

Sustainability management control systems in higher education institutions from measurement to management

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Abstract

Purpose – As social institutions, higher education institutions (HEIs) play a key role in the distribution of knowledge and skills for sustainable development and societal structures. To fulfill this task, the institutionalization of sustainability within the organization's structures is essential. The purpose of this paper is to provide an overview of the status quo of environmental management performance (EMP) in HEIs and conclusions for the application of management control systems.

Design/methodology/approach – Within a systematic literature review, 56 international publications were analyzed along a qualitative thematic content analysis. The coding followed the dimensions of EMP by Trumpp *et al.*

Findings – Structuring environmental sustainability efforts along the concept of EMP reveals a major weakness in environmental sustainability management of HEIs. Therefore, the study proposes a model for a processual integration of steering mechanisms for management bodies to systemize appropriate efforts to gain excellence in operations.

Originality/value – By applying the concept of EMP by Trumpp *et al.*, this systematic review provides an overview of the status quo of environmental management performance at HEIs and proposes a model for the implementation of advanced top-down steering striving a whole institution approach.

Keywords Sustainability, Levers of control, Higher education institutions (HEI), Environmental management performance (EMP), Management control systems (MCS)

Paper type Literature review



1. Call for sustainability management controls in higher education institutions

As important social institutions, higher education institutions (HEIs) play a key role in shaping the process of sustainable development by broadcasting and distributing knowledge and skills (Amaral *et al.*, 2015). To achieve this goal, the institutionalization of sustainability within the organization is essential. The course of implementing sustainability can proceed along various routes, however, ideally pursues a holistic approach controlled by a management process (Nolan, 2012). Therefore, it is necessary to go

beyond the discussions of assessing and measuring the outcomes of activities and turn toward the managerial perspective of applying steering processes. In this context, the implementation of management systems and the application of business tools can contribute to the institutionalization of sustainability efforts in HEIs (Disterheft *et al.*, 2012). Subsequently, this results in a professionalization of functions through actively managing relevant issues (Amaral *et al.*, 2015). The role of management structures therefore is an essential capacity for successfully operating such efforts (Sammalisto *et al.*, 2015).

As management appears to be a critical success factor for implementation processes, the question on systematically approaching management performance and management control systems (MCS) for steering environmental sustainability has not yet been a topic for the case of HEIs. Nor has the relationship between steering processes and environmental sustainability operations been an issue for research.

Previous scholars mostly examine approaches for the implementation and assessment of sustainability in HEIs (Baker-Shelley *et al.*, 2017; Cecal *et al.*, 2008; Comm and Mathaisel, 2005; Delakowitz and Hoffmann, 2000; Disterheft *et al.*, 2012; Lozano, 2006a; Savely *et al.*, 2007a) or obstacles hampering the institutionalization (Leal Filho *et al.*, 2017).

With this focus on an outcome-oriented assessment, a mismatch with the managerial perspectives on managing sustainability and a weak integration within management structures becomes evident (Burrell *et al.*, 2011; Cecal *et al.*, 2008; Lozano *et al.*, 2015; Popescu and Beleaau, 2014).

As institutionalization in management structures is indeed a necessary condition for becoming a sustainable organization (Alshuwaikhat and Abubakar, 2008; Ralph and Stubbs, 2014; Wright and Wilton, 2012), this reveals a major weakness for holistically implementing sustainability.

To issue this topic, the present study applies a systematic literature review to examine how HEIs perform environmental management.

The study makes two contributions to literature. First, archival data-based research gives an insight into the status quo of publications on the specific topic of environmental management performance (EMP). The study can be used to map current research approaches and practices. This allows to identify future research demands and topics that have not been studied yet.

Second, the study contributes to the predominantly case study-based research by expanding the existing literature on sustainability in HEIs on examining the managerial perspective of engagement. To pursue a whole institution approach, the study emphasizes aspects of systematically approaching management performance for environmental sustainability at HEIs. Therefore, the study applies the concept of EMP by Trumpp *et al.* (2015) to highlight the role of management functions, which draws new perspectives on aspects of steering environmental sustainability. This contributes to a better understanding of aims and conditions on a holistic implementation of sustainability within HEIs.

2. Theoretical background

The discussion on sustainability in HEIs often starts with the examination of engagement through participatory approaches as a major factor for a successful implementation (Arroyo, 2017; Clarke and Kouri, 2009; Disterheft *et al.*, 2015). Indeed, voluntary engagement does play a key role in that process, though this must not forego the fact that commitment within management and leadership is essential when pursuing the ideal of a whole institution approach (Brinkhurst, Rose *et al.*, 2011; Lozano, 2006a; Verhulst and Lambrechts, 2015). Management commitment helps to establish the structures necessary for successful saturation in HE bodies. With a rising professionalization of public management through

the adaption of business processes, the application of structured steering mechanisms for HEIs also becomes evident (Arjaliès and Mundy, 2013). In that context the application of MCS serves as a proper tool, which allows to operate a structured management process on environmental sustainability (Pondeville *et al.*, 2013).

For the case of examining the EMP of HEIs, the study applies the model of EMP by Trumpp *et al.* (2015) to systematically survey and structure existing management approaches. The EMP model provides a workable approach for the case of the present examination, as it follows the argumentation of a highly contextual and organization-dependent degree of integration, which makes it assignable for the context of HEIs.

In advancement to the examination of the EMP, the study approaches to map existing activities with the levers of control (LoC) framework by Simons (1994). The choice for this approach is because of the fact that the LoC cover a broad spectrum of relevant aspects of a management control system and its balance between innovation within knowledge intensive organizations.

First applying Trumpp's EMP model as theoretical basis for the content analysis of the reviewed literature pursues the purpose of strategically approaching environmental performance and management principles with regard to the natural environment (Trumpp *et al.*, 2015). As Trumpp designed the EMP along the definition of environmental management systems such as the ISO 14001 and ISO 14031, the structure subdivides into the following dimensions:

- environmental policy;
- environmental objectives;
- environmental processes;
- organizational structures; and
- environmental monitoring.

Environmental policy constitutes an organization-wide pledge for responsibility and states the organization's philosophy regarding improvements of the operational performance.

Environmental objectives refer to specific environmental goals and targets that translate the policy into action. Environmental processes refer to concrete organizational procedures to improve the environmental operational performance of an organization.

Organizational structures describe formal management structures to realize the targeted goals.

Environmental monitoring characterizes review-procedures and corrective actions to ensure improvements of the environmental operational performance (Trumpp *et al.*, 2015).

