

## **Application of Knowledge Management for Sustainable Development in Institutions of Higher Education**

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**Abstract:** Campus sustainability is an increasingly popular notion for universities around the world in light of increasingly serious global environmental problems. Yet the very concept of “sustainability” itself is a complex, or “wicked”, problem that makes managing this transition complex and difficult. The scope of a sustainable campus could include anything from greening facilities, increasing environmental education, integrating sustainability priorities into purchasing policies, and an endless list of other considerations.

Given the breadth that sustainability could have on a university campus, employing tools to help manage this goal will create more effective and immediate change. One possible tool is Knowledge Management (KM), the practice of “capturing, organizing and storing information” (“Imperial College London,” 2010, para. 25). Specifically, a framework by Allen et al. is applied to the sustainability in higher education (SHE) problem to help universities take steps towards creating sustainable campuses.

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## **Introduction**

Campus sustainability is an increasingly popular goal at institutions of higher education. Increasingly students and communities rely on universities to research solutions to the daunting and complex environmental problems of the day, and implement these findings in their day-to-day practice (Kok, 2007). Tackling these goals while maintaining the broader mission of the organization, to educate and research, proves a struggle for even the most advanced institutions because the breadth of the term sustainability itself permeates a multitude of departments and other traditional boundaries, requiring a wealth of knowledge to address the range of issues it presents. These challenges are outlined in a great deal of literature, including Creighton's analysis of campus sustainability challenges in "Greening the Ivory Tower" by Creighton (1998) and the more recent "Planet U: sustaining the world, reinventing the university" by M'Gonigle and Starke (2006).

At its core, planning for sustainable development on campuses is a management issue, and requires the proper skills to do so effectively. Using an appropriate tool could offer universities the potential to increase their ability to address sustainability concerns and pressures. Knowledge Management (KM), or the "process of capturing, organizing and storing information and experiences of workers and groups within an organization and making it available to others" ("Imperial College London," 2010, para. 25), would most certainly be such a tool.

Adjustments to a KM framework proposed by Allen, Bosch, Gibson and Jopp (1998) offer a methodology for moving sustainability goals into practice through four basic processes: scoping goals and objectives, accessing relevant knowledge, creating community dialogue and monitoring and adaptive management. While some of these tools have been used informally with success at various institutions, a holistic application of Knowledge Management can help better manage the environmental challenges universities face today, and move good intentions into action.

## **Sustainability in Higher Education and Knowledge Management**

### **1. Sustainability in Higher Education: A "Wicked" Problem**

Sustainability in Higher Education (SHE) is a fast growing topic that has sprouted up at campuses around the world in recent years. Universities and colleges are inspired for a number of reasons to strive for a more sustainable campus, from altruistic goals set by keen campus leaders, to implementing greater efficiency for fiscal purposes, to simply cashing in on the popularity of the term "SHE."

The creation of the United Nation's Decade of Education for Sustainable Development, which spans 2005 – 2015 ("United Nations," 2010), is a reflection that SHE is an increasingly important and globally significant field of environmental management. Academic institutions are increasingly looked to in times of significant social challenges, as they are generally well

suiting to address the problems through teaching and research. In the case of SHE, campuses can also be used as “living laboratories,” demonstrating the principles of stewardship and conservation as well as using their research to “green” their own facilities (Dahle & Neumayer, 2001).

Universities have much to offer in working towards sustainable development: they are generally stable institutions accustomed to planning long-term visions, have research and education as key facets of their operations, and tend to be receptive to new ideas, or as Graedel (2002) puts it: “if universities cannot define and implement sustainability within their own organizations, who else can be expected to do it?” (p. 347). In many ways campuses act as a sort of microcosm of broader communities, and combined with their roles as community leaders and research hubs they are ideal places to initiate sustainable practices and develop projects before introducing them more broadly.

