

A SUSTAINABLE UNIVERSITY: WHAT CAN BE THE MATTER?

ABSTRACT

This manuscript presents a comprehensive managerial model of a sustainable university created with empirical data collected from eighty higher education institutions around the world. The sustainable university model offers a clear perspective about how people responsible for sustainability initiatives get from their initial momentum to advanced steps in the process to become a sustainable university. It should assist universities to improve the effectiveness of their potential or current sustainability initiatives through the identification of strategies, opportunities, and institutional barriers in universities.

This worldwide model depicts a highly structured framework that is composite by four phases in a strategic management process. In these phases, four diverging strategies, and more than seventy common practices undertaken by key players of sustainability initiatives are analyzed in order to generate initial meaningful insights for exploring by people responsible for sustainability initiatives in higher education institutions

METHODOLOGY

Literature review

In order to assure the quality of the study, data source triangulation¹ was used as a method of increasing reliability of the research. As a first step in the data triangulation, I conducted a literature review of published and unpublished articles, conference proceedings, university reports, books, website documents, and education for sustainability profiles identified through the website of second nature². I did not target any specific discipline. However, most of the material was connected to engineering, economics, sociology, and related sciences.

The ultimate goal of this literature review is the identification of the diverging strategies and practices undertaken by key players of sustainability initiatives in order to be able to generate initial meaningful insights about organizational institutional areas and issues for exploring.

In order to ensure that the model reflects the most current and cutting-edge approaches to depict a sustainable higher education university, the time frame of the literature review was from 1990 to 2002. Selected references prior to 1990 were also analyzed.

Due to the necessity for including representation from most of the continents in the study, the second criterion was the region of the university. For instance, a university report from a university of Africa, Asia, or Latin America has preference over a university report from a university in the United States or Europe. This because, it is less likely to find published material from universities in developing countries than in developed countries.

The last criterion consisted in including all material which topic represented the multiplicity of perspectives within the field. For instance, if a material dealt with recycling, and recycling had been included in the model, that material was not chosen for being part of a sustainability

¹ Triangulation refers to the use of multiples methods, researches, data sources, and theories in a research projects. (7)

² Education for Sustainability Profiles. Available in Second Nature website at http://www.secondnature.org/efs/efs_profiles.html

portfolio. But if new initiatives, tools, or strategies were identified on the material, they were included in the portfolios.

Survey

The knowledge derived from the experiences of universities around the world in the literature review was very useful in helping me develop the initial stage of the model. However, conducting a survey was necessary to extend information and include certain themes in the model that were unavailable in a literature review.

The survey took into consideration that a sustainable university concept might have different meanings across nations, disciplines, and individuals. Therefore, it focused on the contextual background of their particular experiences rather than in generalizations.

Participants

Eighty invitation emails were sent to prospective participants, including several networks.

Therefore, the impact was greater than eighty isolated emails.

Fifty-six people answered my email invitation accepting to be part of the survey, but only forty-two people answered the survey. Two questionnaires were not included in the results because they only answered part I of the questionnaire.

Participants in survey came from 44 different higher education institutions in 18 countries.

The model: organizational structure of a sustainable university

Model description

Figure #1 depicts the structure of the sustainable university model, which systematically exhibits the each of the components of the proposed model encompassed in a strategic management process.

In it, four diverse strategies are delivered through a set of tailored initiatives. Each of the strategies and initiatives has been drawn from the best practices found in the literature, the survey, and in the case study analyzed.

Phase one: Developing a Sustainability Vision for the university

Theoretically, the strategic move towards sustainability begins when someone, or many people, in the university “dream” about the possibility that the institution’s members behave according to the sustainable development philosophy. This means that all the resources are used to accomplish the mission of the university in a sustainable manner. At this point, there are neither barriers nor constraints besides imagination and creativity.

At this stage, universities should define their own concept and definition of what a sustainable university is about.

Figure 1 Sustainable University Model

As a foundation, a sustainable university is defined in this model as:

“A higher education institution, as a whole or as a part, that addresses, involves and promotes, on a regional or a global level, the minimization of environmental, economics, societal, and health negative effects in the use of their resources in order to fulfill its main functions of teaching, research, outreach & partnership, and stewardship among others as a way to helping society make the transition to sustainable life styles .”