The application of Trumpp's model enables to map existing management performance on environmental issues. This allows to examine approaches on current MCS. MCS in general aim at supporting institutionalization by means of different levers or objects of control.

This concept goes back to Anthony (1965), who defined MCS as *"the process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives."* Supplementing these thoughts, Simons (1994) shifts the focus on strategic issues operating along different "levers," which support the implementation of business strategies and objectives. In his understanding, he differentiates four forces being crucial for the field of management controls, namely, beliefs system, boundary systems, diagnostic controls and interactive controls.

The beliefs systems describe an *"explicit set of organisational definitions [...] to provide basic values, purpose, and direction for the organisation"* (Simons *et al.*, 2000). According to Simons, this lever includes the vision and mission, organizational guidelines or codes of conduct.

The boundary systems as the second lever embrace “*explicit statements embedded in formal information systems that define and communicate specific risks to be avoided*” (Simons *et al.*, 2000). This lever works as a limiting force to channel creativity in the course of searching for new opportunities.

Diagnostic control systems describe control-based (re-)actions, such as budgeting or control systems for projects. Simons describes them as “*the formal information systems [...] to monitor organisational outcomes and correct deviations from present standards of performance*” (Simons *et al.*, 2000).

In contrast to the diagnostic controls stand the interactive controls. They describe formal information systems used for personal involvement in decision-making (Simons *et al.*, 2000). Therefore, a constant collection and evaluation of data is required to identify uncertainties.

In advancement to the LoC, Malmi and Brown (2008) highlight the role of information-based routines. Though his concept aims to consider the increasing complexity of corporate structures, so far no empirical proof for the feasibility of this approach could be delivered.

As Simons’ model is a well-established tool in the business context, the application of the LoC for the case of identifying management processes to steer environmental sustainability at HEIs also works as an appropriate framework to identify certain activities.

3. Data collection and analysis

The study applies a systematic review of scientific papers and academic publications following a transparent and structured multi-stage process after Fink (2005) and Tranfield *et al.* (2003).

Step 1: Selecting search terms and databases.

As scanning literature on Google Scholar delivered no results on EMP or the application of management controls at HEIs, the study gives an extended and structured approach for the research on archival data within electronic databases. The examination browsed the databases EBSCO (Academic Search Complete and Business Source Complete) and Web of Science on publications with explicit nominations in topics, titles, abstracts or keywords containing the phrases such as *sustainab**, *green*, *ecol**, *environmental** AND “*manag* control**”, “*public sector accounting*”, “*performance measurement*”, MCS, MAS AND “*high* education*”, *universit**, *college**, *campus*, “*Business school**”, “*HEI**” and “*knowledge intensive organi?ation**” to gain a broad field of articles addressing EMP at HEIs. The social dimension of the triple bottom line issuing responsible management was excluded for the case of the present study, as the examination focused on the environmental dimension of sustainability to maintain a clear construct (Lozano, 2011). To gain a certain level of quality, the screening process primarily aimed at journals from the German VHB ranking in the categories “*Nachhaltigkeitsmanagement*” (NAMA), “*Hochschulmanagement*” (HSM) and “*Rechnungswesen*” (RECH) ranked A, B or C, whereas on journals from the Harzing List subject areas: “*Public Sector Management*” (PSM) and “*Finance and Accounting*” (F&A) ranked A or B in the ABDC ranking. In a second step, the study supplemented the findings with journal recommendations from the Academy of Management in the division “*Organizations and the Natural Environment*” applying the same browsing criteria.

Step 2: Applying practical screening criteria.

To avoid bias in the results, research comprised journal papers, conference papers and practical guidelines in English language without a time restriction. For our content analysis, the study defines distinct excluding criteria covering issues of learning, teaching, training, curricular and student affairs, as well as campus rankings, carbon footprint frameworks or studies dealing with single topics, such as efforts in waste management (Zhang *et al.*, 2011). Furthermore, the study excluded publications from the accounting context without

references to HEIs. This serves to sort out cases without relevance to (environmental) management controls or performance management issues at HEIs

Step 3: Application of methodological screening criteria.

To conclude the screening of literature (Table I), the availability check finalized the process. The categories for the analysis derived from the dimensions of EMP. To specify and structure the findings, a review protocol was generated. The analysis categories embrace the domains:

- Bibliographic data: Author(s) and title, journal year of publication, geographic origin of research, type of publication and land of publication.
- Approach of the publication: Research design, data collection method and data analysis method.
- Dimensions of EMP after Trumpp *et al.*: Environmental policy, environmental objectives, environmental processes, organizational structures and environmental monitoring.
- Synthesizing the findings.

Step 3 actually marks the screening for EMP dimensions. To be assigned to the dimensions of EMP, the statements had to fit the definition in terms of referring to policy, objectives,

<i>Bibliographic data</i>	
Author(s)	Who is/are the author(s) of the publication?
Year	In which year was the work published?
Title	What is the title of the publication?
Type of publication	What kind of publication? (Book, journal, research report, practitioner-related report)
Journal name	If it is a journal: what is the journal's name?
<i>Background of the publication</i>	
Methodology of the publication	What is the main contribution? (theoretical/conceptual, empirical (survey, case study, etc.) and practical-solution oriented)
Country	Which country does the publication focus on?
Research design	Which research design was used? (survey, case study and case study combined with survey)
Data collection method	How was the data collected? (observation, document analysis, interview, questionnaire and combination of data collection methods)
Data analysis method	How was the data analyzed? (inferential statistics, only descriptive statistics, qualitative)
<i>Organizational environmental performance</i>	
Environmental policy	What is the organization-wide pledge for responsibility which states the organization's philosophy?
Environmental objectives	What are the specific environmental goals and targets that translate the policy into action
Environmental processes	What organizational procedures improve the environmental operational performance of the organization?
Organizational structures	What formal management structures are utilized to realize the targeted goals?
Environmental monitoring	What review procedures and corrective actions are used to ensure improvements of environmental operational performance?
<i>Focus and content of the publication</i>	
Focus of the publication	What is the focus of the publication?
Content of the publication	What is the subject of the publication?

Table I.
Review protocol

structures, monitoring or processes. The coding was held deliberately open to cover a vast spectrum subjecting EMP at HEIs within the publications. The coding was undertaken by one member of the research team and double checked by a student researcher to avoid bias and suggestive defamation in the results.

4. Results

The following section is structured into a bibliographic analysis and content analysis following the recommendations of [Schaltegger and Wagner \(2017\)](#), [Seuring and Gold \(2012\)](#).

