

Perspectives on Sustainability Governance from Universities in the USA, UK, and Germany: How do Change Agents Employ Different Tools to Alter Organizational Cultures and Structures?

Felix Spira, Valentin Tappeser and Arian Meyer

Abstract Previous studies on organizational change processes toward sustainability at universities have mainly focused on which structures—sustainability visions, policies, or governance mechanisms—should be altered to advance these processes. Relatively few studies however, have focused on how this structural transformation is promoted by different change agents, as well as which tools they employ. Understanding this process is important to understand the underlying mechanisms of organizational transformations toward sustainability. This research tries to contribute to the existing literature and models, by examining how change agents utilize different tools—policies, missions, visions, etc.—to alter existing organizational structures and cultures. Qualitative data from three case studies in the US (University of California Santa Cruz), the UK (University of Greenwich) and Germany (Lüneburg University) has been collected and analyzed to this end. The findings suggest that different groups of change agents are responsible to advance the changes at each of the three institutions under scrutiny, including researchers, operational staff, higher management, and students. These actors mobilized different tools to advance sustainability. The choice of tools is mainly determined by their position within the organization and personal background. Moreover, the promotion of certain tools is facilitated through outside actors. However, the interaction between these outside actors and the change agents needs to be further examined.

F. Spira (✉) · V. Tappeser · A. Meyer
rootAbility/Maastricht University Green Office, Maastricht, The Netherlands
e-mail: felix.spira@rootability.com

V. Tappeser
e-mail: valentin.tappeser@rootability.com

A. Meyer
e-mail: arian.meyer@rootability.com

Introduction

In recent years, several studies have been dedicated to the analysis of organizational change processes toward sustainability at institutions of higher education around the world. This essay builds on this knowledge foundation and tries to expand it. Our approach is based on the central assumption, that processes of organizational change should be studied by analyzing the complex and dialectical interaction between change agents on the one hand, and organizational structure and culture on the other hand. Those change agents employ a variety of mediating tools—such as sustainability missions, visions, policies, or proposals for new sustainability management systems—to shape and reorganize organizational culture and structure.

Previous studies of organizational change processes at universities have mainly focused on which structures—policies, missions, or finance mechanisms, etc.—should be changed within the organization. Relatively few studies have focused on how this structural transformation is promoted through different change agents. This research tries to contribute to the existing literature on the sustainability transformation of universities, by examining how change agents utilize different tools—policies, missions, visions, etc.—to alter existing organizational cultures and structures. Qualitative data from three case studies in the USA (University of California Santa Cruz), the UK (University of Greenwich), and Germany (Lüneburg University) was collected and analyzed.

The remainder of this essay is organized as follows. The first section provides an overview and synthesis of existing models to describe organizational change toward sustainability at universities. The section presents the theoretical foundation for the later analysis of the three case studies. The second section shortly outlines the methodology used to gather and analyse the data. The third and fourth sections present and discuss the findings. They describe the different actors involved in the process of organizational transformation in the three case studies, the tools they used, as well as the way in which those tools shaped and reconstructed organizational culture and structure.

Literature Review

Organizational change can be understood through the interaction of change agents and structures (Reed 1997). Change agents are defined as individuals, groups or networks within or outside the organization that engage in an active and conscious effort to change organizational structures. In the broadest sense, structures represent organizational rules such as written policies, physical infrastructures such as buildings, as well as more informal processes such as organizational cultures and worldviews.

Previous studies on organizational change toward sustainability at universities can be situated within this agency-structure framing. The majority of studies concentrate on the structures that need to be altered or put in place to advance sustainability. Based on the review of 80 campus sustainability transitions, Velazquez et al. (2006) proposed a four-step process. These four-steps include the creation of a sustainability vision, mission, committee, targets and objectives, as well as strategies. Lukman and Glavic (2007) also developed a four step process—policy, operations, evaluation, and optimization—with several subsections. Alshuwaikat and Abukabar (2008) propose three strategies to promote sustainability on campus. Those include the implementation of an environmental management system (EMS), public participation to promote engagement, and initiatives to integrate sustainability in teaching and research.