Despite all this potential, institutions of higher learning struggle to incorporate the concept into practice while maintaining their day-to-day priorities as a research institution and business (Creighton, 1998). Sustainability remains an elusive goal, perhaps the first challenge being to define the term itself (Fien, 2002). There are a number of definitions unearthed in a literature review, but for the purposes of this discussion a broad definition, as described by Dahle and Neumayer (2001) as the “process of reducing the multitude of on-and-off site environmental impacts resulting from campus decisions and activities, as well as raising environmental awareness within the human communities of a college or university” (p. 141), seems most appropriate.

Moving this definition into practice, however, is a complex, or “wicked” problem because of the notorious vagueness of the term. It makes it an elusive goal as neither the mission, nor whether or not success has been achieved, are ever quite clear. Rittel and Webber (1973) discuss how an exhaustive list of all the information needed to solve the problem is possible for “tame” problems, and once compiled all the problem-solver needs to understand beyond this list is their own tools or training to begin to solve the problem at hand. “Wicked” problems, by contrast, have a potentially limitless amount of information to be captured and so deciding which method of problem-solving will be employed *prior* to receiving this information makes tackling it all the more difficult, and may mean that more than one methodology needs to be tested to ensure a solution. By this understanding, SHE is most definitely a “wicked” problem, as it requires an exhaustive understanding of all the possible interpretations of the term and its applications in order to reach it. Defining SHE as a “wicked” problem is helpful in so far as it confirms what many sustainability practitioners already know: sustainability is a complex and multi-faceted issue that without proper management is likely to fall short on an institution’s priority list.

Sustainability, then, can perhaps more aptly be described as a balancing point rather than an end-goal, as the definition of the term can be interpreted in a myriad of ways and may

constitute different approaches at each institution. Rather than focus on a rigid definition, Van Weenen (2000) suggests that sustainable development can be successfully encapsulated within the acronym “LIFE” where “L” suggests the significance of recognizing limitations, “I” reminds us of our social and ecological interdependence, “F” stands for the fundamentals, such as the concepts and systems that must be altered, and “E” represents equity, between persons locally and globally.

Organizations like the Association for the Advancement of Sustainability in Higher Education represent hundreds of educational institutions working to put LIFE principles into practice. AASHE projects range from energy retrofits to supplying local food in campus cafeterias, and organizations like this one offer a plethora of resources for moving towards greater change in the institution’s daily practices. Clearly, institutions are struggling with how to create a sustainable campus and are in need of tools to create this change while they maintain their other priorities of education, research, and housing students (Creighton, 1998).

Because each institution is unique in their priorities, facilities, funding, infrastructure and management practices, there is no one clear path towards sustainable development, leaving each educational facility to work towards this goal individually, with varying levels of effectiveness. Dahle and Neumayer (2001) point out that although a “green” campus may be a popular goal, it is no small task to achieve and there is not one correct path towards becoming a sustainable campus. Though many campuses make pronouncements about their intentions or desires to become a “greener” campus, there are only a select few vigorously addressing it from all angles.

There are a multitude of ways higher education institutes can move towards sustainable development, including through management, planning, development, education, research, operations, community service and outreach, purchasing, transportation, design, new construction, renovation, and retrofits (Van Weenen, 2000). As the sustainability goal becomes broader and encompasses more of these options, it has greater potential to make for a truly “green” campus, but also faces more difficulties.

## **2. Knowledge Management: Definition and Potential**

As a management tool and research discipline, Knowledge Management (KM) has increased in popularity within the past decade (Cranfield, 2008). Perhaps as society shifts to increasingly knowledge-based jobs, and the problems businesses and institutions face are increasingly complex, KM has become an asset to a myriad of organizations.

KM is essentially a process for “optimizing the effective application of intellectual capital to achieve objectives” (Bennet & Bennet, 2004, as cited in “Mountain Quest Institute,” 2010, para. 17). In other words, KM concentrates on the processes and people involved in any area and aims to distil the most relevant information necessary to solve a problem or integrate processes (“Learning for Sustainability,” 2010). It is a tool that goes beyond traditional

boundaries to integrate all available knowledge and information, certainly something managers in most disciplines could appreciate.