4.1 Bibliographic analysis

Screening for title, abstract and subject terms as well as full text under the application of filter criteria and availability check, the review identified 56 relevant publications for the inquiry ([Figure 1](#)).

The distribution of articles over time reveals a growing number of publications since the year 2006 (5 per cent) with a peak in the year 2015 (23 per cent) ([Figure 2](#)). This shows that (environmental) sustainability in HEIs is becoming a topic of growing interest for both research and practice. Almost 55 per cent of publications apply case studies for research design, followed by surveys (32 per cent), mixed method approaches (7 per cent) and indefinite designs (6 per cent). The examination of the publications' background furthermore shows that almost 40 per cent of the articles are document analyses, followed by 30 per cent qualitative and quantitative methods and 10 per cent questionnaires. The data analysis

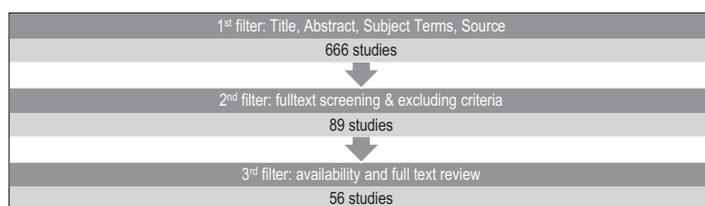


Figure 1.
Steps of filtering
literature (own
illustration)

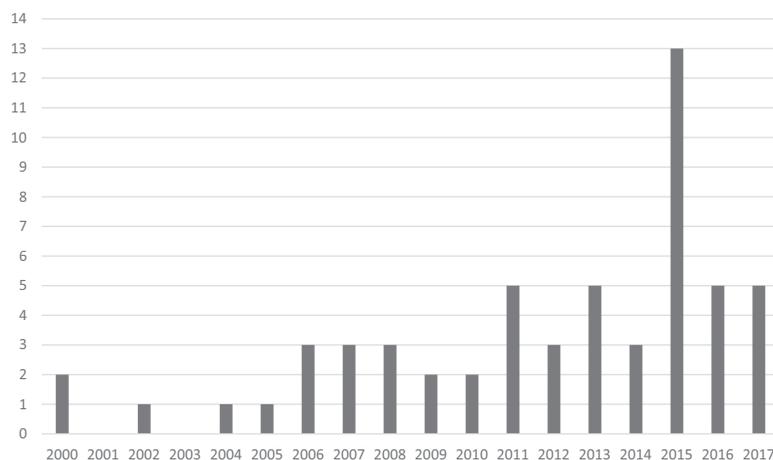


Figure 2.
Distribution of
publications over
time (own
illustration)

method dominates with approximately 70 per cent qualitative approaches, 13 per cent inferential statistics and 8 per cent descriptive statistics.

Looking to the publication's background, the origin mainly centers on Europe (44 per cent) and North America (27 per cent) followed by Australia and Asia (22 per cent), whereas South America (7 per cent). Analyzing the European cluster in detail, the study shows a publication focus in Spain (20 per cent), Portugal (12 per cent) and the UK (12 per cent) (Figure 3).

Looking into the journals addressing EMP issues at HEIs, the majority of publications originates from the *Journal of Cleaner Production* (41 per cent), whereas the *International Journal of Sustainability in Higher Education* (44 per cent). Only 14 per cent of literature originates from various other journals (Figure 4).

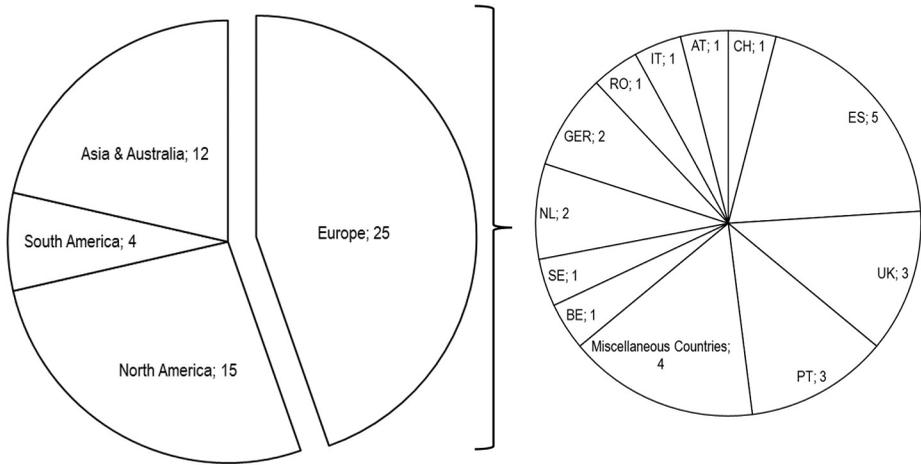


Figure 3. Global distribution of publications with a special focus on Europe (own illustration)

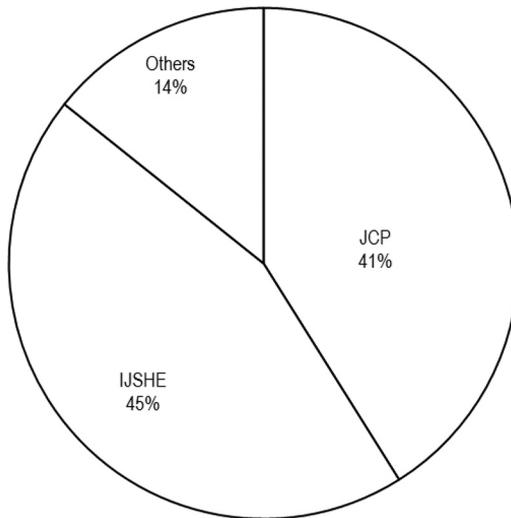


Figure 4. Distribution of journal publications (own illustration)

4.2 Content analysis

The content analysis follows the dimensions EMP after [Trumpp et al. \(2015\)](#). The appearance of distinct performance features within the dimensions allows a structured view on the current management performance in HEIs.