Phase Two: The mission

The ideal future envisioned should be used as a fundamental basis for the development of the mission. As a matter of fact, the mission statement conveys the inspiration and motivation of the vision. However, a mission statement tends to be more realistic than a vision statement and answers three key questions: who, what, and why (1). The mission lays a foundation for future actions and philosophies that underlie those actions (2).

Epistemological and political philosophies are often found in university missions as a way to legitimate to these institutions (3). The ultimate goal of university members who advocate sustainability is amending, or creating, the university mission statement to include sustainability as one of the core values of their university.

Phase Three: Sustainability Committee: creating policies, targets, and objectives

The next managerial step mandates that the organizational structure of a sustainable university reflect its commitment by incorporating its policies into their habitual operations as well as the generation of the means necessary to successfully achieve the mission.

In the sustainable university model, the establishment of a sustainability committee facilitates the tasks of creating and establishing comprehensive campus-wide policies, objectives, and targets. This committee is the main decision-making level. The committee does not take over the initiatives around the campus, it helps people responsible of those initiatives by

disseminating and receiving information, coordinating initiatives, avoiding overlapping efforts, getting funds, and ensuring that policies are being effectively implemented.

Ideally, the committee must be formed with the representation of all key players in the university community such as students, professors, staff members, unions, administrators, and if possible some representation of honorable members of the surrounding society.

Sustainability should be promoted by policies aimed at inspiring behavioral changes of university members. “When a policy is absent or is developed with broad unit input, efforts are likely to be uncoordinated, and the result will be unfocused and short-lived.” (4)

Diverse departments implement sustainable initiatives in the university in order to contribute to achieve the goals and targets of the institution. However, when campus-wide policies do not exist, the heads in charge of each initiative should set their own specific policies, objectives, and targets.

Phase Four: Sustainability Strategies

All the sustainability initiatives that are being made by universities members are organized into four strategies. The first three of them, education, research, and outreach and partnership, can be carried out inside or outside the campus. The other is aimed at implementing sustainability on the campus itself.

All of these four strategies have two fundamental means for successfully fulfill their goals. One is to enhance the awareness of sustainability issues among the people related with the initiative; the other is the use of technology that permits reduction of the environmental burden at the local or global level depending on where the initiative is being implemented. On occasion, succeeding in raising levels of awareness does not automatically translate into expected results (5).

The following segment outlines the main strategies for higher education institutions reaching sustainability.

Strategy one: Education for sustainability

Knowledge is the key word in this group of initiatives. Usually, they are created for teaching sustainability in order to change attitudes and behaviors that are affecting the quality of life on the planet. “Many schools around the world are making important strikes toward necessary changes in education.” (6)

The model indicates three avenues as the most adequate ways to meet the goals of education for sustainability.

Although most activities in formal, non-formal, and informal education take place on the university campus, in classrooms and laboratories, they are not limited to those settings. It is also possible that sustainability knowledge be delivered outside the campus through distance learning, using the Internet, email, videotapes, and correspondence. Distance learning facilitates the access to a greater audience without the limitation of space and time.

- *Formal Education*

“Greening the Curriculum” or “Curriculum for Sustainability” are names that people use for this alternative. Characterized by the acquirement of credits, sustainability is taught in universities at three levels: undergraduate, graduate, and certificate programs.

Generally, the courses are elective, but a few academic departments have required sustainability courses in their curriculum (7), (8). There is a diversity of contents for sustainability course depending on the discipline where the class is taught. However, the interdisciplinary approach is a characteristic often mentioned in literature. Interdisciplinary distinguishes education for sustainability from environmental education.

- *Non-Formal Education*

This is also aimed at increasing knowledge among university members and the greater university community. Since this avenue does not give credits, it is easier to be implemented

into the university's structure than a change in the curriculum. These initiatives are short-term initiatives that are scheduled depending on the capacity and necessity of the institution. Workshops, seminars, training sessions, meetings, and pilot projects are some of the initiatives often found under this category. This alternative has been widely used to educate professors in sustainability issues. The foundation in this practice is that after professors take those short courses, they use the material learned to introduce, or expand, sustainability issues into their courses (9).

- *Informal Education*

Beyond increasing the knowledge, the goal of this other alternative to education is raise the awareness of people about sustainability issues. This kind of initiative is used often in non-environmental programs and with the greater university community to promote a sustainable society.