While not traditionally used in the environmental sector, KM has great potential for being applied to achieve sustainability targets. Allen et al. (1998) describe how KM has capacity in this regard, using application in rural New Zealand as an example, as it is designed to support ongoing processes and is inherently helpful in creating dialogue, discussions and community so people can share their experiences and observations, ultimately leading towards sound decision-making for the problem at hand.

With the multitude of challenges sustainability practitioners face on campuses, it seems any additional tool to facilitate change would be a welcome one. Knowledge Management has proven its usefulness and longevity in other sectors and could do the same for SHE. Figure 1 outlines the benefits of KM as described in the OD Practitioner (2000) relating each aspect to SHE, ultimately demonstrating how KM is good for business, the community, and the individual — all aspects of a university institution.

<b>KM benefits for the business</b>	<b>Relevance to SHE</b>
Help drive strategy.	<i>Can guide the path to sustainability by identifying areas of major significance and “low hanging fruit” through local knowledge.</i>
Support faster problem solving both locally and organization wide.	<i>Help tame the “wicked” nature of SHE by identifying problems and working towards solutions quickly.</i>
Aid in developing, recruiting and retaining talent.	<i>SHE requires the best intellectual capacity available from a multitude of disciplines for all stakeholder levels.</i>
Build core capacities and knowledge competencies.	<i>As a cross-sector problem, building core knowledge across sectors will help achieve true SHE in all aspects of campus life.</i>
More rapidly diffuse practices for operational excellence.	<i>Cultivate solutions and move towards implementation sooner, to allow for swift feedback and return on investment.</i>
Cross fertilize ideas and increase opportunities for innovation.	<i>The cross-disciplinary and “wicked” nature of SHE requires innovative ideas that draw from all aspects of campus.</i>

<b>KM benefits for the community</b>	<b>Relevance to SHE</b>
Help build common language, methods and models around specific competencies.	<i>Help the multitude of players from different aspects of campus life communicate towards solving specific problems related to a sustainable campus and open lines of communication for future problem solving.</i>
Embed knowledge and expertise in a larger population.	<i>Plant understanding of SHE concepts to empower local populations to identify and address sustainability concerns in their own areas and share across campus.</i>
Aid retention of knowledge when employees leave the company.	<i>Increase the potential of the campus to continue projects thereby increasing the ability of the school to meet its long-term sustainability goals.</i>
Increase access to expertise across the company.	<i>Instead of relevant SHE knowledge available in only specific departments or upper management, increasing viability and speed of projects by having knowledge shared throughout these silos.</i>
Provide a means to share power and influence with the formal parts of the organization.	<i>Empowering local communities to make SHE decisions by increasing their knowledge and relevance to problem solving.</i>
<b>KM benefits for the Individual</b>	<b>Relevance to SHE</b>
Help people do their jobs.	<i>When integrated with SHE principles, KM helps people do their jobs with minimal harm to the environment, and in some instances with more economic efficiency.</i>
Provide a stable sense of community with other internal colleagues and with the company.	<i>A healthy campus requires high-quality employees that are invested in their campus. SHE requires a strong community of employees.</i>
Foster a learning-focused sense of identity.	<i>Employees eager and encouraged to identify areas of improvement and contribute to problem solving for SHE are more invested in their work, campuses and can cultivate a strong sense of pride in their work.</i>
Help develop individual skills and competencies.	<i>Integrating working towards SHE along with regular job duties can increase the investment and appreciation for the workplace and create more effective employees to draw from when tackling other SHE issues.</i>

Help a knowledge worker stay current.	<i>By participating in KM practices to address SHE issues, employees will become inherently more valuable for future problem solving as they become more up-to-date, experienced and knowledgeable.</i>
Provide challenges and opportunities to contribute.	<i>Helps employees to become more invested in the campus and the overarching goals of campus excellence while advancing their own knowledge and experience, and making them better able to contribute to future challenges and participated in opportunities.</i>

Figure 1: Relevant benefits of KM to SHE

## **Discussion: Knowledge Management applied to Sustainability in Higher Education**

### **1. Potential and Framework for applying Knowledge Management**

Institutions of higher education are unique in the vast amounts of knowledge they accumulate through staff, faculty, administration, and the student body. Operating in the current economic structure creates additional complexity, Cranfield and Taylor (2008) point out, as the academic sector moves largely towards being a competitive “industry” instead of solely a place of scholarship — technological advancements, facilities, extracurricular opportunities, funding, and a long list of other criteria are all necessary to attracting the best students, as well as teachers.

