☐	☐
Fosters concern and initiatives for social inclusion	☐	☐	☐	☐	☐
Promotes social solidarity initiatives	☐	☐	☐	☐	☐
Has on-campus community vegetable gardens	☐	☐	☐	☐	☐
Provides suitable access and installations for the disabled	☐	☐	☐	☐	☐

If there are other projects, practices and initiatives that promote the SD of the institution, in the institutional, educational and political dimension, and that are not listed above, please indicate them in the following space:

INSTITUTIONAL, EDUCATIONAL AND POLITICAL DIMENSION

In my University/ Polytechnic:	**Not implemented, not planned and not relevant**	**Not implemented, not planned but relevant**	**Yes there is, but only in the planning phase**	**Yes there is, but only in the implementation phase**	**Yes there is and it is fully implemented**
Sustainable development questions are included in the mission, vision and values of the HEI	☐	☐	☐	☐	☐
The strategic plans and objectives include concerns about sustainable development	☐	☐	☐	☐	☐
Publishes sustainability reports	☐	☐	☐	☐	☐
Communicates sustainable development activities	☐	☐	☐	☐	☐
Demonstrates concern about ethical issues (e.g., code of ethics or code of behavior, ethics commission)	☐	☐	☐	☐	☐
Promotes the education of teachers on sustainable development	☐	☐	☐	☐	☐
Organizes courses in partnership with other educational institutions in the area of sustainable development	☐	☐	☐	☐	☐
There are optitive curricular units on sustainable development in some courses	☐	☐	☐	☐	☐
There are optitive curricular units on sustainable development in all courses	☐	☐	☐	☐	☐
There are mandatory curricular units on sustainable development in some courses	☐	☐	☐	☐	☐
There are mandatory curricular units on sustainable development in all courses	☐	☐	☐	☐	☐
There are degrees in the area of sustainable development	☐	☐	☐	☐	☐
There are post-graduations, masters or doctorates in the area of sustainable development	☐	☐	☐	☐	☐
Encourages the development of systemic and holistic thinking in teaching and research	☐	☐	☐	☐	☐
Enables students, professors and staff to do exchange programs in the area of sustainable development	☐	☐	☐	☐	☐

There is a sustainable development research unit/center	☐	☐	☐	☐	☐
There are transdisciplinary research units/centers	☐	☐	☐	☐	☐
Has scientific publications in the area of sustainable development	☐	☐	☐	☐	☐
Organizes seminars or workshops on sustainable development	☐	☐	☐	☐	☐
There is a multidisciplinary structure to promote research and education in sustainability	☐	☐	☐	☐	☐
Conducts R&D projects on sustainable development	☐	☐	☐	☐	☐
Promotes the development of technologies and registers patents in the area of sustainable development	☐	☐	☐	☐	☐
Promotes the transfer of technology, innovation and knowledge (e.g., patents, company start-ups)	☐	☐	☐	☐	☐
Belongs to national and/or international networks for sustainable development (e.g., UES4D)	☐	☐	☐	☐	☐
Its organization chart includes a department responsible for sustainable development	☐	☐	☐	☐	☐
Its organization chart includes human resources whose work is to promote sustainable development	☐	☐	☐	☐	☐
Promotes student participation in on-campus sustainable development activities	☐	☐	☐	☐	☐
Promotes participation of (teaching and non-teaching) staff in on-campus sustainable development activities	☐	☐	☐	☐	☐
Sustainable development is taken into account in the institution's quality and evaluation procedures	☐	☐	☐	☐	☐
Conducts projects with other higher education institutions in the area of sustainable development	☐	☐	☐	☐	☐

Develops formal regional, national or international partnerships with a view to promoting sustainable development	☐	☐	☐	☐	☐

If there are other projects, practices and initiatives that promote the SD of the institution, in the institutional, educational and political dimension, and that are not listed above, please indicate them in the following space:

RANKINGS, CERTIFICATIONS AND DECLARATIONS IN WHICH YOU PARTICIPATES

7. Does your HEIs integrate any national or international ranking?

YES ☐

NO ☐

8. If yes, which one or which ones? Please select all that apply:

Greenmetric of World Universities (GreenMetric) ☐

Times Higher Education (THE) ☐

Leiden ☐

Global Research University Profile ☐

Scimago ☐

U-Multirank ☐

Quacquareli Symonds – University World Ranking (QS)☐

QS World University Ranking☐

Webmetrics☐

Shangai Academic Ranking of World Universities (ARWU)☐

Other:

9. Does your HEI have any certification?

YES ☐

NO ☐

10. If yes, which one or which ones? Please select all that apply:

Graphical Assessment of Sustainability in Universities System (GASU)☐

Quality Management System (ISO 9001)☐

Environmental Management System (ISO 14001)☐

Comunnity Eco-management and Audit Scheme (EMAS)☐

Monitoring and Avaliation of Social Responsibility Management System ☐

Management System for Social Responsability (NP 4469-1:2008 e/ou ISO 26000)☐

Energy Management System (ISO 50001)☐

Food Management System (ISO 22000)☐

Sustainable Events Management System (ISO 20121)☐

Information Security Management System (ISO 27001)☐

FSC Certification ☐

Other:

11. Has your HEIs signed any declaration of commitment for sustainable development and / or education for sustainable development?

YES ☐

NO ☐

12. If yes, which one or which ones? Please select all that apply:

Have signed the Principles PRiME (Principles for Responsible Management Education)☐

Integrates the Group for Reflection and Support for Corporate (GRACE)☐

Integrates the national Network of Social Responsability for Organizations (RSO.PT)☐

Integrates the Copernicus☐

Integrates the UE4SD (University Educators for Sustainable Development) ☐

Other:

CHARACTERIZATION OF THE INQUIRED

Provide us, please, some data about you.

13. Position in the University / Polytechnic:

Rector☐

Vice-Rector☐

President☐

Vice-President☐

Other:

14. How many years have you held this position:

Less than 1 year ☐

1☐

2☐

3☐

4☐

5☐

6☐

7☐

8☐

9☐

10☐

More than 10 years ☐

Name of HEIs

University of Minho

University of Coimbra

Polytechnic Institute of Leiria

University of Trás-os-Montes and Alto Douro

University of Lisboa

University of Porto

University of Aveiro

Polytechnic Institute of Viana Castelo

University of Beira Interior

New University of Lisbon

Nursing School of Porto

Polytechnic Institute of Portalegre

Nursing School of Porto

Polytechnic Institute of Guarda

University of Evora

Polytechnic Institute of Beja

Polytechnic Institute of Coimbra

Polytechnic Institute of Viseu

Polytechnic Institute of Porto

Polytechnic Institute of Lisboa

University of Algarve

University Institute of Lisbon (ISCTE-IUL)

