

DESIGN AND IMPLEMENTATION OF A SUSTAINABILITY INITIATIVE FROM THE “INSTITUTIONAL MIDDLE”: REFLECTION ON THE ORGANISATIONAL CONDITIONS FOR IT TO THRIVE/OR FAIL

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ABSTRACT

This paper explores the organizational, structural, conditions for the “institutional middle” to thrive in the implementation of sustainability efforts in a High Education Institution. This work combines participant observation and case study techniques, together with linear analysis concepts from Organizational Cybernetics and literature on campus sustainability to analyze the organizational conditions that affect the institutional middle’s potential for success/failure in the implementation of sustainability initiatives in a private small university.

The empowerment and recognition of autonomy of faculty and staff are found to be critical for the successful conception and implementation of sustainability initiatives. However, such effectiveness depends on the provision and emergence of adequate organizational structures to guarantee the resilience and viability initiatives born from the “institutional middle”.

The case study provides evidence of how the institutional middle can affect the top-down management for both the management of environmental issues in campus and the development of contextualized academic programs. The case study suggests a cost-effective, efficient and high-impact method to design and implement sustainability initiatives in universities.

The case study provides evidence of the impact of adequate organizational structures supporting initiatives from faculty and staff. The organizational cybernetic approach proves to be useful to understand (sustainability) entrepreneurship in the institutional mid

INTRODUCTION

Since the publication of “Our Common Future” (Brundtland, 1987) sustainability has become a major topic of discussion in the private and public sector. The challenge that this new agenda imposed on Higher Education (HE) became compelling as it influenced not just the development of academic contents but the HE institutions’ management and ultimately, their environmental behavior. The documentation of this process of adaptation and change is not well documented, due perhaps to the specific challenging operational context, the sui-generis missional nature of HE institutions and their particular structure and forms of governance that differ from those of conventional firms (Bero et al, 2012; Cortese, 2003).

Recently, the increasing literature on campus sustainability describes the change towards sustainability either as a top-down process led by managers, or as a bottom-up movement led by students, with few references to a mixed approach. The top-down approach describes the process as less time consuming whereas the bottom-up is perceived as more robust. Recent cases suggest that a mixed approach as the most desirable and effective implementation scenario (Disterhef et al, 2012; Lozano et al, 2014; Ramos et al, 2015).

Within this context, the description of the role of the “institutional middle” - staff and academics - as a driver of change towards campus sustainability has been documented describing the role of academics and staff as intrapreneurs; identifying strengths and obstacles for their action and recommending strategies to foster middle-up initiatives (Brinkhurst et al, 2011). From this last perspective, the aim of this paper is to contribute to the knowledge of the organizational (structural) conditions that affect the viability and emergence from the “institutional middle” of a process of organizational change for management sustainability (OCMS) in HE.

Background

Sustainability has become a source of inspiration for bottom-up activities in many institutions (e.g. People and planet – Go Green/Going Green initiatives¹; OIKOS²) and core for some more formal and top-down approaches such as the Magna Charta Universitarium (1987); the Talloires Declaration (1990); Copernicus – Campus (1993); the Luneburg Declaration on Higher Education (2001); the IUA-UNESCO Global Higher Education for Sustainability Partnership (2002) and more recently the International Sustainable Campus Network (2010), and the

¹ People and Planet is a spin-off of the Third World First initiative. Its campaigns include programs such Go Green and Going Green grouping more than 60 Universities mainly in the UK.

² OIKOS was created by students at the St. Gallen University in 1987 with the aim to include conferences and workshops related with environmental issues in the academic programs of Business Management and Economy. In 1989 they created the conference in Ecologic Management and transformed one organization with more than 300 associated enterprises, starting an industrial re-engineering process towards sustainability in the Swiss Industrial sector.

Decade of Education for Sustainable Development 2005-2015 proclaimed by UNESCO (UNESCO, 2010).

These schemes invite the HE institutions to act towards the implementation of sustainability measures, particularly since the educative institutions become subject to the effects of environmental regulation (Noeke, 2000). In response to these challenges the Higher Education Institutions have implemented actions, predominantly toward greening their campuses, either through formalized environmental management plans following the ISO 14001 structure – or any other certified scheme – or with the use of informal mechanisms as documented by Wells et al (2009); von Oelreich (2004); Conway et al (2008); Clarke (2006); Spelleberg et al (2004) and Clarke and Kouri (2009). In general, these responses are aimed to green the campus by reducing consumption of paper, energy and/or water or implementing architectural changes to gain in energy/resources efficiency, leading to financial saving (Nicolaidis, 2006; Camacho, 2005, 2007).

On the identification of the actors of this change process, Hefery and Clarke (2009) recognized senior managers and students as the change makers that drive the adoption of sustainability initiatives in HE; neglecting the role of the “institutional middle”. More recently, from the observation of the nature of the change process Brinkhust et al (2011) and Disterheft et al (2012) recognized the implementation of sustainability in HE as a complex process that involves many organizational levels and actors; where the “institutional middle” – academics and staff – are critical for institutional change due to their long-term presence in the institutions and their brokerage capacity linking diverse organizational levels (including students and top managers). In this context, academics and staff have been described as “organizational innovators and intrapreneurs” (Lozano, 2006; Brinkhurst et al, 2011).

Organizational Change and Campus Sustainability

The change process can be described as the movement of an organization from a certain status to a new future state; involving modifications that may occur at different scales (e.g. minor, incremental, transformative/radical); at different organizational levels (individual, teams/divisions, institution) and affect and/or being expressed in the cultural, political, processual and/or organizational systems (Dawson, 1994; Dopplet, 2010; Cameron and Green, 2009).

To make sense of this complexity some classifications for this process have been suggested. For instance, according to intervention in the change process Bennis et al (1969) identify three types of organizational change: 1- radical intervention: organized and strictly top-down with emphasis on conflict management; 2- serendipitous change: described as a continuous and unpredictable laissez-faire process of adaptation to changing conditions; and 3- planned change: that offers guidance without being too restrictive or too serendipitous. With regard to the existence of a preparatory stage to change, divergent positions also exist. Some authors advocate for the development of the introductory planning stage (Beckhard and Harris, 1987; Cameron and Green, 2009; Kotter and Schlesinger, 2008); while others understand the change process as dynamic, adaptive and emergent - with a start in small individual projects that grow steadily without too much planning (Boiral, 2008; Senge, 2006; Verhulst, 2012).

Closely related to the understating of change as a complex, dynamic, adaptive and emergent phenomena, observations of Organizational Change for Management Sustainability (OCMS)

have been made focusing on soft managerial and control mechanisms e.g. leadership, culture (Doppelt, 2010; Verhulst and Lambrechts, 2013; Ceulemans et al, 2015). Also, observations of the OCMS have described this change process as innovation, entrepreneurship and participative cultural change; offering lists of identified drivers, barriers and key factors that affect the implementation process – e.g. organizational culture, resistance to change, empowerment, communications, power, bureaucratic distance and leadership, among others (Lozano, 2013; Lozano, 2015; Brinhurst et al, 2011; Disterherft et al, 2012).