From purchasing to housing, accounting to academics, and a plethora of different positions in between, the sharing of knowledge throughout each unique aspect of campus life could help transition our academic institutions into leaders of sustainable development. University departments tend to be compartmentalized yet overlap in their jurisdiction: a Sustainability Director, for example, may have the mandate of reducing the university’s energy footprint, but lacks the data of how much energy is currently used. Facilities management may have the data, but lack the information about the over-arching principles that effect energy decisions within administration. Incomplete knowledge makes it difficult for anyone to make informed decisions and set a plan for achieving goals.

Increasingly, we operate within a system in which the resources we use are ideas and knowledge, and thus using a system that manages this resource is a logical concept. Because of the emphasis on this new “economy” and increased interconnectivity, higher learning institutes face an enormous amount of pressure to manage information and the flow of

knowledge responsibly and effectively in the wake of global integration (Cranfield & Taylor, 2008).

Though SHE is a goal for many campuses, and universities offer a broad and varied body of knowledge to draw from, much of the research and practices are still based on traditional approaches and the expertise from single disciplines (Allen et al., 1998). There is growing recognition of the complexity of environmental management, and in some cases practitioners are learning to bust out of their silos and draw from other areas of expertise. Perhaps one of the most obvious places to start would be from management, particularly the management of knowledge.

The KM approach is designed for the very complex, wicked problem described, though it remains unclear what the process of application looks like. Allen et al. (1998) outlined four stages: scoping goals and objectives, accessing relevant knowledge, community dialogue, and monitoring and management. These four stages have been applied to the SHE problem specifically to demonstrate their potential usefulness in this field.

## **2. Phase 1: Scoping goals and objectives**

Though almost certainly any person striving to achieve a sustainable campus has developed some goals to work towards, KM emphasizes this as an integrated process based on a common understanding of the issue or problem (Kok, 2007). This objective may sound obvious but is not always a given — the Director of Sustainability may perceive an issue differently from the Grounds Manager, for example. An initial scoping process that helps those involved define the nature of the system being discussed creates a basis for understanding the needs of all groups involved and their respective aims (Allen et al., 1998, p. 43). With all parties given an opportunity to be involved from the onset and collectively develop mutual goals, there is a higher likelihood of success in achieving those goals (Creighton, 1998). While sustainability may begin as a lofty goal, refining this ambitious and overarching priority to meaningful targets is the first phase to creating a sustainable campus, and a holistic view that examines energy use, water use, the use of resources, emissions, and land use is a good starting point (Graedel, 2002).

## **3. Phase 2: Accessing Relevant Knowledge**

This twofold stage requires accessing *relevant* knowledge through thorough problem formulation, and the creation of monitoring tools for measuring goals and success (Allen et al., 1998). Within each respective profession lies a wealth of untapped knowledge, from the official policies and procedures of the department to the reality of day-to-day interactions. Waste Management staff, for example, will have a local knowledge about the waste-related procedures and realities on the campus; this information is rarely documented and therefore not readily available for access through literature review or other traditional methods of studying a problem. Initial scoping activities in the form of informal discussions, interviews,



focus groups, questionnaires, and surveys will allow the investigator to understand what existing data and information exists as well as get managers involved at preliminary stages and become invested and involved in the monitoring and management of the project (p. 56).

At its core, we are really trying to coax a knowledge transfer, which Comm (2003) described as involving converting knowledge into teachings and talent so it can be utilized by sustainability managers to work towards priorities and objectives. All staff departments should both be exposed to environmental education and have understanding of how sustainability relates to their tasks assessed through this process (Noeke, 2000).

#### **4. Phase 3: Community Dialogue**

Improving communication flows among relevant persons to utilize this “relevant knowledge” is the next logical step to maintain interest and empower solutions. This can take place in a formal setting, like a facilitated workshop, or a more organic initial meeting where dialogue is more open-ended. This phase facilitates an understanding of each other’s role in meeting the aims of the project and is designed to seek the active cooperation of all participants (Allen et al., 1998).