In general, the content analysis reveals that the majority of literature addresses implementation efforts triggering transformational processes toward the implementation or the improvement of sustainability efforts in HEIs ([Baker-Shelley et al., 2017](#); [Hoover and Harder, 2015](#); [Lozano, 2006a](#)). One research direction is the examination of obstacles for the implementation ([Clarke and Kouri, 2009](#); [Disterheft et al., 2015](#); [Lozano, 2006a](#)) or the assessment of the institution's sustainability engagement whereas the measurement of its outcomes ([Cronemberger de Araújo Góes and Magrini, 2016](#); [Lozano, 2006b](#); [Urquiza-Gómez et al., 2015](#)). Furthermore, participatory approaches considering stakeholder engagement seem to be of particular interest ([Alshuwaikhat and Abubakar, 2008](#); [Hoover and Harder, 2015](#); [Kapitulčinová et al., 2017](#); [Velazquez et al., 2006](#); [Wolf et al., 2011](#)). As the study shows, environmental management systems are in fact an objective of research, although the focus lies on the measurement of outcomes ([Noeke, 2000](#); [Savely et al., 2007a, 2007b](#); [Spellerberg et al., 2004](#)).

For the detailed analysis of the EMP, the study applies certain working definitions on the dimensions of EMP to achieve a clear construct and to distinguish the scales for the content analysis. For a better understanding, the definitions are placed before the analysis of each dimension.

The “environmental policy” of HEIs defines the existence of certain strategic orientations toward environmental issues. As the study shows, this is a very strong and common attitude in HEIs' implementation efforts on (environmental) sustainability issues ([Arroyo, 2017](#); [Ralph and Stubbs, 2014](#)). This strategic orientation often condenses to a commitment on general objectives, which are not explicitly referring to a distinct action or procedure ([Finlay and Massey, 2012](#); [Vaughter et al., 2016](#)).

A further aspect with a high relevance within “environmental policy” is the development of governance guidelines defining a distinct standard for the institution's activities ([Jorge et al., 2015](#)). Besides this strategic orientation, the transformation of management commitments into clear action plans appears as an important step on the pathway toward institutionalizing sustainability. Implementing sustainability through formal governance structures and a clear policy requires a management commitment under regard of leadership, as it is a management task to distribute resources to process sustainability ([Finlay and Massey, 2012](#); [Ralph and Stubbs, 2014](#); [Sammalisto et al., 2015](#)).

The dimension of “environmental objectives” embraces the strategic planning and transmission of action plans within the various fields of environmental activities. This embraces different topics that are decisive for operating a green campus comprising issues such as waste reduction, energy efficiency or resource management ([Disterheft et al., 2012](#); [Er and Karudan, 2016](#); [Lozano et al., 2015](#); [Swearingen-White, 2014](#); [van Weenen, 2000](#)). The environmental objectives define a precise goalsetting, which condenses in a more tangible and assessable measurement of efforts, e.g. for reducing the carbon footprint or updated guidelines and obligations for more awareness in campus operations ([Atherton and Giurco, 2011](#); [Finlay and Massey, 2012](#); [Lo, 2015](#)). In this context, the usage of management tools is an important aspect. Measures, guidelines and assessment tools for the specific context of HEIs are in fact common in research and also in application ([Burrell et al., 2011](#); [Noeke, 2000](#)). Despite their existence and proliferation, the analysis shows no common standard for the assessment of engagement among HEIs, instead unveils a variety of different tools in use (see environmental monitoring). Therefore, the dimension of “environmental objectives”

can be seen as the operationalization of management commitment and strategy defined within the dimension of environmental policy. Environmental objectives break down the pledge for engagement to a level that can be operationalized. This actually paves the way for determining environmental sustainability efforts.

“Environmental processes” describe the process-oriented and interpersonal performance of environmental management (Hoover and Harder, 2015; Swearingen-White, 2014; van Weenen, 2000). As the analysis shows, environmental processes are primarily driven by individuals (promoters) or networks (stakeholders). Therefore, the environmental process pursue an activity as a hub for interaction. These interrelations with internal and external stakeholders mark the institutional link with the organizational environment by processing participation and inter or transdisciplinarity (Baker-Shelley *et al.*, 2017; Barth, 2013; Comm and Mathaisel, 2005; Disterheft *et al.*, 2012; Sammalisto *et al.*, 2015). Research and exchange networks with practitioners (non-academic staff), researchers (academic staff), students or interest groups (NGOs) mark the major interest groups currently taken into account in terms of campus sustainability activities (Barth, 2013; Disterheft *et al.*, 2015; Swearingen-White, 2014). Networking on environmental sustainability seems to be an important issue for HEIs. As the content analysis shows, management bodies can provide helpful support, as initiating and fostering networks requires resources (financial, time, space, capacities, etc.) for integrating and linking various demands (Disterheft *et al.*, 2012; Jorge *et al.*, 2015; Verhulst and Lambrechts, 2015).

The “organizational structures” and “environmental monitoring” as the final dimensions of EMP range from formal management structures derived from functions within the environmental processes to the assessment of engagement on environmental sustainability. As the examination shows a certain interrelation between both, the analysis comprises them simultaneously.

The “environmental structure” characterizes along distinct management patterns installed to ensure and maintain sustainability setups (Atherton and Giurco, 2011; Finlay and Massey, 2012; Ribeiro *et al.*, 2015). These structures are an often mentioned factor for the implementation of sustainability, which are located in different parts of the institution ranging from sustainability offices, interdisciplinary task forces of experts or voluntary engagement at the interface between students and administration (Barth, 2013; Hoover and Harder, 2015; Spellerberg *et al.*, 2004). Involvements with the dimensions of environmental objectives and processes consequently put management commitment and policy into action.

An aspect, which often receives little attention, but nevertheless plays a role for the success of sustainability efforts is the incorporation beyond formal structures into aspects of organizational culture, such as rules or campaigns (Posner and Stuart, 2013; Spellerberg *et al.*, 2004). This enables to informally incorporate sustainability values as a cross-sectional topic into the whole institution.

The strong link between formal structures and “environmental monitoring” becomes evident, when it comes to the questions of performance outcomes. Environmental monitoring therefore aims at a general supervision of performance outcomes. As a major task the assessment of effectiveness determines further actions of both, management and operations (you cannot manage, what you do not measure) by making it able to assess the success of distinct sustainability activities. Frequently mentioned assessment standards for the context of HEIs are the ISO 14001, the Green Building Initiative or the EMAS Standard (Alshuwaikhat and Abubakar, 2008; Amaral *et al.*, 2015). Distinct tools for the assessment of HEI’s engagement range from: Auditing Instrument for sustainability in higher Education, sustainability change agents’ toolbox, sustainability tracking assessment and rating system, and graphical assessment of sustainability in universities as a further development

of the GRI standard for the HE context (Baker-Shelley *et al.*, 2017; Berzosa *et al.*, 2017; Bullock and Wilder, 2016; Kaptulčinová *et al.*, 2017).