These three studies focus on the structures that should be put in place to achieve the end goal of a sustainable university. Their lowest common denominator of a sustainable university is an institution that integrates sustainability into educational, research, operational, and community activities. The difference between these studies lies in the extent of steps that are involved in the process—three or four major steps with different subactivities. Those steps function as good guidelines for actors interested in learning where to start when they want to transform their university. However, they fail to illustrate the deeper mechanisms involved in advancing these structural changes through the work of change agents.

Apart from this primary focus on structure, several studies exist with a stronger emphasis on the interaction between change agents and structures. Shriberg (2002) found that change agents tend to be successful if they wrap their arguments in different discourses: For instance, when talking to higher management, change agents should appeal to the strategic benefits of sustainability for the university. However, when engaging with lower levels in the organizational hierarchy they should appeal to promoting sustainability out of personal ethics. Change agents should consider these findings when engaging with actors who adhere to a certain organizational culture.

Disterheft et al. (2012) analyze the success factors in the implementation of EMSs. Participatory implementation of an EMS features as an important success factor in their model. This quantitative study does not provide a detailed analysis of the change agents behind the promotion of the EMS. Nonetheless, it illustrates the importance of gaining legitimacy and input of actors in the design of an organizational structure.

Finally, Sharp (2011) presents a three-stage model to explain organizational change. According to Sharp, the organization first experiences a process of awakening, in which few sustainability change agents generate small victories. Then, the scale of the sustainability ambitions and the amount of actors involved in the transformation grows in a process called pioneering. Through further successes, design of organizational structures and changing organizational culture, the university enters the phase of transformation. In this phase, sustainability has become a core principle of the institution. Compared to Shriberg (2002) and

Disterheft et al. (2012), the strength of Sharp’s analysis lies in her explicit emphasis on the agency—structure interaction, in which a growing alliance of change agents infuses organizational culture and structures.

Theoretical Framework: Actor Dynamics in Change Processes

The literature review illustrated that existing studies on change processes toward sustainability in higher education place different emphasis on the role of actors or structures. Based on these existing studies and models, as well as the engagement of the authors with sustainability governance through the Maastricht University Green Office, the following model was developed to better capture the agency—structure dynamic (cf. Fig. 1). This model is later used to analyze the three case studies.

On the first level, actors are subdivided into supporters, change agents and decision makers. Change agents are defined as individuals groups or networks that engage in the active and conscious effort to change organizational structures.

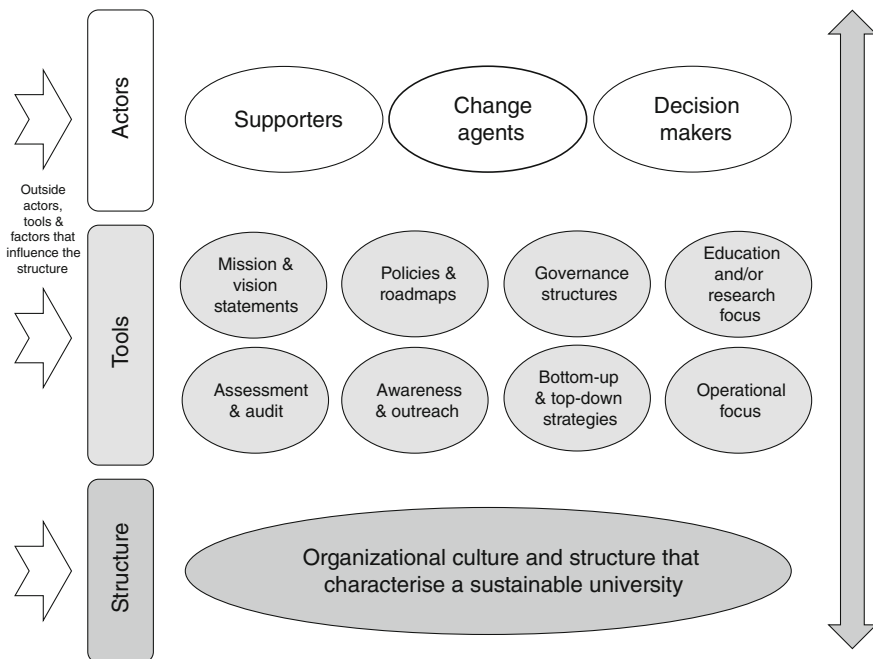


Fig 1 Structure-actor dynamics in change processes (developed based on models by Shriberg (2002), Velazquez et al. (2006), Lukman & Glavic (2007), Alshuwaikat & Abukabar (2008), Sharp (2011), Disterheft et. al. (2012) and the personal experience of the authors through their work at Maastricht University Green Office