More detailed observations on OCMS include descriptions of evolutionary social networks and how they reflect the key role of academic and staff in the change process (Kurland, 2011) – but not making a clear correlation with the organizational structure of the HE institutions. Further developments (Hoover and Harder, 2014) define the OCMS as a complex phenomenon where multiple interactions among actors and organizational levels can be identified as key for the organizational change towards sustainable development in HE (AKA: organizational culture; territories, conflict and competition; collaboration; importance of committed individuals; individual knowledge and worldviews; personal characteristics – influence, creativity; interplay between structures and people; dialogue, relationships and networks; locating power and the ability to effect change) suggesting the need for a new methodological alternative - complexity management - to the study of OCMS. Aligned with this last perspective, Lozano (2006) and Sterling (2001) advocate for the adoption of a whole-system approach to better understand and drive the process of change towards sustainability in HE.

Organizational Cybernetics perspective

Organizational Cybernetics was developed as a comprehensive body of knowledge to study (organizational) complexity through the analysis and design of organizational structures, roles, communication and information systems. It was introduced as a Systems Complexity Theory approach inspired in the principles of communication and control introduced by Weiner (1948) and other early cyberneticists from the late 60s and early 70s. The foundations of the Organizational Cybernetics were consolidated and presented as the Viable System Model (VSM), providing the necessary and sufficient conditions of communication and control that create viable organizations (Beer, 1979; 1984, 1985; 1989).

The VSM can be described as a framework/methodology to model organizational structures and the relationships among them (AKA: processes, roles/functions and information flows). Paramount to the VSM modelling and analysis is the understanding of how the organization handles the complexity of both their environment and their own activities. To do so, the VSM suggests as modelling building blocks six constitutive parts with specific roles and functions (Figure 1):

The environment (represented as an amoeba-like irregular shape to denote dynamic change)

Primary activities

1. System 1 – Operational units (circle) directly interacting with the environment – they have the potential to become independent/autonomous business/operative units and have their own management roles/functions (square - 1b)

Secondary/Supportive/Meta-systemic activities

2. System 2 – in charge of coordination and conflict resolution of/among primary activities (triangle)
3. System 3 – Is a management role/function (represented as a small square inside the management box) in charge of the delivery and operations management: budgeting, identification of synergies among the primary activities and organizational identity and ethos enforcement and evaluation of operational effectiveness (observation of the operational “here and now”. System 3* (inverted triangle)- Monitoring of operations.
4. System 4- Development Management and strategic planning. Identification, observation, evaluation and forecasting of external variables that may affect the organization’s viability (observation of the organizational and operational “there and then” - represented as a small square contained in the management box between S3 and S5).
5. System 5- Definition of the organization’s ethos, identity and policy (represented as a small square inside the management box).

These Systems (1 to 5) deployed in a recursive structure, facilitate the understanding of how the organization balances complexity among its different components; how the organization unfolds creating a fractal structure that describes (and manages) the complexity of the system and ultimately, the communication, coordination and control mechanisms that provide organizational viability (Hoverstadt, 2009). This mapping of the different systems - their connections and fractal structure - can be compared against the theoretical VSM allowing the identification of organizational pathologies (Beer, 1989; Schwaninger, 2007; Espejo, 2008; Hetzler, 2008, Perez-Rios, 2008, 2012; Hoverstadt, 2009; Espejo and Reyes, 2011) and the design of systemic and structural corrective measures.

The VSM has been proposed as a tool to guide organizational change (Caspel, 2011) and increasing literature documents the use of VSM in organizational change - related with consultancy projects - with observations on specific phenomenon as emergence, resilience, self-organization and viability in different organizations (Espinosa et al, 2015; Cardoso, 2011; Cardoso and Espinosa, 2014; Espinosa et al, 2011; among others). In this context and related with OCMS the VSM was used by Knowles and Espinosa (2009) and Knowles (2010) to design a participative bottom-up Environmental Management System where it proved effective to diagnose and accelerate the rate of cultural change and acceptance in the implementation of a set of environmental policies in one HE institution.

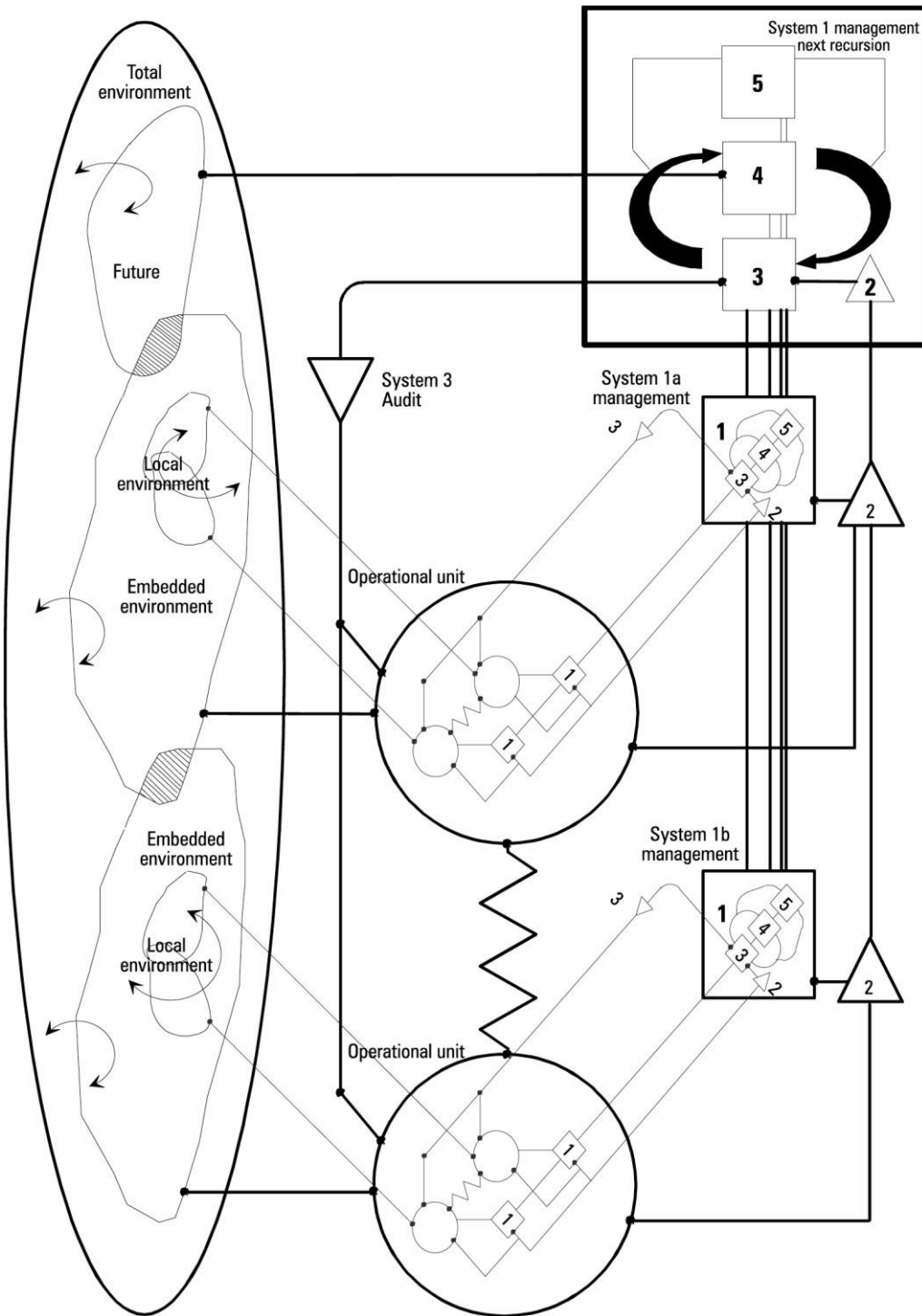


Figure 1. VSM. From Beer (1989). The distribution of the systems 1-5 is represented with the ideal suggested connections that provide viability. Notice the connection of the operations (S1) with the environment and the recursive structure embedded each System 1 where the same architecture is observable - a complete VSM with its systems 1 to 5 inside each S1