Polytechnic Institute of Santarem

Polytechnic Institute of Bragança

Polytechnic Institute of Castelo Branco

University of Madeira

Polytechnic Institute of Setubal

Coimbra Nursing School

Polytechnic Institute of Cávado Ave

Higher Institute for Nursing of Lisboa

University of Azores

Polytechnic Institute of Tomar

University Aberta

Estoril Higher Institute for Tourism and Hotel Studies

Higher Nautical School

Thanks for the collaboration

Ana Marta Aleixo

APPENDIX E

Questions for the interviews and their translation

Guião de Entrevista	Interview script	
1ª Parte	**1st Part**	**References**
1.Em sua opinião, e em termos conjunturais quais são as questões mais relevantes que esta universidade/este instituto politécnico terá que enfrentar nos próximos dez anos?	1. In your opinion, what are the key conjunctural issues facing this university over the next ten years?	Wright & Worst (2013), Wright &Wilton (2012), Wright (2010)
2.Quando ouve falar em desenvolvimento sustentável, o que é que este termo significa para si?	2. When you hear the term sustainable development, what does this mean to you?	Wright & Worst (2013), Wright &Wilton (2012), Wright (2010)
3.A seu ver, qual o papel que as universidades e politécnicos devem ter, se é que devem ter algum, no alcance da sustentabilidade?	3. For you, what role, if any, do you feel universities and polytecnic institutes in general should play in achieving sustainability?	Wright & Worst (2013), Wright &Wilton (2012), Wright (2010)
4.Quando ouve o termo "universidade sustentável"/"politécnico sustentável", o que é que ele significa para si?	4. When you hear the term "sustainable University" or "Polytecnic institute Sustainable" what does this mean to you?	Wright & Worst (2013), Wright &Wilton (2012), Wright (2010)
5.Quais os obstáculos, se é que existem, que possam impedir a universidade/politécnico de se envolver em iniciativas sustentáveis?	5. What, if any, are the barriers that can prevent your university from engaging in sustainable initiatives?	Wright & Worst (2013), Wright &Wilton (2012), Wright (2010)
6.Que obstáculos e desafios prevê no futuro das IES no que se refere ao seu desenvolvimento sustentável?	6. Do you foresee different barriers and challenge in the future for sustainable development?	Wright & Worst (2013), Wright &Wilton (2012), Wright (2010)
7.**Dirigentes:** Considera ser plausível a sua Universidade/Politécnico passar a adotar, o desenvolvimento sustentável como eixo estratégico prioritário? Quais seriam as motivações para que isso acontecesse?	7. Do you think it is possible for your university/polytecnic institute to adopt a sustainable development as a strategic, priority objective? What would be the motives for this happen??	change the subject by authors
8.**Estudantes:** Acredita que a recente tendência das universidades verem os estudantes como "clientes" influencia a sustentabilidade no seu campus? Se sim, de que maneira?	8. Do you believe that the recent trend of universities viewing students as "customers" influences sustainability on your campus?	Elliot, H. 2014
2ª Parte	**2nd Part**	**References**
9.Considera que as IES devem ter a preocupação de ensinar conceitos de desenvolvimento sustentável no âmbito dos cursos de licenciatura e/ou de pós-graduação (mestrados, doutoramentos) das suas diversas faculdades/escolas? Se sim: a. Porquê? b.Como é que essa preocupação deve ser formalizada/implementada?	9. Do you onsider that HEIs should teach concepts of sustainable development within the undergraduate and/or graduate (master's, doctoral) of its various faculties/schools? If yes: a. Why? b.How is that this concern should be formalized/implemented?	proposed by the authors
10.Considera que as IES devem ter a preocupação de incentivar a investigação sobre questões de desenvolvimento sustentável? a.Como é que isso pode ser implementado ou incentivado?	10. Do you consider that HEIs should take care to encourage research on sustainable development issues? a.How is that this can be implemented or encouraged?	proposed by the authors
11. Considera que as IES devem ter a preocupação de tornar os campus mais verdes, i.e., amigos do ambiente? a. De que modo é que isso pode ser implementado? b. Essas decisões devem ser centralizadas ou descentralizadas?	11. Do you consider that HEIs should take care to make the greenest campus, e.g., environmentally friendly? a. How could this be implemented or encouraged? b. Should these decision be	proposed by the authors
12. Considera que as IES devem trabalhar com as autoridades locais e a sociedade civil para promover comunidades mais sustentáveis? a.No contexto da sua instituição de que modo é que isso poderia ser implementado? b.Quem deve tomar esta iniciativa?	12. Do you consider that the HEIs must work with local authorities and civil society to promote more sustainable communities? a. In your institution context what way this could be implemented? b. Who should take this initiative?	proposed by the authors
13. Considera que as IES devem comprometer-se com resultados e ações por meio de estruturas internacionais? a.Quais os benefícios que poderiam advir de tal envolvimento?	13. Do you consider that the HEIs must commit to results and actions through international structures? a. What are the benefits that might arise from his involvement?	proposed by the authors
14.Para além do acima mencionado, que outras práticas ou medidas podiam ser implementadas pelas IES portuguesas para promoverem o *desenvolvimento sustentável* e/ou se tornarem *IES sustentáveis*?	14. In addition to the above, what other practices or measures could be implemented by the Portuguese HEIs to promote sustainable development and/or become sustainable HEIs?	proposed by the authors
15.Há alguma informação adicional que queira acrescentar?	15. Do you wish to add any additional information?	proposed by the authors