Supporters constitute all other actors that the change makers can mobilize for their quest. Change agents and supporters can also come from outside the organization. Decision makers constitute the actors within the organization that can decide about the adaptation or implementation of sustainability projects or policies.

The second level constitutes the tools that the change agents use to advance their sustainability agenda. This vast array of tools accounts for the diversity that can be found in sustainability initiatives across universities. Some change agents might focus more on bottom-up strategies to advance educational changes. Other change agents might focus more on promoting operational changes, e.g., through energy projects and policies. Change agents can also rely on tools that are provided by outsiders, such as NGOs, national governments or companies. The division between the tools and the structure is fluent. Tools can be understood as the building blocks of a sustainable university. In this sense, tools that the change agents promote become part of the structure if they are successfully implemented.

The interaction between change agents, tools, and structure is complex and dynamic. Change agents are products of the organizational culture and structure. They are constrained by their formal positions and powers, and shaped by years of working within the organization. However, the change agents also try to expand the structural constraints. Due to this dual causality, a neat distinction into independent—change agents—and dependent—structure-variables cannot be made. Moreover, the choice of tools change agents employ to alter the structure is shaped by their personal preference and ability, as well as their position within the organizational structure. In this sense, not all tools are equally available to all change agents.

Methodology

A purposive sample of three case studies was chosen. Those three cases were chosen, because they dispose over a long and rich history of organizational change. Sustainability initiatives at the respective universities also unfolded differently from each other so that they provide a diverse and thick web of data. Since the study only contains three cases, the specific results should not be expected to be generalizable across all universities, but rather provide illustrations of different sustainability change processes in higher education (Ghauri 2004).

First, five interviews with the founder of the sustainability office, the interim sustainability director, sustainability office staff, and an operational director were conducted at the University of California Santa Cruz in the United States. Second, the sustainability manager at the University of Greenwich in the United Kingdom was interviewed. Finally, three interviews were conducted at the Leuphana University Lüneburg in Germany. Among the interviewees were the Environmental coordinator and two professors that have been involved in the sustainability transition of the university from the beginning. All nine interviewees for this research possess considerable experience with and influence on the sustainability

transformation of their respective universities. The aim of the interviews was to map the historical development of the change processes, the different actors involved, challenges encountered, and future directions. The interview accounts are verified, supplemented, and enriched through content analysis of sustainability reports, websites, policies, and strategies from the respective universities and the University of California.

Results

University of Greenwich

Concentrated sustainability efforts at the University of Greenwich are the most recent among the three case studies. In 2008, the university was still on place 109 (out of 119) in the People and Planet Green League of UK universities (People & Planet 2008). However within 4 years, Greenwich rose in this ranking from place 109 onto the first place (People & Planet 2012).

Sustainability efforts have mainly been driven by staff members from operations and higher management. In 2009, a Sustainability Manager was hired after lobbying from staff members and an environmental society. Since then, the engagement of students has been relatively low, mainly involving student representatives on committees and volunteers working in the university garden. Despite this limited participation from students, the involvement of staff member is high. The sustainability team just comprises three people, but many staff members are involved in the implementation of sustainability policies, as the change agents managed to spread responsibilities for sustainability throughout the organization. Nonetheless, the wide-spread engagement of researchers, as well as students, still appears to be a major issue.