The content analysis provides insight into the performance of environmental management. Figure 5 illustrates the number of mentions on the dimensions and topics of EMP derived from the content analysis. It becomes evident that leadership (43), followed by participatory approaches (40), as well as people and networks (34) show a high proliferation among publications. Low disseminations can be found on topics of governance (9), management bodies (12) and the cultural incorporation of sustainability values (14).

5. Propositions

EMP as a bundle of policies, objectives, structures, processes and monitoring finally enables to make propositions for the implementation of management controls and for the determination of environmental (management) performance of HEIs. With the examination of perceptible performance outcomes, it is possible to compress the existing data into implications for research and practice.

The examination reveals, that contemplating environmental sustainability efforts on a whole-institution basis is not yet mainstream. The study proposes a model for the integration of steering mechanisms in HEI's management to operate environmental performance. Based on the findings of the content analysis, the model provides a template with increasing complexity and management commitment, which serves to process a structured approach for HEIs. Therefore, the results of the analysis are merged with the LoC in a two-stage integration process. This process depicts the implementation of environmental performance management depending on the institution's capacities.

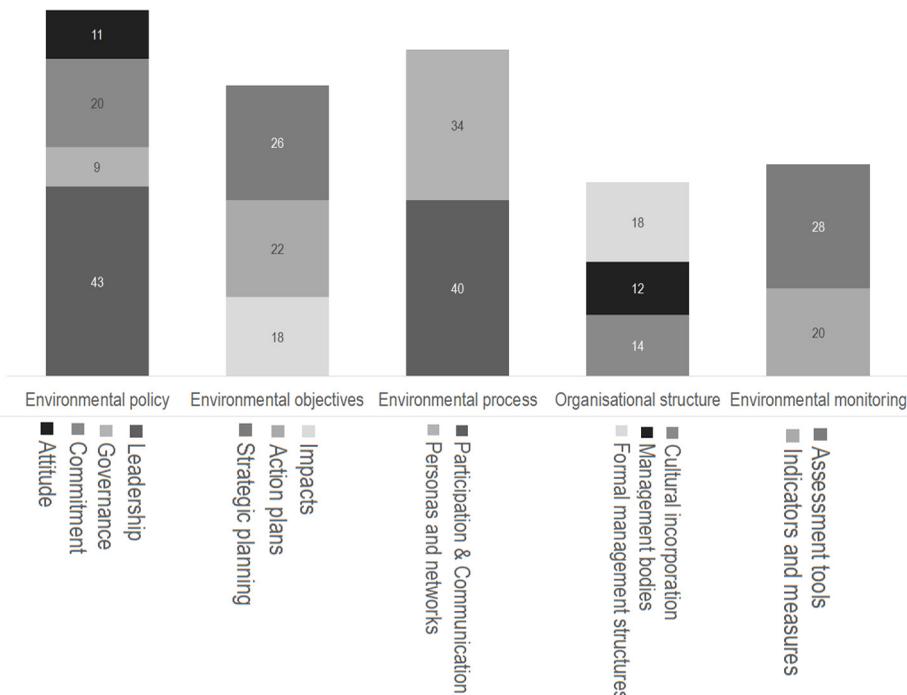


Figure 5. Absolute dispersion of EMP

In the first stage, the circular model starts with low expense operational activities (light grey) introducing the assessment and creation of basic structures for further engagement. According to the LoC, these activities represent the levers of diagnostic and interactive controls. The organizational structure serves as an operational pattern to enable target fulfillment by supervising measures, which requires a low degree of management activities.

In stage two, the active participation of management rises with an increasing complexity of tasks. Likewise, the view widens on all LoC (including belief and boundary systems = dark grey). Environmental policy as the management commitment and objectives as the target system requires an increasing management involvement, as they define the institution's superstructure and serve as a basis for pursuing an environmental strategy. Striving environmental objectives determine environmental processes, which lead to their proliferation and rigidity within the institution's structures. An occurring coherency between the dimensions suggests that they are not isolated, but rather aligned in an interrelation cascade. Therefore, an overlapping in the dimensions strengthens their internal consistency. Along these stages institutions can install a system of management controls to steer their environmental activities within existing structures and running management processes.

6. Discussion and conclusion

The present study examines the environmental performance and the operationalization of environmental issues in HEIs' management. The study gives insight into the status quo of implementation efforts and examines HEIs' environmental performance along the dimensions of policy, objectives, structures, processes and monitoring. The results show that performance issues play a role within HEIs' environmental management, though the distribution across the dimensions differs. The content analysis shows that performance in the dimensions of EMP stands in interrelation with a structured management approach on environmental sustainability. The perceivable EMP of HEIs (so far) does not follow a common practice.

The present study *contributes* to the discussion of sustainability in HEIs in two ways.

First, the study provides a systematical overview of different research approaches on environmental management aspects determining the environmental performance of HEIs. The study shows, that so far no common practice for systematically managing environmental sustainability exists for the case of HEIs.

In total the proliferation of EMP appears to be moderate. Many HEIs focus on the assessment of engagement applying one of the various tools designed for determining HET's sustainability outcomes. This can be explained by the amount of voluntary and feasible disclosure opportunities, which can be adopted with a limited use of resources and a low degree of management involvement. For the case of environmental policy, a commitment to sustainability actually bears low hurdles, since the non-binding character doesn't necessarily lead to a direct entitlement or obligations. This makes it easy to access the field of sustainability but in the same way might also lead to inactivity and could foster lip-serving. These difficulties are underlined by the fact, that HEIs often have an environmental policy, though distinct objectives are missing.

Remarkably is also a low level of information on processes and structures, which points to a weak institutionalization of engagement. Since these functions require the allocation and use of resources (time, money, capacities etc.), many HEIs seem to withdraw from putting their commitment into practice. This might reason from a hardly quantifiable outcome attributed to this engagement or unclear objectives, which make it difficult to

pursue distinct goals. This indicates, that present environmental management at HEIs pursues an operational pattern with little consideration on strategic approaches. This might also be a reason for a separation of sustainability functions hampering a holistic implementation within HEIs.

Second, the study expands the current literature on sustainability in HEIs by exploring the role of management performance for the implementation and steering of (environmental) sustainability within management structures. The application of EMP enables a new perspective for the understanding of aims and conditions on a successful implementation of steering sustainability within HEIs along the proposed model (Figure 6).

The proliferation of performance information on policies, objectives and monitoring and the weak expressions of structures and processes illustrates the need for a systematic approach on environmental management. Though the willingness to commit to sustainability values is apparent, the operational implementation so far is limited to performance measurement.