Opening up the lines of communication allows access to two kinds of knowledge: the explicit knowledge, which is deliberately shared and communicated, and the tacit knowledge that resides in people’s heads and is rooted in their experiences, though seldom documented (“The OD Practitioner,” 2000). This type of knowledge is the most hard to uncover yet is at the core of solving difficult and complex problems particular to each specific campus – a literature review can help suggest possible tactics, but only the people working directly with the issue on a day-to-day basis know the reality of the processes and decisions made.

#### **5. Phase 4: Monitoring and Adaptive Management**

In order to maintain effectiveness and relevance, the KM frameworks both requires and allows the information flows to be updated as more knowledge or understanding is unearthed, or as goals adapt or new ones emerge (Allen et al., 1998, p. 58). As initial steps are taken on any project those involved at all levels will gain initial results and outcomes that inform the effectiveness of the venture. This information can be used along with the knowledge base developed in the third phase to re-evaluate and, if necessary or possible, expand the project through further collaboration or broadening of stakeholders (Allen et al., 1998). Creating responsibility within the department to check the work and report back is crucial to the ongoing management during this early phase (Velazquez, Munguia, & Sanchez, 2005).

Involving stakeholders at all levels to participate in the monitoring and management phase helps lead to a greater confidence in their role in the project, and the greater goals of SHE. Of course, traditional research can help fill in the gaps of local knowledge and prioritize goals. The monitoring and management of the project still requires “official” leadership through the

direction of a project manager (Clarke, 2006), but allowing for community input at all phases of the project helps ensure the likelihood of meeting the goals, and perhaps open doors to buy-in for future projects.

## **6. Challenges and Shortcomings**

Applying KM to higher education institutes is no easy task. Each university is unique in its scope, size, and priorities, and is a complex institution that balances both providing superior education and research opportunities, while simultaneously operating as an efficient and effective business in a competitive market (Cranfield et al., 2008). With such broad and vast goals, SHE is not always the top priority for campuses and most schools have limited resources to work with. This may prevent managers from applying tools and frameworks as they frantically attempt to stay on top of their lofty missions and goals.

One of the most limited of these resources cross-campus may be time, a limited factor in all sectors, but particularly in the university setting described above where there are multiple priorities all vying for time from administration, staff, and faculty (Creighton et al., 1998). Convincing staff and faculty to attend the sessions, complete the follow-up work required, and continually provide input on a project may be difficult and present itself as a major roadblock for applying KM to SHE.

Some researchers have raised concerns that KM is merely a fad, just another tool that will inevitably lose its effectiveness in the ever-changing realities of running complex institutions (Belinger, 2010). Cranfield (2008) and others, however, insist that while some management tools may be short-lived, KM is not susceptible to this because the “knowledge-economy is here to stay” (p. 86). Further, they point out that typically management fads reveal themselves as such at about a five-year period, and KM has surpassed this in its longevity.

As with most things, it is hard to implement any project or management system without integrating one’s own biases, and KM is no exception. To stay true to the integrity of the framework, SHE managers may have to identify and shelve their own conceptions or perceived understanding of the barriers to achieving campus sustainability and be open to an honest dialogue.

## **Conclusion**

There are a number of barriers to implementing SHE that differ from one institution to the next, but generally consistent themes include: a fundamental lack of interest and commitment towards green initiatives; a lack of financial resources; little environmental education within the campus community; a general lack of incentives; misconceptions about the term “sustainability”; and, the predominating culture and organizational structures of the university (Dahle & Neumayer, 2001). All of these are legitimate and real concerns, and yet almost all of them can also be tackled through the application of the KM framework.

As outlined by Creighton and others, a truly sustainable campus requires support and input from all sectors of campus, and a plan for follow-through (Creighton, 2008). The four-phased KM framework adapted from Allen and outlined in this paper offers a potential starting point for achieving this description and working towards management of a sustainable campus environment.

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