This has been achieved through the use of several tools: The participation of staff members in the Sustainability Champions Program is approved by their supervisors, so that they can officially dedicate a certain amount of hours per month to sustainability issues and participate in monthly trainings. Then, Greenwich participates in the behavior change project Green Impact run through the National Union of Students (2011), which empowers staff members to implement small sustainability projects in their department. Sustainability was also integrated in all new job descriptions so that also staff members who are not sustainability champions are encouraged and have a justification to dedicate working time to sustainability issues. Through this mobilization of existing personnel, only three new sustainability staff needed to be hired since 2008.

The use of existing governance structures and the creation of specialized committees further contributed to the spreading of responsibilities throughout the organization. Rather than having created a new sustainability committee, the Sustainability Manager joins the resources subcommittee to discuss strategic

sustainability issues. This high level committee includes the deputy vice chancellor, directors of offices and deans of schools who meet on a monthly basis. Moreover, sustainability issues are reported twice a year to the university court. Next, five highly specialized committees on biodiversity, fair-trade, sustainable food, education for sustainable development and carbon management directly deal with issues that have been approved in the sustainability policy on an operational level. Those committees comprise higher management such as the director of facilities, students, researchers, and facility staff.

Sustainability efforts started with and still maintain a strong operational focus, while educational initiatives are still nascent. This could be explained by the fact that the majority of change agents have a strong operational focus and are staff members, rather than students who might primarily focus on outreach issues. Then, certain tools are adopted—carbon management plan, Green Impact Program, and ISO14001—, because they are promoted or made compulsory by outside organizations. For instance, Greenwich developed the carbon management plan, because the funding council for higher education in the UK partly links funding to the achievement of CO₂ objectives (University of Greenwich 2011).

The change agents managed to alter the organizational structure and culture through the specific choice of these tools. The broad mobilization of staff members through different programs, policies, and committees increases staff involvement and spreads responsibility for sustainability issues. The first sustainability policy and action plan was launched in 2010 and subsequently extended through sustainable food, procurement, biodiversity, and fair-trade policies in 2011. In 2012, sustainability was integrated into long-term planning documents such as the Strategic Plan, as well as the Teaching and Learning Strategy. In this sense, sustainability objectives diversified from a narrow operational focus to also include educational and strategic elements. By aligning sustainability with the core principles of the organization, University of Greenwich can thus be seen as reaching the transformation stage as defined by Sharp (2011).

University of California Santa Cruz

Different from Greenwich, students at UCSC play a central role in the university's sustainability transformation. In 2003, students from the University of California Santa Cruz UCSC and the other eight campuses in the University of California system lobbied for a system-wide sustainability policy. This Policy on Sustainable Practices was then adopted by the University of California System (University of California 2009), which gave further legitimacy and upwind for sustainability change agents to advance UCSC's commitment. A student and staff-driven Council for Sustainability and Stewardship was established in 2006.

A former student leader was also hired as Sustainability Coordinator to run the first sustainability office alongside two student interns. UCSC students then provided further finance to the office and other climate change initiatives by passing

an additional fee levied on top of tuition. The sustainability office grew its team over time, now including four full-time staff members, and dozens of student employees and interns involved in specific projects. Staff members are further engaged through several committees and working groups with a major emphasis on sustainable operations management. Similar to Greenwich, the major challenge has been the engagement of researchers in the sustainability transformation.

The tools employed by the change agents were heavily influenced by outside organizations. The framework for sustainability activities was set by the UC Policy on Sustainable Practices in 2004. Also, in 2006, the chancellor signed the Climate Action Compact and the American College and University Presidents Climate Commitment (ACUPCC). The first is a student-initiated, system-wide policy on green building and clean energy (University of California 2009). The latter is a major commitment of over 650 US-American institutions of higher education to assess and reduce their greenhouse-gas emissions (ACUPCC 2013).

The nature of these commitments can explain the strong climate change and operational focus of sustainability management at UCSC. Areas of education or research for sustainable development are not addressed by existing policies or commitments, despite a strong environmental studies focus of UCSC. In addition to these climate change agreements, a major step after the establishment of the sustainability office was the compilation of a campus wide sustainability assessment, published in 2007 (UCSC 2007). This assessment—which has again a strong operational focus and only includes one chapter on curriculum—provided the basis for the first Campus Sustainability Plan published in 2010 (UCSC 2011).