Based on these findings, the study holds *implications* for decision-makers and researchers. First, the policy and objectives have to be translated into distinct structures and processes that focus not only on the assessment of activities, but are also capable to act proactively. The allocation of resources is a necessary management task to enable the processing of sustainability and implementing long-term structures.

Second, the results suggest the charge for environmental sustainability within HEIs is complex. As the analysis shows management steering appears to be inevitable. Therefore, a shift from operational activities to a more strategic orientation seems necessary. Even with limited resources sustainability can be managed along participatory approaches supporting existing structures with voluntary engagement.

This leads to a third implication issuing the impact of engagement. So far assessment focuses on the outcomes of efforts, but foregoes the long term impacts of engagement.

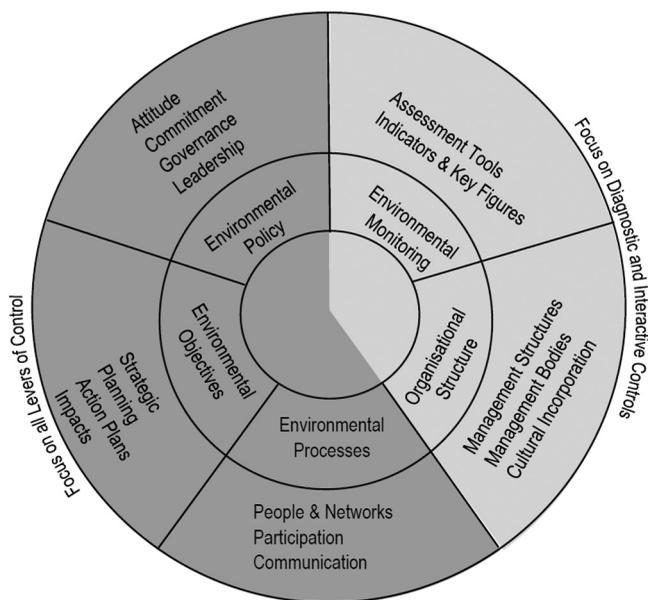


Figure 6.
Process of integrating
EMP within the LoC

Though plenty of measurement tools for HEIs exist, indications on impact measurement or long term effects are not available. In contrast the study observes measurement and evaluation of environmental performance remains on a level of short or mid-term effects. Although considerations of impact should be included into engagement, appropriate indicators are missing.

Just as many other surveys, the present study also shows *limitations* providing future research needs. A constrain lies in the consideration of archival data. This might limit the generalizability, since a certain bias on environmentally engaged institutions is evident. When talking about management performance an understanding for sustainability and management processes is necessary. This might be a reason for increased application barriers in practice. Future research could empirically test our results along a practical application within HEIs.

A possible research demand could seek a comparison with performance aspects of teaching- and research in relation to the EMP of HEIs to assess the overall sustainability performance of an institution. Furthermore, an adjustment with social performance aspects could also be an interesting topic for examining management systems as steering mechanisms of sustainability performance in HEIs.

Another field for future research could be the transfer from indicator-driven operational performance to a more holistic approach which addresses steering processes in advance and applying the model proposed in this study. Finally, the study states a positive trend for the proliferation of (environmental) sustainability efforts at HEIs. Even without advanced steering concepts, it is possible to start reducing environmental impacts and contribute to sustainable development, a trend which can be expected to improve with further research in the field.

References

- Alshuwaikhat, H.M. and Abubakar, I. (2008), "An integrated approach to achieving campus sustainability: assessment of the current campus environmental management practices", *Journal of Cleaner Production*, Vol. 16 No. 16, pp. 1777-1785.
- Amaral, L.P., Martins, N. and Gouveia, J.B. (2015), "Quest for a sustainable university: a review", *International Journal of Sustainability in Higher Education*, Vol. 16 No. 2, pp. 155-172.
- Arjaliès, D.-L. and Mundy, J. (2013), "The use of management control systems to manage CSR strategy: a levers of control perspective", *Management Accounting Research*, Vol. 24 No. 4, pp. 284-300.
- Arroyo, P. (2017), "A new taxonomy for examining the multi-role of campus sustainability assessments in organizational change", *Journal of Cleaner Production*, Vol. 140, pp. 1763-1774.
- Atherton, A. and Giurco, D. (2011), "Campus sustainability: climate change, transport and paper reduction", *International Journal of Sustainability in Higher Education*, Vol. 12 No. 3, pp. 269-279.
- Baker-Shelley, A., van Zeijl-Rozema, A. and Martens, P. (2017), "A conceptual synthesis of organisational transformation: how to diagnose, and navigate, pathways for sustainability at universities?", *Journal of Cleaner Production*, Vol. 145, pp. 262-276.
- Barth, M. (2013), "Many roads lead to sustainability: a process-oriented analysis of change in higher education", *International Journal of Sustainability in Higher Education*, Vol. 14 No. 2, pp. 160-175.
- Berzosa, A., Bernaldo, M.O. and Fernández-Sánchez, G. (2017), "Sustainability assessment tools for higher education: an empirical comparative analysis", *Journal of Cleaner Production*, Vol. 161, pp. 812-820.
- Brinkhurst, M., Rose, P., Maurice, G. and Ackerman, J.D. (2011), "Achieving campus sustainability: top-down, bottom-up, or neither?", *International Journal of Sustainability in Higher Education*, Vol. 12 No. 4, pp. 338-354.