Commonly, the proposition of these initiatives is only to inform the audience about a specific topic. Speaker sessions, cultural events such as the Earth Day celebration, rallies, and demonstration projects are good examples of this alternative.

Strategy Two: Research

Individuals, research groups, and affiliated centers are conducting sustainability research within high education institutions. The main goal of this strategy is to increase knowledge in this field under economic, social, environment, and political approaches on both regional and global scales.

Universities perform multidisciplinary and interdisciplinary research projects that include a great variety of topics, such as global climate, pollution prevention, sustainable consumption, toxic use reduction, industrial ecology, regional development, hazardous waste, and environmental justice among others.

Strategy Three: Outreach and Partnership

Universities also engage in sustainability by community outreach and partnership with industries, governmental agencies, educational institutions, and non-governmental organizations among others groups.

This strategy poses a particular challenge to universities. It is aimed at collaborating with communities, agencies, and organizations to improve the quality of life of their members. Initiatives involved in these activities work to coordinate, and improve efforts of communities, workers, churches and other organizations by given advising services and technical assistance.

Among the preferred tasks of people participating in these sustainability initiatives are grassroots movements, the creation of networks that address issues of poverty, health, environmental and social justice, and the design of educational materials for all education level students, teachers, and community leaders.

Strategy Four: Sustainability on campus

Least, but not least, the fourth strategy is practicing sustainability on the campus itself.

“There is a growing student demand at colleges and universities in the United States and internationally for environmental education and for institutions to reduce the environmental impact of their own operations.” (10) In fact, students and professors are using university campuses as a laboratory to research and learn.

The target of each initiative is very diverse; universities around the world are engaged in a number of successful projects. Nevertheless, Those programs are generally operated from a department and usually are not linked with university-wide policies.

The next section presents the projects, with their main practices, found in this study:

- *Energy Efficiency*

From all the projects undertaken by university members, initiatives related to conserve energy on campus are the most preferred. It perhaps is because “campus energy costs typically constitute 30% of a university’s total operations and maintenance budget.” (11) Energy audits, energy-efficient lighting retrofit or upgrade, buildings insulation, high-efficient equipment installation and maintenance, movement sensors and timers installation, energy facts cultural awareness, course scheduling, solar panel installation, the use of wind and geothermal alternative sources of energy, energy use policy, and green computing are some of the practices used to fulfill the goals of this alternative. As a result, many universities have saved many dollars in energy cost (12).

- *Global Climate Change*

Despite the great dissemination of sustainability projects aimed at conserving energy, encourage more efficient transportation methods, and others that could be related with the reduction of greenhouse gases, only a few initiatives address the issue on a global scale. Climate change projects strive to dissemination of knowledge to educate and raise awareness among the university members about the consequences of climate change and to reduce the emission of greenhouse gases on campus. The hardest task of those projects is the elaboration of the university greenhouse inventory. The goal of this inventory is to determine the sources and the amounts of emissions generated by the university community during the performance of their activities.

- *Water Efficiency*

Universities are large-scale water users. For that reason, the preservation and purification of water is one of the biggest concerns in universities and colleges around the world.

The most effective means of accomplishing the goals of water initiatives are water audits, repairing or replacing leaky faucets and others plumbing reparations, pipe maintenance, low-flow showerheads and toilets retrofit, flush valves installation, automatic faucet retrofit, improvement of irrigation practices, high-efficiency cooling system installation, sewage treatment facilities, water conservation awareness, sprinkling systems installation, and water use policies.

- *Composting*

Recycling of organic waste is being done in universities either on site or hauled off the campus to external composting facilities.

There are several ways to compost organic material. The most convenient methods for on-campus composting are the trench, vermicomposting, and composting toilets. It is because these methods are developed on a small scale besides that they are aimed at encouraging university members to compost their organic waste at home. However, others have the goal of produce enough compost to be used in their university green areas.

Food, wood and yard, and animal wastes are the organic material that is often composted in universities.

- *Transportation and Commuting*

As the university community is growing, universities are coping with transportation issues, and the environmental problems associated to it. However, it is often seen as an environmental issue of minor relevance (13).

Several strategies have been tried on campus to encourage students and faculty to reduce the use of particular vehicles driven to get on campus. These are aimed at stimulating walking, the use of bicycles and public transportation.