Sustainability policies and commitments are implemented and monitored by a complex system of governance mechanisms. Different from the University of Greenwich, UCSC established a new Committee on Sustainability and Stewardship (CSS), which reports to the Advisory Committee for Facilities. Interviewees mentioned dissatisfaction with the CSS, because its role was sometimes unclear and members felt dissatisfied that they could not directly report to the executive committee. Attempts are now made to restructure the governance system, so that the CSS directly reports to the executive committee and is better aligned with the sustainability office's work, by setting concrete targets and benchmarks. In addition to the CSS and the Sustainability Office, nine working groups— with a focus e.g. on buildings, energy, water, transport, etc.,— as well as several student initiatives are involved in the sustainability transformation of UCSC.

The sustainability efforts at UCSC were a product of student activism, and they strengthened student engagement in return. Change agents from within the student body convinced the university management to make regional or national sustainability commitments. Those commitments were then used to drive sustainability issues into the organization. The focus of these commitments established a strong historical trajectory to alter the operational structure and culture of UCSC, while education and research in the area, though existing remains somewhat disconnected. Change agents also established a complex mixture of governance mechanisms, which are currently restructured to place sustainability at a higher level in the organization.

Leuphana University Lüneburg

Leuphana University is at the forefront of the sustainable university movement in Germany. In contrast to the two other case studies, a small group of professors and students were the pioneers of the university's sustainability transformation starting in the 1990s. Given the fact that the first change agents comprised professors, they utilized a strong set of research and educational focused tools to advance sustainability. As a first milestone, these change agents guaranteed government funding for a research project. From 1999 until 2001, they investigated the meaning of the Agenda 21 for Leuphana University.

As part and parcel of this first research project, several changes in operations, e.g., the introduction of an EMS, education, e.g., the establishment of sustainability courses and art projects, and research, e.g., the fostering of collaboration between researchers of various fields. The project also laid the foundation for the comprehensive sustainability definition the university employs. The focus is on six areas, namely inter- and transdisciplinary research, education, the university as a societal actor, campus development, operational efficiency, and the university as a space to live (Leuphana Universität Lüneburg 2011). This definition of sustainability that also strongly emphasizes well-being, interestingly lead to the implementation of a steering group and policies on health in 2003—representative of the holistic approach to sustainability the Leuphana employs.

Following the first research project and the implementation of the EMS, the change agents achieved the commitment necessary for the university management to publicize the first sustainability guidelines in 2000. Hence, different from models presented in the literature review, the development of sustainability guidelines did not represent one of the first steps. It could be assumed that the change agents first needed to create successes to convince the university management to commit to sustainability issues university-wide. Following the publication of the guidelines, the change agents—drawing on an increasing support basis—launched a second research project entitled “Sustainable University,” which ran from 2004 until 2007. This laid the ground for the creation of an UNESCO chair on Higher Education for Sustainable Development in 2005, the integration of sustainability as one of the core research principles in 2008 and the creation of the first German faculty of sustainability in 2010. This trajectory illustrates that research and teaching remained driving forces behind the slow infusion of sustainability into the core principles and organizational structure.

The position of an environmental coordinator was created following the first research project, but no central sustainability office exists. Only two working groups have been formed on the environment and health. Their members are drawn from student, staff and faculty and include the environmental coordinator. One reason for the creation of this rather small governance structure could be that the faculty for sustainability and its teaching and research output are key actors in the transformation process. The President and his office also exhibit strong leadership on sustainability issues.

At Leuphana, change agents initiated a systemic restructuring of the organization's research, education and operational principles. Change agents advanced this structural transformation primarily through a research-driven agenda. The findings of the research were then directly implemented to improve Leuphana's sustainability. The holistic definition of sustainability also enabled the change agents to include other discourses in their agenda, such as health improvements. Overall, students are engaged in global or campus related sustainability issues through their classes, student organizations and the two working groups. However, the process itself is primarily driven by researchers and higher management.