METHODOLOGY

The case study methodology was adopted to consolidate the information from interviews to key members of the HE organization who actively participated in the creation and implementation of the sustainability initiative. Documents (mostly minutes from Deanery meetings) of the HE institution describing the general environment of the organization - structure, general performance, etc. - were collected as well as reflective notes from the researchers during their intervention as actors of the observed emerging sustainability initiative.

This information was codified and organized to create a case study aimed to gain understanding from the researchers' experience in the design and implementation of a sustainability initiative in a small private university in Colombia (described as "The U" in this paper) from 2003 to 2007 and 2010 to 2015; in alignment with Yin (2003) about the use of this methodology to describe a contemporary phenomenon within a real context. The case study is relevant as it was the first initiative born in the "institutional middle" and the first and most successful development of an institutional program for sustainability in the HE sector in the country at that time.

Simultaneously, a combination of methods of data collection was used (interviews, focus groups) to triangulate and identify key actors and (organizational) events (Yin, 2003; Eisenhardt, 1989). To create a more complete and updated picture of these events, interviews with identified key actors in different stages of the project were made to gain a deep understanding and an updated description of the organizational context of the sustainability initiative up to its current situation in 2015.

These datasets and rich descriptions were contextualized and analyzed from an Organizational Cybernetic perspective using the Viable System Model (Beer, 1979, 1984, 1985) as this methodology/theoretical framework builds around the operative functions (systems 1) becoming an ideal instrument to observe the role/function of the "institutional middle" from a structural perspective; aiming to identify organizational conditions that influence the emergence and ultimately the viability of sustainability initiatives in the case study. The VSM modelling followed the steps suggested by Espejo et al (1999), with special consideration to the steps: structural modelling and understanding the unfolding complexity that focus on the description of the organizational structure and connections between roles and functions inside the organization. The system in focus was the group of academics based in the faculty of Agro- industrial management where the HE sustainability project was created.

RESEARCH RESULTS

"The U" was created as a vocational institution with a family-business structure (top-down, hierarchical; where the key directive roles were performed by members of the same family, e.g. Rector, some Vice-chancellors and some Deans) in the early 1980s, it aimed to provide qualified workers to the growing banking industry in Colombia. Soon after its creation "The U" developed by demand different schools and faculties in areas such as accountancy; banking and finances; business management; international business; Agro-industrial management; marketing; tourism & airlines management and media & communications; spreading out some elements of control but preserving a rigid top-down hierarchical structure.

With the arrival of the 21st century the environment induced “The U” to upgrade its status to university; implying changes such as the restructuring of schools and faculties, the redesign of academic programs and the implementation of research activity.

Among these changes, by 2002 (figure 2) the faculty of Agroindustry Management was considered redundant. The U was under the scrutiny of the environmental authorities due to the location of the campus in a protected area (forestall reserve) and it needed to address to the new regulations derived from the signature of the Clean Production Act that made compulsory to all HE to include a module on Clean Production in all the Engineering programs. During this period, to adapt to the new organizational realities the head of school (A) and the principal lecturer of this faculty (B) introduced the concept of sustainability in the campus, starting with the design of a general lecture on sustainability and management for the Business School and the publication of the first paper introducing the topic in the University and the academic community in the Bogota (Boada, 2002).

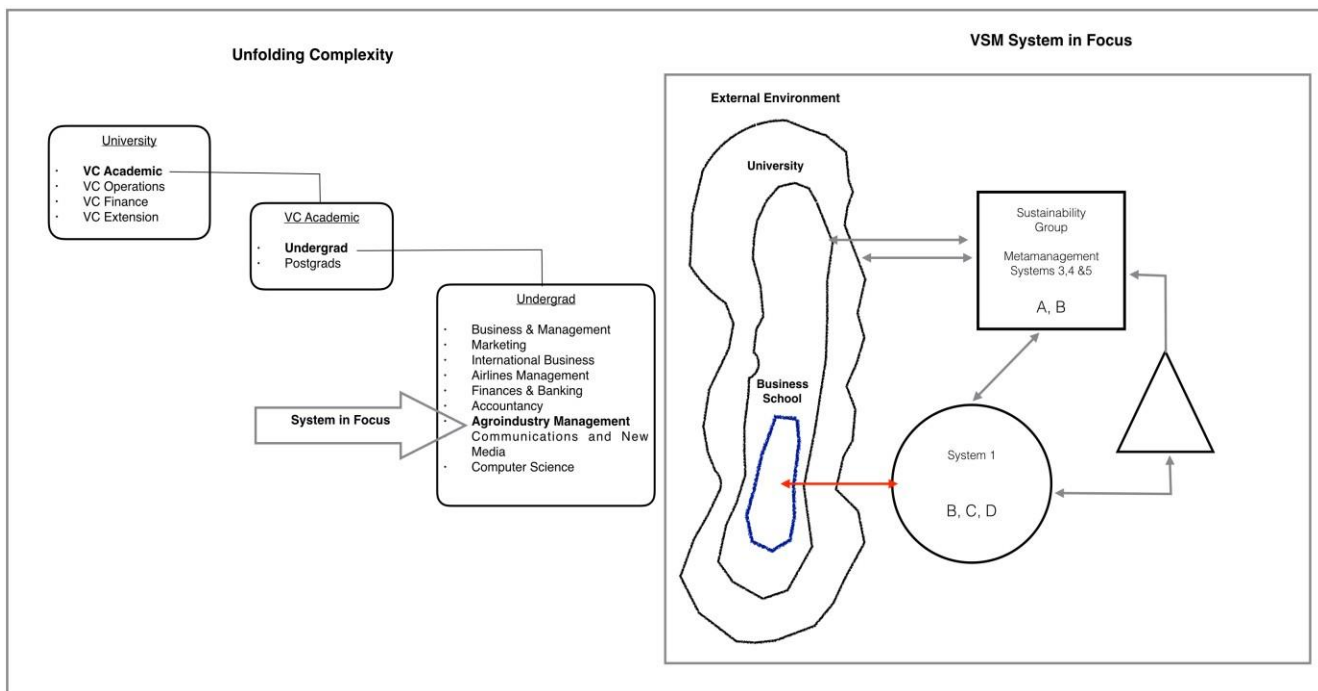


Figure 2. VSM of the sustainability group in 2002. Notice the existence of 3 levels of recursion – unfolding complexity, (left side of the figure) and the presence of all roles/functions that provide viability according the VSM (S1 to S5) in the system in focus (the emerging sustainability group).