- Bullock, G. and Wilder, N. (2016), "The comprehensiveness of competing higher education sustainability assessments", *International Journal of Sustainability in Higher Education*, Vol. 17 No. 3, pp. 282-304.
- Burrell, D.N., Anderson, M., Besette, D. and Dawson, M. (2011), "A contemporary evaluation of universities and sustainability strategic planning", *Review of Management Innovation and Creativity*, Vol. 4 No. 11, pp. 65-80.
- Cecal, A., Cecal, A.L., Humelnicu, D., Endler, W. and Draghici, C. (2008), "Environmental management implemented in German universities", *Bulletin of the Transilvania University of Brasov, Series I: Engineering Sciences*, Vol. 1 No. 50, pp. 203-206.
- Clarke, A. and Kouri, R. (2009), "Choosing an appropriate university or college environmental management system", *Journal of Cleaner Production*, Vol. 17 No. 11, pp. 971-984.
- Comm, C.L. and Mathaisel, D.F. (2005), "A case study in applying lean sustainability concepts to universities", *International Journal of Sustainability in Higher Education*, Vol. 6 No. 2, pp. 134-146.
- Cronemberger de Araújo Góes, H. and Magrini, A. (2016), "Higher education institution sustainability assessment tools: considerations on their use in Brazil", *International Journal of Sustainability in Higher Education*, Vol. 17 No. 3, pp. 322-341.
- Delakowitz, B. and Hoffmann, A. (2000), "The hochschule zittau/görlitz: Germany's first registered environmental management (EMAS) at an institution of higher education", *International Journal of Sustainability in Higher Education*, Vol. 1 No. 1, pp. 35-47.
- Disterheft, A., Caeiro, S. and Azeiteiro, U.M. (2015), "Sustainable universities – a study of critical success factors for participatory approaches", *Journal of Cleaner Production*, Vol. 106, pp. 11-21.
- Disterheft, A., Ferreira da Silva, S.S., Ramos, M.R. and de Miranda Azeiteiro, U.M. (2012), "Environmental management systems (EMS) implementation processes and practices in European higher education institutions – top-down versus participatory approaches", *Journal of Cleaner Production*, Vol. 31, pp. 80-90.
- Er, A.C. and Karudan, R. (2016), "Promoting campus sustainability: a conceptual framework for the assessment of campus sustainability", *E-BANGI Journal*, Vol. 11 No. 2, pp. 36-63.
- Fink, A. (2005), *Conducting Research Literature Reviews: From the Internet to Paper*, SAGE.
- Finlay, J. and Massey, J. (2012), "Eco-campus: applying the ecocity model to develop green university and college campuses", *International Journal of Sustainability in Higher Education*, Vol. 13 No. 2, pp. 150-165.
- Hoover, E. and Harder, M.K. (2015), "What lies beneath the surface? The hidden complexities of organizational change for sustainability in higher education", *Journal of Cleaner Production*, Vol. 106, pp. 175-188.
- Jorge, M., Madueño, J., Cejas, M.Y. and Peña, F.J. (2015), "An approach to the implementation of sustainability practices in Spanish universities", *Journal of Cleaner Production*, Vol. 106, pp. 34-44.
- Kapitulčinová, D., Atkisson, A., Perdue, J. and Will, M. (2017), "Towards integrated sustainability in higher education – mapping the use of the accelerator toolset in all dimensions of university practice", *Journal of Cleaner Production*, doi: [10.1016/j.jclepro.2017.05.050](https://doi.org/10.1016/j.jclepro.2017.05.050).
- Leal Filho, W., Wu, Y.-C.J., Brandli, L.L., Avila, L.V., Azeiteiro, U.M., Caeiro, S. and Madruga, L.R.D.R.G. (2017), "Identifying and overcoming obstacles to the implementation of sustainable development at universities", *Journal of Integrative Environmental Sciences*, Vol. 14 No. 1, pp. 93-108.
- Lo, K. (2015), "Campus sustainability in Chinese higher education institutions", *International Journal of Sustainability in Higher Education*, Vol. 16 No. 1, pp. 34-43.
- Lozano, R. (2006a), "Incorporation and institutionalization of SD into universities: breaking through barriers to change", *Journal of Cleaner Production*, Vol. 14 Nos 9/11, pp. 787-796.

- Lozano, R. (2006b), "A tool for a graphical assessment of sustainability in universities (GASU)", *Journal of Cleaner Production*, Vol. 14 Nos 9/11, pp. 963-972.
- Lozano, R. (2011), "The state of sustainability reporting in universities", *International Journal of Sustainability in Higher Education*, Vol. 12 No. 1, pp. 67-78.
- Lozano, R., Ceulemans, K., Alonso-Almeida, M., Huisingh, D., Lozano, F.J., Waas, T., Lambrechts, W., Lukman, R. and Hugé, J. (2015), "A review of commitment and implementation of sustainable development in higher education: results from a worldwide survey", *Journal of Cleaner Production*, Vol. 108, pp. 1-18.
- Malmi, T. and Brown, D.A. (2008), "Management control systems as a package—opportunities, challenges and research directions", *Management Accounting Research*, Vol. 19 No. 4, pp. 287-300.
- Noeke, J. (2000), "Environmental management systems for universities – a case study", *International Journal of Sustainability in Higher Education*, Vol. 1 No. 3, pp. 237-251.
- Nolan, C. (2012), *Shaping the Education of Tomorrow: 2012-2012 Report on the UN Decade of Education for Sustainable Development, Abridged*, UNESCO, Paris.
- Pondeville, S., Swaen, V. and De Rongé, Y. (2013), "Environmental management control systems: the role of contextual and strategic factors", *Management Accounting Research*, Vol. 24 No. 4, pp. 317-332.
- Popescu, M. and Beleaua, I.C. (2014), "Improving management of sustainable development in universities", *Bulletin of the Transilvania University of Brasov. Series V: Economic Sciences*, Vol. 7 No. 1, pp. 97-106.
- Posner, S.M. and Stuart, R. (2013), "Understanding and advancing campus sustainability using a systems framework", *International Journal of Sustainability in Higher Education*, Vol. 14 No. 3, pp. 264-277.
- Ralph, M. and Stubbs, W. (2014), "Integrating environmental sustainability into universities", *Higher Education*, Vol. 67 No. 1, pp. 71-90.
- Ribeiro, M.M., Hoover, E., Burford, G., Buchebner, J. and Lindenthal, T. (2015), "Values as a bridge between sustainability and institutional assessment: a case study from BOKU university", *International Journal of Sustainability in Higher Education*, Vol. 17 No. 1, pp. 40-53.
- Sammalisto, K., Sundström, A. and Holm, T. (2015), "Implementation of sustainability in universities as perceived by faculty and staff – a model from a Swedish university", *Journal of Cleaner Production*, Vol. 106, pp. 45-54.
- Savely, S.M., Carson, A.I. and Delclos, G.L. (2007a), "A survey of the implementation status of environmental management systems in US colleges and universities", *Journal of Cleaner Production*, Vol. 15 No. 7, pp. 650-659.
- Savely, S.M., Carson, A.I. and Delclos, G.L. (2007b), "An environmental management system implementation model for US colleges and universities", *Journal of Cleaner Production*, Vol. 15 No. 7, pp. 660-670.
- Schaltegger, S. and Wagner, M. (Eds). (2017), *Managing the Business Case for Sustainability: The Integration of Social, Environmental and Economic Performance*, 1st ed., Routledge, doi: [10.4324/9781351280525](https://doi.org/10.4324/9781351280525).
- Seuring, S. and Gold, S. (2012), "Conducting content-analysis based literature reviews in supply chain management", in Wilding, R. (Ed), *Supply Chain Management: An International Journal*, Vol. 17 No. 5, pp. 544-555.
- Simons, R. (1994), *Levers of Control: How Managers Use Innovative Control Systems to Drive Strategic Renewal*, Harvard Business Press.
- Simons, R., Dávila, A. and Kaplan, R.S. (2000), *Performance Measurement & Control Systems for Implementing Strategy*, Prentice Hall, Upper Saddle River, NJ.