Discussion

Table 1 provides an overview of the main findings. The type of actor involved in the respective institutions' sustainability transformations is different in each case. Greenwich started with a change agenda that was primarily driven by operational staff and middle-line managers. UCSC exhibits an important influence of student leadership, while researchers were the main drivers at Leuphana University. Interestingly, in all of the cases, change agents have not yet managed to significantly involve other groups of actors that have been previously underrepresented, despite attempts to do so. Early involvement of sustainability champions in the student community, higher management, education and research at a very early stage of the process that avoids such path dependencies may thus be a key for a holistic transformation to occur. The University of Greenwich successfully illustrates how responsibilities for operational sustainability can be diffused throughout the organization, by using tools that engage staff members.

Next, the choice of tools was determined by different factors. On the one hand, the University of Greenwich and Leuphana illustrate that the change agents mainly employed tools, which correspond to their position and background within the university. On the other hand, the direction of the sustainability agenda at UCSC was strongly influenced through regional or national commitments that the university signed. Those commitments laid the basis for a strong operational and climate change focused discourse. Prioritizing areas to pioneer change is important, as this can create successes to convince decision makers to further commit to a sustainability agenda. Nonetheless, the initial emphasis on one area, such as operations can again create trajectories of change that are difficult to alter. Leuphana University presents a successful case study in which the research, education and operational areas are linked to create powerful synergy effects to advance change in each area.

Moreover, the degree of formalized governance structures varies between the cases. Greenwich managed to diffuse responsibility for operational sustainability throughout the organization, and Leuphana draws on its faculty of sustainability and environmental committee. Change agents at UCSC created a complex web of governance mechanisms involving staff, students, and higher management. Hence,

Table 1 Overview findings

	University of Greenwich	UCSC	Leuphana university
Actors	<p>Pressure from middle-managers and students to employ sustainability manager</p> <p>Primarily staff-driven sustainability efforts, with student input on some committees</p> <p>Wide-spread mobilization of existing personnel and integration into existing governance structures and establishment of five specialized committees</p>	<p>Lobby work of dedicated students to approve sustainability policy in the University of California system</p> <p>One student leader starts the sustainability office</p> <p>Complex mixture of student and staff initiatives and governance structures</p>	<p>Professors and students as early change agents</p> <p>Main actors remain professors and other research staff, as well as higher management.</p> <p>One environmental manager, environment and health committees drawn from student, staff and faculty</p>
Tools	<p>Started off with sustainability policy, then development of specialized policies (food, biodiversity, fairtrade, etc.) until final integration into strategic program</p> <p>Strong operational focus, but beginning spread into educational policies</p> <p>External actors promoted or made some tools compulsory</p>	<p>First sustainability assessment of UCSC laid foundation for further actions</p> <p>Significant influence of outside actors through commitments that created path dependency of operational focus</p>	<p>Research project laid conceptual and strategic foundation</p> <p>Holistic sustainability concept</p> <p>Integration in the university's principle, reorganization of research and education toward sustainability focus. Operational efficiency just one component</p>
Organizational Culture and Structure	<p>Increased staff engagement in sustainability issues</p> <p>Diffusion of sustainability agenda from operational focus into strategic plans of university</p>	<p>Culture of student and staff engagement, however challenges to involve researchers</p> <p>Principles of sustainability mainly implemented in operations</p>	<p>Strengthening of sustainability research and educational structure, whereas operational efficiency is just one component</p> <p>Significant realignment of the university's principles with sustainability</p>

rather than following a broad three or four-step approach, the sustainability transformation was advanced through change agents who lobbied for change in different areas. Models that frame campus transformations as large scale designs following a three or four step process—such as Lukman and Glavic (2007) and Velazquez et al. (2006)—should be downscaled to also account for these incremental achievements.

Nonetheless, despite these differences in the change processes, similar patterns exist across the three cases: In each case, a small group of change agents started to build alliances with powerful actors. This is similar to Leenders (2009) observation that transition processes start with small teams and then draw on a larger coalition of change agents. Moreover, all change agents in the three cases worked on a strategic dimension—through policy tools—and a specific dimension through tangible sustainability projects. The projects generated the successes to show the benefits and potential of sustainability, which helped to commit the university through sustainability policies and guidelines. In return, the strategic commitments further legitimized and enabled small-scale projects. Hence, the choice of specific tools varies across the three cases, whereas some general and broad patterns persist.