In 2003 the Faculty of Agro-industry Management was definitely closed and the remaining faculty multidisciplinary group³ was re-assembled as a thematic group (Sustainability Group) to

³ The core group was composed by former staff members of the Faculty of Agro-business Management and was constituted by professionals in Biology, Biochemistry and agro industrial engineering (Individuals A, B, C and D). Later additions of experts in International Business, Biology, Business Management, Marketing, Industrial Engineering, Economy, Law. Communications and New Media and Philosophy (individuals D, E, F, I, J, K, L, M, N).

develop specialized modules, initially for the Business School^{4,5,6} - aimed to provide a business- oriented view on sustainability.

A continued as manager at head of school level preserving connections with peers and upper levels of recursion (Heads of School, Deans and VC academic). The delivery of these modules in all the programs of the business school consolidated the connections with that faculty. Other faculties became interested by the customized design of these modules, supported by a constant stream of publications relating sustainability concepts with the ethos of the business school (e.g. Boada, 2003, 2003b; 2004, 2004a, 2004b, 2007; Camacho, 2003, 2007a, 2008, 2013; Boada, Rocci and Kuhndt, 2005; Mont and Boada, 2005; Mont and Boada, 2008) and links with key national and international institutions related with sustainability and business (e.g. Wuppertal Institute; Lund University; Club 10; WBCSD, CECODES).

In 2004 a recently created Research Department provided instructions to all the Schools and Faculties to develop applied research. In response, the sustainability group devised a zero budget-short term-high impact research plan of participative research involving students from the Business School. The scenario for this research was "The U" itself; consequently, the first research project was the Environmental diagnostic of the Campus in cooperation with other vocational institutions, followed by a second research project on Environmental Management Systems (EMS) in Universities culminating with the design of the EMS of the University (Quintero and Camacho, 2004; Camacho, 2003, 2004, 2005, 2007b; Avendanno et al, 2004; Camacho and Cardoso 2010a, 2010b; Camacho and Mejia 2011). From this period the definition of roles and functions that satisfy the structure and criteria for viability as defined by the VSM are noticeable. Mechanisms of coordination and monitoring were set in place as the informal creation of thematic groups to deliver modules in different schools/faculties through an organic and adaptive process of recruitment of new team members (clearly definition of autonomous system 1); the nomination of C as general coordinator (system 3); the role of B (charismatic and transformational leader) as principal lecturer leading the general development of content and developing contacts with several external partners - together with A; the role/function of A, B, C, D as the main team defining the identity and policy of the group (system 5). In this stage A was also key in the development of solid contacts with the Deanery, advertising the activity of the group at the higher recursive levels of the university (Vice-Chancellor, and informally to members of the board of directors) and particularly gaining support from the VC-academic.

Consequently, at the beginning of 2005 and due to the impact of these short-term research projects and the development of specialized modules that provided "The U" with a unique profile; sustainability was included as one of the main pillars of the strategic plan of the University 2005-2010.

⁴ Man and Environment: This module covered basic concepts of ecology, systems thinking and historic and contemporary effects of human/industrial development on the environment.

⁵ Environmental Management: This module covered the evolution of environmental management tools AKA: UN/Clean Production Handbook, BS, ISO 14001/EMAS II Environmental Management Systems

⁶ Management Tools for Sustainability: This module offered a customized version of the Balanced Scorecard (BSC) for sustainability; the Life Cycle Analysis (LCA); Material Input Per Service Unit (MIPS); the SAFE-COMPASS (Sustainability Assessment For Enterprises – Companies and Sectors in Path for Sustainability); and concepts such as the Extended Producer Responsibility (EPR), Corporate Social Responsibility (CSR), principles of Strategy in Green Marketing and the introduction to Product-Service Systems - all in cooperation with the Wuppertal Institute – Germany and CECODES - Colombia.

Once this “institutional middle” initiative gained recognition and support from the top management of the University the next step was the implementation of some of the programs suggested in the design of the EMS, giving priority to the ones related with the academic functions of the University. Thus, the first actions were the development and introduction of customized compulsory modules on sustainability for each of the Faculties and Schools of the University (table 1) and the implementation of operative planes described in the designed EMS for the university (AKA: Energy Management, Waste Management, Greening Infrastructure, Landscape Management, and a task force to enhance relationship with environmental agencies) all of them under initiatives of participative research, and others under the direct administration of academics from the sustainability group hired for such purpose.

FACULTY	MODULES
Business Management	Man and Environment, Environmental Management, Management Tools for Sustainability
Industrial Engineering	Man and Environment Environmental Management Cleaner Production and Environmental Management Systems
International Business	Man and Environment Management Tools for Sustainable Development
Marketing	Green Marketing and Strategy
Tourism and Airlines Management	Man and Environment – Eco-tourism
Communication and New Media	Man and Environment – Communication for development
Law	Environmental Law

Table 1. Sustainability modules delivered in the faculties of the University.

The level of complexity of the operation under control of the sustainability group generated high levels of specialization of functions for some group members (figure 3); implying high differentiation in the construction of links in and outside the University as well as the redefinition of levels of autonomy for some working groups. For instance: *C* (authoritarian leader) was assigned to the general coordination (VSM- S2), and the leadership of the implementation of some of the EMS programs; *D* (transformational leader) took over the leadership of the development of academic content and scientific production; *E* was hired to administrate the EMS programs that demanded co-management and close coordination with the VC-operations and could not be delivered under the participative research scheme; *B* specialized in scientific production and development of key external contacts; and *M* and *O* started a consultancy unit. In general, almost all team members started to participate actively in academic activities related with sustainability in HE outside “The U”.