- Spellerberg, I.F., Buchan, G.D. and Englefield, R. (2004), "Need a university adopt a formal environmental management system? Progress without an EMS at a small university", *International Journal of Sustainability in Higher Education*, Vol. 5 No. 2, pp. 125-132.
- Swearingen-White (2014), "Campus sustainability plans in the United States: where, what, and how to evaluate?", *International Journal of Sustainability in Higher Education*, Vol. 15 No. 2, pp. 228-241.
- Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a methodology for developing evidence-Informed management knowledge by means of systematic review", *British Journal of Management*, Vol. 14 No. 3, pp. 207-222.
- Trumpf, C., Endrikat, J., Zopf, C. and Guenther, E. (2015), "Definition, conceptualization, and measurement of corporate environmental performance: a critical examination of a multidimensional construct", *Journal of Business Ethics*, Vol. 126 No. 2, pp. 185-204.
- Urquiza-Gómez, F., Sáez-Navarrete, C., Rencoret Lioi, S. and Ishanoglu Marzuca, V. (2015), "Adaptable model for assessing sustainability in higher education", *Journal of Cleaner Production*, Vol. 107, pp. 475-485.
- Van Weenen, H. (2000), "Towards a vision of a sustainable university", *International Journal of Sustainability in Higher Education*, Vol. 1 No. 1, pp. 20-34.
- Vaughter, P., McKenzie, M., Lidstone, L. and Wright, T. (2016), "Campus sustainability governance in Canada", *International Journal of Sustainability in Higher Education*, Vol. 17 No. 1, pp. 16-39.
- Velazquez, L., Munguia, N., Platt, A. and Taddei, J. (2006), "Sustainable university: what can be the matter?", *Journal of Cleaner Production*, Vol. 14 Nos 9/11, pp. 810-819.
- Verhulst, E. and Lambrechts, W. (2015), "Fostering the incorporation of sustainable development in higher education. Lessons learned from a change management perspective", *Journal of Cleaner Production*, Vol. 106, pp. 189-204.
- Wolf, P., Hansmann, R. and Troxler, P. (2011), "Unconferencing as method to initiate organisational change: a case study on reducing CO₂ emissions of a university", *Journal of Organizational Change Management*, Vol. 24 No. 1, pp. 112-142.
- Wright, T.S.A. and Wilton, H. (2012), "Facilities management directors' conceptualizations of sustainability in higher education", *Journal of Cleaner Production*, Vol. 31, pp. 118-125.
- Zhang, N., Williams, I.D., Kemp, S. and Smith, N.F. (2011), "Greening academia: developing sustainable waste management at higher education institutions", *Waste Management*, Vol. 31 No. 7, pp. 1606-1616.

Further reading

- Sayed, A., Kamal, M. and Asmuss, M. (2013), "Benchmarking tools for assessing and tracking sustainability in higher educational institutions: identifying an effective tool for the university of Saskatchewan", *International Journal of Sustainability in Higher Education*, Vol. 14 No. 4, pp. 449-465.
- Waheed, B., Khan, F.I. and Veitch, B. (2011), "Developing a quantitative tool for sustainability assessment of HEIs", *International Journal of Sustainability in Higher Education*, Vol. 12 No. 4, pp. 355-368.
- Rusinko, C.A. (2010), "Integrating sustainability in higher education: a generic matrix", *International Journal of Sustainability in Higher Education*, Vol. 11 No. 3, pp. 250-259.
- Carpenter, D. and Meehan, B. (2002), "Mainstreaming environmental management: case studies from Australasian universities", *International Journal of Sustainability in Higher Education*, Vol. 3 No. 1, pp. 19-37.
- Vagnoni, E. and Cavicchi, C. (2015), "An exploratory study of sustainable development at Italian universities", *International Journal of Sustainability in Higher Education*, Vol. 16 No. 2, pp. 217-236.

- Ferrer-Balas, D., Buckland, H. and de Mingo, M. (2009), "Explorations on the university's role in society for sustainable development through a systems transition approach. Case-study of the technical university of Catalonia (UPC)", *Journal of Cleaner Production*, Vol. 17 No. 12, pp. 1075-1085.
- Geng, Y., Liu, K., Xue, B. and Fujita, T. (2013), "Creating a 'green university' in China: a case of Shenyang university", *Journal of Cleaner Production*, Vol. 61, pp. 13-19.
- Chang, H.C. (2013), "Environmental management accounting in the Taiwanese higher education sector: issues and opportunities", *International Journal of Sustainability in Higher Education*, Vol. 14 No. 2, pp. 133-145.
- Larrán Jorge, M., Herrera Madueño, J., Calzado, Y. and Andrades, J. (2016), "A proposal for measuring sustainability in universities: a case study of Spain", *International Journal of Sustainability in Higher Education*, Vol. 17 No. 5, pp. 671-697.
- Ramos, T.B., Caeiro, S., van Hoof, B., Lozano, R., Huisingh, D., *et al.*, (2015), "Experiences from the implementation of sustainable development in higher education institutions: environmental management for sustainable universities", *Journal of Cleaner Production*, Vol. 106, pp. 3-10.
- Sobreiro, V.A. and Jabbour, C.J.C. (2007), "Toward a greener university: some lessons from the Brazilian experience", *Environmental Quality Management*, Vol. 16 No. 4, pp. 69-73.
- Jain, S. and Pant, P. (2010), "Environmental management systems for educational institutions: a case study of TERI university, New Delhi", *International Journal of Sustainability in Higher Education*, Vol. 11 No. 3, pp. 236-249.
- León-Fernández, Y. and Domínguez-Vilches, E. (2015), "Environmental management and sustainability in higher education: the case of Spanish universities", *International Journal of Sustainability in Higher Education*, Vol. 16 No. 4, pp. 440-455.
- Yoshida, Y., Shimoda, Y. and Ohashi, T. (2017), "Strategies for a sustainable campus in Osaka university", *Energy and Buildings*, Vol. 147, pp. 1-8.

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