Conclusion

The findings of this research emphasize the diversity of approaches to advance sustainability at a university. Change agents can come from students, research, operational staff, or higher management. They have multiple tools at their disposal to alter organizational structures and cultures. Among others, change agents can try to kick-start the process through an assessment, vision, research project, carbon management plan or lobby work to influence higher education policies in general. Rather than following a broad three- or four-step process as recommended by some models in the literature review, change agents should become aware of the multiple options they have to approach sustainability at their university and review them carefully.

University of Greenwich illustrates that tools which succeed in mobilizing existing resources and personnel to diffuse the sustainability agenda into the DNA of the university appear could be successful. Leuphana University shows that powerful synergies can be created between the research, educational, and operational actors at a university to advance changes in each area. Nonetheless, change agents should also be aware of the path-dependencies they create with the initial choice of tools. For instance, Greenwich and UCSC developed a strong operational focus and experience difficulties to diffuse their message into research and education.

The case studies also illustrate the importance of outside organizations to provide valuable tools that change agents can use. On the one hand, those tools can constitute certifications for EMSs or behavior change programmes. On the other

hand, they can represent legislation from the university system, which helps change agents to justify their sustainability agenda toward local decision makers. However, the complex interactions between the change agents within the organization and outside actors need to be further examined.

References

- Abubakar, I., & Alshuwaikhat, H. M. (2008). An integrated approach to achieving campus sustainability: assessment of the current campus environmental management practices. *Journal of Cleaner Production*, 16(16), 1777–1785.
- American College and University Presidents Climate Commitment. (2013). *American College & University Presidents' Climate Commitment*. Boston: Second Nature.
- Disterheft, A., da Silva Caeiro, S., Ramos, M. & de Miranda Azeiteiro, U. (2012). Environmental Management Systems (EMS) implementation processes and practices in European higher education institutions - Top-down versus participatory processes. *Journal of Cleaner Production*, 31, 80-90.
- Ghauri, P. (2004). Designing and Conducting Case Studies in International Business Research. In R. Marscham-Piekkari & C. Welch (Eds.), *Handbook of qualitative research methods for international business*. Northampton: Edward Elgar Publishing.
- van Leenders, C. (2009). *Ten tips for clever change*. Utrecht: Competence Centre for Transition Management.
- Lukman, R., & Glavic, P. (2007). What are the key elements of a sustainable university? *Clean Technology and Environmental Policy*, 9, 103–114.
- Leuphana Universität Lüneburg. (2011). *Nachhaltigkeitsbericht*. Lüneburg: Leuphana Universität.
- Reed, M. (1997). In praise of duality and dualism: Rethinking agency and structure in organizational analysis. *Organization Studies*, 18(1), 21–42.
- Sharp L (2011) Presentation on transformation processes at universities. http://www.aashe.org/files/documents/resources/apt.newman.sharp_.pdf. Accessed 10 Jan 2013.
- Shriberg, M. P. (2002). Sustainability in US higher education: organizational factors influencing campus environmental performance and leadership. Unpublished dissertation, University of Michigan.
- National Union of Students. (2011). *Green impact portfolio 2011–12*. London: National Union of Students.
- People & Planet. (2008). *People & planet green league 2008*. Oxford: People & Planet.
- People & Planet. (2012). *People & planet green league 2012*. Oxford: People & Planet.
- University of Greenwich. (2011). *Carbon management plan*. Greenwich: University of Greenwich.
- University of California. (2009). *Policy on sustainable practices*. Oakland: University of California.
- UCSC. (2007). *Campus sustainability assessment*. Santa Cruz: University of California.
- UCSC. (2011). *Campus sustainability plan 1.5 2011–2013*. Santa Cruz: UCSC Sustainability Office.
- Velazquez, L., Munguia, N., Platt, A., & Taddei, J. (2006). Sustainable university: what can be the matter? *Journal of Cleaner Production*, 14(9–11), 810–819.