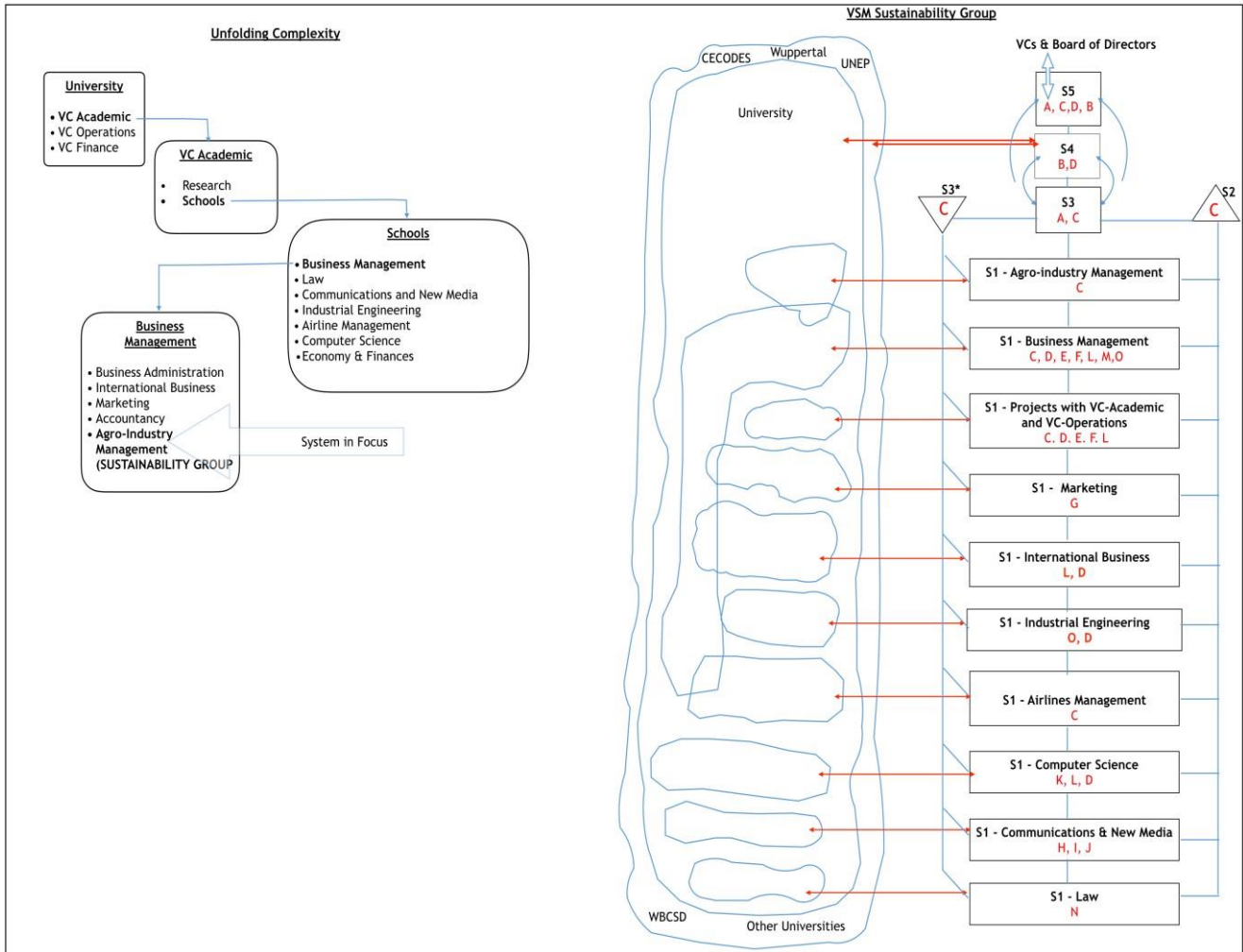


Figure 3. VSM of the sustainability group 2005. Notice the addition of a recursive level in the organization and the increasing number of S1 – increasing complexity and diversity of roles/functions within the sustainability group.

In 2007 a new management, with a different ethos, took over “The U” and started an aggressive market-oriented expansion, both nationwide and internationally. This expansion changed the priorities of “The U” and induced a new restructuring process oriented to reduce costs, mostly via standardization and escalation of modules. In consequence most of the customized sustainability modules disappeared and just the core generic modules⁷ remained.

As a result of these changes some members of the group migrated to other universities (B, N, I, J) and others were relocated in different groups (A - to lead research; O - to join the VC- operations; D - to lead research in a different faculty; L and F to act as researchers in a different faculty.

As a result, C took over the leadership of the remaining sustainability group and relocated roles and functions to respond to the reduced modules and areas of activity. At the end of that period ER “The U”. The resulting structure of the group at 2008 can be seen in figure 4.

⁷ The core modules in sustainability were Man and Environment (to all students), Environmental Management (for engineering) and Management for Sustainability (Business School).

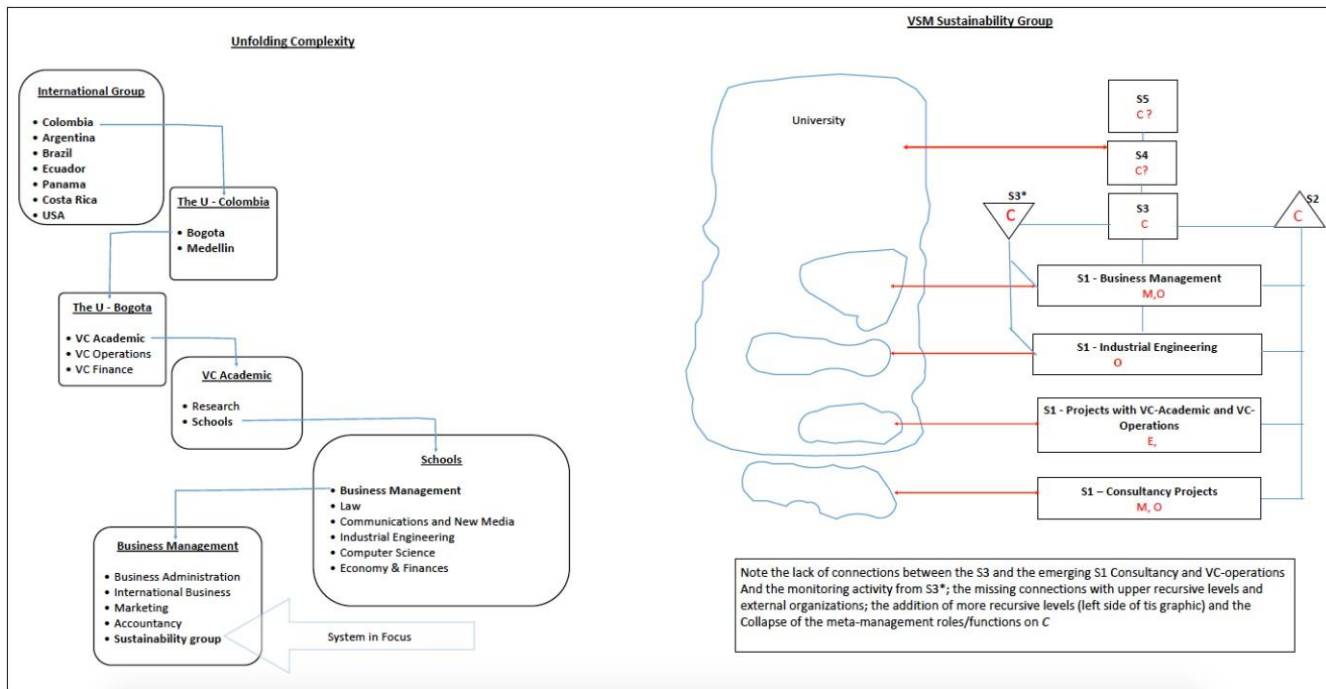


Figure 4. VSM of the Sustainability Group 2010. Notice the reduction of S1, The addition of 2 more recursive levels in the organization, the lack of mechanisms of control in the emergent S1 and the collapse of the all the meta-management roles/functions on C and its lack of connectivity with upper levels of recursion.

By 2010 once the process of internationalization and growth stabilized, the institution reassumed its agenda in sustainability. Thus, a top-down, hierarchical structure was set in place, from the VC-operations, looking forward for the ISO 14001 certification for the campus. As a result, some programs were revamped through the provision of additional resources and the execution of small research projects (e.g. Camacho and Cardoso, 2010: offering a comprehensive review about the evolution of and global context of the policy framework underpinning Environmental Management in HE; Camacho and Mejia, 2011; offering a case study describing an environmental program for the redevelopment of the green areas and soil regeneration in “The U” campus). However, by 2011 the sustainability group formally ceased to exist, and just the remaining EMS programs under direct control of the VC-operations were still active.

DISCUSSION

The design and implementation of a OCS described in the case study follows the descriptions documented by Boiral, (2008); Senge, (2006) and Verhulst, (2012): a small, almost individual, project that grew organically without much planning. The case observed also followed patterns of adaptive behavior where charismatic leadership (Individual A) played a crucial role in the development and growth of the sustainability initiative, close to what was registered in other cases by Lozano (2013, 2015) where attributes of the communication network, empowerment and leadership configured a case of intrapreneurship.

In the observed case study, serendipity happened as: 1) the background of the key/founding members of the sustainability group (individuals A, B, C, D, E) was closely related to Natural Sciences (Biochemistry, Agronomy, Biology, Marine Biology) facilitating the communication, the creation of a common mental model and conceptualization of ideas towards applied

From the organizational perspective, yet being generated in the “institutional middle” - without inputs from students or the top management- the sustainability initiative was led by an upper middle manager (A - Head of School) with key connections with peers and top managers (VC- academic, Board of Directors, Deans, Heads of School). This reduced the bureaucratic distance despite the constantly increasing number of (administrative) recursive levels. It also made fluid the process of pitching as well as the recognition and validation of the group as soon as it generated results with high impact (academic & research products).

These advantages disappeared when A migrated to other departments and eventually left the University and the replacement C took over, not having the same connections and operative capacity to liaise with the upper management of “TheU” increasing the bureaucratic distance.

From a Complexity Management Perspective, the VSM representation (figure 2) shows how from the first stage of development (2002) the group created clear distinctions between operative and managerial roles/functions: S1 delivering two specialized modules; S2 to coordinate the activity of academics; S3 & 3* providing resources, developing internal synergies and alignment with the ethos/identity of the group, defined as an anthropocentric view of sustainability in accordance to the Identity/Ethos of the University and the faculties served at that moment; S4 developing key external contacts to monitor cutting edge trends on applications of sustainability in business management, (e.g. Lund University, Wuppertal Institute) scanning for new trends in sustainability relevant to the activity of the group; S5 defining the identity, ethos and policies for the group in alignment with the ones of “TheU” – developing close connections at higher and lower recursive levels (top/senior managers and students).

As the group’s activity grew, the sophistication of the operative systems (S1) followed, originating several specialized S1; all adequately interconnected, autonomous and coordinated through the assignment of a team member for such function.

It is also important to recognize the key role of B in his role/function of S4 developing contacts outside the University with key partners both nationally and internationally.

In the peak of the group activity (2005-2007) several highly specialized functions emerged but in retrospective, it was evident that despite satisfying the conditions for viability, having in place all the VSM subsystems and connections, there were issues that threatened the group resilience: 1) “The U” cultural change with the imposition of a new ethos and institutional project; 2) structural change: the addition of more recursive levels adding bureaucratic distance; 3) lack of resilience/ structural equivalence inside the sustainability group: the lack of individuals at the same structural/organizational level with similar connections, for the key

members of the group (e.g. *A, B, C, D*). Particularly the lack of structure equivalence for *A, B* and *D* was critical. Once *A* was removed, the group lost connection with senior and top managers; with *B* leaving the group lost contact with key organizations and when *D* left, the group lost the complex, binding intellectual links and the academic leadership. These withdrawals threatened the group's adaptability and cohesiveness, finally conducing to the collapse of the group's operative capacity. 4) The emergence of new operative units (S1: design and implementation of an EMS with specific actions in cooperation with the VC-Operations in the campus of the University and a consultancy unit). The lack of early recognition of these emergent S1, eventually as a new recursive level inside the sustainability group, conduced towards a lack of control and coordination and communication mechanisms, necessary to manage the increasing complexity of the hectic activity of the group. 5) The withdrawal of *A, B* and *D* left *C* single handing the VSM S2, 3, 4 and 5, clearly overwhelmed as all the meta-management functions collapsed in a single person. 6) Lack of awareness and reflection on the internal structure of the group (double loop VSM S3-4 and S4-5). It can be assumed that the lack of structural equivalence, the threat to the resilience and ultimately to the viability of the group was never noticed due to the lack of awareness and reflection inside the group on its own organizational structure, due perhaps to the adaptive/reactive nature of its planning and the lack of knowledge and tools to do so at the time.

CONCLUSION

This paper contributes empirical evidence on the importance of the understanding of organizational structures for intrapreneurship and the development of key connections in the emergence and consolidation of OCSD.

In VSM terms, the quick development of connections at higher recursive levels of the organization (top management) seems to be crucial, particularly to gain recognition for emergent initiatives on sustainability. For this validation/recognition to be effective, it should be followed by the delivery of tangible academic impact and results (e.g. impact in the curriculum, publications, results from research activity). The case study documented in this study suggests that such tangible products can be generated with little effect on the budget of the HE institution and be aligned with the current workload, profile and deliverables of the staff involved in such initiatives.

From a methodological perspective, the VSM seems to be an effective framework to interpret and contextualize information from complex datasets to analyze organizational structures, their evolution, viability and resilience. This observation suggests that future OCSD and initiatives to design and implement sustainability projects from the "institutional middle" should consider the use of the VSM to monitor and guide the process/project on real time within a context of complexity.

The case study confirms the importance of empowerment, recognition, serendipity - good timing - and autonomy of faculty and staff as critical conditions for the emergence and implementation of OCDS/sustainability initiatives from the "institutional middle". However, such process is highly sensitive to the development and maintenance of supportive organizational structures (AKA: VSM subsystems 1-5) and the early recognition and support from top management.

The paper in general suggests the need for additional research on the attributes of the organizational structures required to provide viability and resilience to OCSD in the HE sector

as the results presented are limited to a single case study. In addition, the use of unconventional frameworks to address complexity was explored, however, additional evidence of the effectiveness of such tools/frameworks (AKA: VSM) is needed.

Practical Implications

The case study provides empirical evidence of how the “institutional middle” can affect the top-down management with positive repercussions for both, the management of environmental issues in campus and the development of contextualized academic programs with strong content in sustainability. The case study suggests a cost-effective, efficient and high-impact method to design and implement sustainability initiatives in universities.

This study also provides evidence about the importance of structural equivalence to provide resilience and viability to emergent organizational structures (from an organizational perspective).

REFERENCES

- Avendanno, E., Camacho, C. and Cardoso, P. (2004) **Resultados de la revision ambiental inicial en la Institucion Universitaria Politecnico Grancolombiano**. *Poliantea*. 1(1): 69-84. Beckhard, R. and Harris, R. (1987). *Organizational Transitions*. 2nd Ed. Reading. MA. Addison. USA.
- Beer, S. (1979). **The heart of the enterprise**. Jhon Wiley & Sons. Chicester, UK
- Beer, S. (1984). **The Viable System Model: its Provenance, Development, Methodology and Pathology**. *Journal of the Operational Research Society*. 35:7-25.
- Beer, S. (1985). **Diagnosing the System for Organizations**. Jhon Wiley & Sons. Chichester, Uk Beer, S. (1989). National Government: Disseminated Regulation in Real Time, or How to Run a Country. In: Espejo, R. & Harnden, R. (Eds). **The Viable System Model: Interpretations and Applications of Stafford Beer 's VSM**. Wiley & Sons. Chichester, UK.
- Bero, B., Doerry, E., Middleton, R. and Meinhardt, C. (2012). **Challenges in the development of environmental management systems on modern university campus**. *International Journal of Sustainability in Higher Education*. 13(2): 133-149.
- Boada, A. (2002). **Desmaterializacion**. *Centro de Gestion Ambiental*. Universidad Externado de Colombia.
- Boada, A. (2003). **El reciclaje: una herramienta no un concepto. Reflexiones hacia la sostenibilidad**. *Centro de Gestion Ambiental*. Universidad Externado de Colombia. [Online]. Available at: http://www.researchgate.net/publication/238754428_EL_RECICLAJE_UNA_HERRAMIENTA_NO_UN_CONCEPTO_REFLEXIONES_HACIA_LA_SOSTENIBILIDAD. [Accessed: 24-05-2015].
- Boada, A. (2003b). **De la produccion sostenible al consumo sustentable**. Univeraidad Externado de Colombia editorial. Bogota, Colombia.Boada, A. (2004). Empresario y medio ambiente: Mentalidad en contravia?. *Poliantea*. 1(1): 35-67.
- Boada, A. (2004a). **Ecoeficiencia Una ventaja competitiva?** *Revista Sotavento*. 8(8): 25-37.
- Boada, A. (2004b). **Desmaterialization as a supply chain management strategy to promote sustainable development**. *Avances de Tecnologia y Produccion*. 1(1): 2-29.
- Boada, A. (2007). **Ecoinnovacion: de la produccion mas limpia al consumo sustentable**. *Innovacion y Ciencia*. 14(1):52-59.
- Boada, A., Rocci, S. and Kuhndt, M. (2005). **Negocios y Sostenibilidad. Mas alla de la gestion ambiental**. Politecnico Grancolombiano Editorial. Bogota, Colombia.
- Boiral, O. (2008). **Greening the Corporation Through Organizational Citizenship Behaviors**. *Journal of Business Ethics*. 87: 221-236
- Brinkhurst, M., Rose, P., Maurice, G. and Ackerman, J. (2011). **Achieving campus sustainability: top-down, bottom-up, or neither?** *International Journal of Sustainability in Higher Education*. 12 (4):338-354.

- Bruntland, G. (1987). **Our Common Future**. [Online]. Available at: <http://www.un-documents.net/wced-ocf.htm>. [Accessed: 20- 02-2015]
- Camacho, C. (2003). **El politecnico grancolombiano y su compromiso con el ambiente**. *El Poli*. 1.
- Camacho, C. (2004). **Diagnostico ambiental de la flora del campus politecnico grancolombiano**. *Poliantea*. 2.
- Camacho, C. (2005). **Propuesta de implementaicon de un sistema de gestion ambiental para un campus universitario**. *Poliantea*. 2(3).
- Camacho, C. (2007a). **La crisis del Medio Ambiente**. *Revista Panorama*. 2
- Camacho, C. (2007b). **El sistema de gestion ambiental en el politecnico grancolombiano**. Memoria del IV seminario internacional universidad y ambiente, Bogota. 2.
- Camacho, C. (2008). **Desarrollo Sostenible: Un tema de Responsabilidad Social Universitaria, Compromiso del Politécnico Grancolombiano**. In: Responsabilidad Social de las Universidades. Tomo II. Red Latinoamericana de Cooperación Universitaria. Buenos Aires.
- Camacho C. and Cardoso, P. (2010a). **La problematica ambiental y los centros de desarrollo academico**. *Poliantea*. 11.
- Camacho, C. and Cardoso. P. (2010b). **Revision del problema ambiental y su gestion**. *Poliantea*. 10.
- Camacho, C. and Mejia. A. (2011). **Restauracion ecologica del campus de la institution universitaria Politecnico Grancolombiano**. *Poliantea*. 7(12).
- Camacho, C. (2013). **Del consumismo al consumo sustentable**. *Punto de Vista*. 4(6). Cameron, E. and Green, M. (2009). **Making Sense of Change Management: A Complete Guide to the Models, Tools and Techniques of Organizational Change**. 2nd Ed. Kogan Page Ltd. London. UK.
- Cardoso, P. (2011). **Facilitating self-organization in non-hierarchical communities. A methodology for regeneration programs**. PhD dissertation. University of Hull.
- Cardoso, P. and Espinosa, A. (2014). **Understanding Emergence, Resilience and the recursive distribution of knowledge in organizations. An application of the combined powers of organizational cybernetics and social network analysis**. *OLKM conference*. Oslo. Norway.
- Ceulemans, K., Lozano, R. and Alonso-Almeida, M. (2015). **Sustainability Reporting in Higher Education: Interconnecting the Reporting Process and Organizational Change Management for Sustainability**. *Sustainability*. 7 (7):8881-8903.
- Clarke, A. and Koury, R. (2009). **Choosing an appropriate university or college environmental management system**. *Journal of Cleaner Production*. 17:971-84.
- Clarke, E. (2006). **The campus environmental management system cycle in practice: 15 years of environmental management, education and research at Dalhousie University**. *International Journal of Sustainability in Higher Education*. 7 (4): 374-89.

Copernicus – **Campus.** (1988). [Online]. Available at: <http://www2.leuphana.de/copernicus/background/> [Accessed: 28-04-2014].

Cortese, A. (2003). **The critical role of Higher Education in creating a sustainable future.** Planning for Higher Education. [Online]. Available at: http://www.aashe.org/documents/resources/pdf/Cortese_PHE.pdf [Accessed: 20-01-2015].

Conway, T., Dalton, C., Loo, J., and Benakoun, L. (2008). **Developing ecological footprint scenarios on university campuses: a case study of the University of Toronto at Mississauga.** *International Journal of Sustainability in Higher Education.* 9 (1): 4-20.

Dawson, P. (1994). **Organizational Change: A Processual Approach.** Paul Chapman Publishing, Ltd. London.UK.

Disterhef, A., Ferreira, S., Ramos, M. & De Miranda, U. (2012). **Environmental Management Systems (EMS) implementation process and practices in European higher education institutions – top-down versus participatory approaches.** *Journal of Cleaner Production.* 31:80-90.

Dopplet, B. (2010). **Leading Change toward Sustainability: A Change-Management Guide for Business, Government and Civil Society.** 2nd ed.; Greenleaf Publishing: Sheffield. UK

Eisenhardt, K. (1989). **Building theories from case study research.** *Academy of Management.* 14(4):532-550.

Espejo, R. (2008). **Observing Organizations: The Use of Identity and Structural Archetypes.** *Journal of Applied Systemic Studies,* 2(1/2) (Special issue: Organizational Cybernetics in focus, Perez Rios, J. & Schwaninger, M. (Guest Editors).

Espejo, R., Bowling, D. and Hoverstadt, P. (1999). **The Viable System Model and the VIPLAN software.** *Kybernetes.* 28(6/7):661-678.

Espejo, R. and Reyes, A. (2011). **Organizational systems: managing complexity with the viable system model.** London: Springer.

Espinosa, A., Cardoso, P., Arcaute, E. and Christensen, K. (2011). **Complexity approaches to self-organization: A case study from an Irish Eco-Village.** *Kybernetes.* 40 (3/4):536-558.

Espinosa, A., Reficco, E., Martinez, A. and Guzman, D. (2015). **A methodology for supporting strategy implementation based on the VSM. A case study in a Latin-American multi-national.** *European Journal of Operational Research.* 240(1):202-212.

Hefery, A. and Clarke, A. (2009). **Student-led campus climate change initiatives in Canada.** *International Journal of Sustainability in Higher Education.* 10 (3):287-300.

Hetzler, S. (2008). **Pathological Systems.** *International Journal of Applied Systemic Studies.* 2(½). (Special issue: Organizational Cybernetics in Focus, Perez-Rios, J. & Schwaninger, M. (Guest Editors)).

Hoover, E. and Harder, M. (2014). **What lies beneath the surface? The hidden complexities of organizational change for sustainability in higher education.** *Journal of Cleaner Production.* [Online]. Available at:

http://eprints.brighton.ac.uk/12014/1/Hoover_Harder_2014_OrgChangeSustainabilityHE_Post%20Print.pdf. [Accessed: 17-05-2015].

Hoverstadt, P. (2009). **The Fractal Organization: Creating Sustainable Organizations with the Viable System Model**. John Wiley & Sons. Chichester, UK.

IUA – UNESCO (2002) GHESP. [Online]. Available at: <http://www.iau-aiu.net/content/outcomes-4> [Accessed:28-04-2014].

International Sustainable Campus Network. (2010). [Online]. Available at: <http://www.international-sustainable-campus-network.org/about/introduction-and-analysis.html> [Accessed: 28-04-2014].

Knowles, K. (2010). **A holistic framework for environmental change: socio-environmental cohesion for sustainability**. PhD dissertation. Business School. University of Hull, UK.

Knowles, K and Espinosa, A. (2009). **Towards an Holistic Framework for Environmental Change: The Role of Normative Behavior and Informal Networking to Enhance Sustainable Business Practices**. *Systemic Practice and Action Research*. 22(4):275-291.

Kotter, J. and Schlesinger, L. (2008). **Choosing Strategies for Change**. *Harvard Business Review*. July-August: 130-139 (Reprint of original article from 1973).

Kurland, N. (2011). **Evolution of a campus sustainability network: A case study in organizational change**. *International Journal of Sustainability in Higher Education*. 12(4):395-429

Lozano, R. (2013). **Are companies planning their organizational changes for corporate sustainability? An analysis of three case studies on resistance to change and their strategies to overcome it**. *Corporate Social Responsibility and Environmental Management*. 20: 275-295

Lozano, R. (2006). **Incorporation and institutionalization of SD into universities: breaking through barriers to change**. *Journal of Cleaner Production*. 14:787 -796.

Lozano, R. (2015). **A holistic perspective on corporate sustainability drivers**. *Corporate Responsibility and Environmental Management*. 22: 32-44.

Lozano, R., Ceulemans, K., Alonso-Almeida, M., Huisingh, D., Lozano, F., Waas, T., Lambrechts, W., Luckman, R. and Hüge, J. (2014). **A review of commitment and implementation of sustainable development in higher education: results from a world wide survey**. *Journal of Cleaner Production*. In press.

Mont, O. and Boada, A. (2005). **Producto, Produccion y Consumo: Los frentes de la sostenibilidad**. Universidad Externado de Colombia. [Online]. Available at: http://www.researchgate.net/profile/Alejandro_Boada2/publications. [Accessed: 18-05-2015].

Mont, O. and Boada, A. (2008) **Desmaterializacion. Sistemas Producto-Servicio una estrategia diferente de negocio**. Universidad Externado de Colombia Editorial. Bogota, Colombia.

Nicolaidis, A. (2006). **The implementation of environmental management towards sustainable universities and education for sustainable development as an ethical imperative**. *International Journal of Sustainability in Higher Education*. 7 (4):414-424.

Noeke, J. (2000). **Environmental management systems for universities – A case study.** *International Journal of Sustainability in Higher Education*. 1(3):237-251.

Observatory. (?). **The Magna Charta Univeersitarium** [Online]. Available at: <http://www.magna-charta.org/cms/cmspage.aspx?pageUid={d4bd2cba-e26b-499e-80d5-b7a2973d5d97}> [Accessed:28-04-2014].

People and Planet. (2012). **About People and Planet** [Online]. Available at: <http://peopleandplanet.org/aboutus/> [Accessed: 28-04-2014].

Perez-Rios, J. (2008). **Aplicacion de la Cybernetica Organizacional al Estudio de la Viabilidad de las Organizaciones.** *Patologias Organizativas Frecuentes (Parte II). DYNA. Vol 8* Perez-Rios, J. (2012). **Design and Diagnosis for Sustainable Organizations. The Viable System Method.** Springer-Verlag. Berlin Heidelberg. 250p

Quintero, J. and Camacho, C. (2004). **Diagnostico de la flora del campus del Politecnico Grancolombiano.** *Panorama*. 1(2).

Ramos, T., Caeiro, S., van Hoff, B., Lozano, R., Huisingh and Ceulemans, K. (2015). **Experiences from the implementation of sustainable development in higher education institutions: Environmental Management for Sustainable Universities.** *Journal of Cleaner Production*. 106:3-10

Roberts, H. and Robinson, G. (1998). *ISO 14001 EMS Implementation Handbook*. Linacre House, Oxford. pp 403.

Schwaninger, M. (2007). **Intelligent Organisations: Powerful Models for Systemic Management.** St Gallen: Springer.

Senge, P. (2006). **The Fifth Discipline. The Art & Practice of the Learning Organization.** Random House Inc. Doubleday. USA.

Spelleberg, I., Buchan, G. 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*. 5 (2):125-132

Sterling, S. (2001). **Sustainable Education: Re-visioning Learning and Change (Schumacher Briefings).** *Green Books Ltd. Darlington, UK.*

The Talloires Declaration. (2008). [Online]. Available at: <http://www.ulsf.org/publications.html>. [Accessed:28-04-2014].

Van Weenen, H. (2000). **Towards a Vision of a Sustainable University.** *International Journal of Sustainability and Higher Education*. 1(1): 20-34

Verhulst, E. (2012). **The Human side of Sustainable Design Implementation from the Perspective of Change Management.** Doctoral Thesis. University of Antwerp. Belgium
Verhulst, E. and Lambrechts, W. (2013). **Fostering the incorporation of SD into the university system. Lessons learned from a change management perspective.** *ERSCP-EMSU Conference.* Istanbul. Turkey 4-7 June. [Online]. Available at: https://lirias.kuleuven.be/bitstream/123456789/455652/1/186_Fostering_the_incorporation_of_SD_into_the_university_system_Lessons_learned_from_a_change_management_perspecti_ve.pdf.

[Accessed: 24-04-2015].

Von Oelreich, K. (2004). **Environmental certification at Malardalen University.** *International Journal of Sustainability in Higher Education*. 5 (2):133-46

Wells, C., Svanick, S. and Manning, C. (2009). **Using a class to conduct a carbon inventory: a case study with practical results at Macalester College.** *International Journal of sustainability in Higher Education*. 10 (3):228- 38

Yin, R. (2003). **Case Study Research: Design and Methods**, Applied Social Research Methods Series. SAGE. Thousand Oaks, CA.