Among the preferred practices are the purchase of highly efficient vehicles, running shuttle services, car-pooling programs, installation of bicycle parking racks, raising the awareness among the campus, creating policies, replacing fuel vehicles with electric vehicles, using of alternatives to fossil fuel, such as diesel or propane, discussions with public officials to improve public transportation, financial incentives to use mass transit to get to work, creation of transportation policies, and introducing university parking fees.

- *Hazardous Waste Management*

Hazardous waste generated in European or North American universities is regulated by a governmental agency. In other countries, the situation could be different. Anyway, universities around the world are intending to reduce, reuse, and recycle their hazardous wastes produced in their labs, research centers, janitorial services, or in any other university sources. Sometimes, hazardous wastes only can be neutralized and disposed in a safety site. In order to succeed in these initiatives, higher education institutions are putting into practice some tasks such as sharing material between labs, making audits for getting comprehensive data, improving chemicals storage practices, coordinating material purchasing, using micro-scale methods in chemistry lab courses, doing chemical tracking, creating policies, and substituting hazardous materials with non or less hazardous materials. It is common that these activities are backed or lead by the safety and health department because of the risks that these materials pose to the human, animals, and ecosystems.

- *Non Hazardous Waste Management*

Similar to the hazardous waste management, these initiatives promote the use of reduction, reuse, and recycle techniques for managing the waste generated on campus.

The only difference is that this waste does not pose any risk to users. The inorganic materials that often are found on campus include office paper, newspaper, aluminum, glass, plastic, batteries, cardboard, and metal.

In general, recycling is the most chosen technique to deal with a non hazardous waste followed by reusing and then reducing.

- *Green Buildings*

These initiatives are also called ecological design, intelligent building, environmental building design, or healthy building. The basic idea is to concert all sustainability principles in the design, construction, operation, and demolition of a university building.

In most of the cases, old buildings are remodeled or reconstructed taking into account environmental considerations. Intelligent buildings do not contain hazardous materials in their walls, roofs, floors, and peripherals. Solar panels feed the energy needed. Energy and water conservation systems are in place. The equipment used in their interiors is highly efficient. Furniture is made with environmental friendly materials. The quality of the interior air is monitored with high quality ventilation systems, and landscaping promotes biological diversity. A few universities are involved in these projects (14).

- *Dining Services*

These efforts are addressed to improve the quality of the food served in universities dining halls. Those programs have strong links with composting and recycling projects. One of the main concerns is where the food comes from. The purchasing of organic food is promoted because the negative impacts attributed to genetically engineered food (15). In addition, it is also preferred that food comes from local family businesses.

Issues related to healthier food such as vegetarian and low cholesterol dishes are also considered in these initiatives.

- *Integrating Pest Management*

High education institutions are reducing their dependence on highly toxic pesticides by controlling pests in a manner that minimizes risks to human health, other organisms, and the environment.

Nevertheless, when pesticides are needed for controlling pests, human and environmental risks are reduced through good application practices.

- *Environmentally Preferable Procurement*

The purchasing of environmentally friendly products³ is a good alternative to reduce wastes at the source.

Post-consumer recycled paper is the classical example, but other environmentally friendly products are also bought in universities such as re-refined oil, tires, floor pads, toilet and facial tissues, construction material, cleaners, non-genetically engineered food, inks, fluorescents lights, and others.

Buying items in bulk, returning packaging to vendors, creating procurement policies, making centralized purchases, requesting small amounts of hazardous materials, renting services rather than buying equipment, and purchasing to local suppliers are practices that complement the effort to reduce risks on humans and the environment as well as foster local economies.

- *Natural Heritage*

The growth of universities has dramatically affected the ecosystems on their grounds. Natural Heritage projects are aimed at preventing further environmental damage and to restore the natural capital that has been lost.

³ An environmentally preferable product is a product or service that have lesser or reduced negative effect on human health and the environment than a similar product or service and both serve the same purpose.

The common practices in those projects are: picking up garbage from rivers, forest, and green areas; culture awareness campaigns; landscaping activities; monitoring activities, and restoring parks.

- *Other Sustainability Initiatives*

This section highlighted several innovative and important ways that higher education institutions are implementing towards sustainability on campuses. But, there is no doubt that existing others of equal worth and that were not mentioned.

The model recognizes that it is very likely that there are others initiatives that were not present in the institutions analyzed. Therefore, it leaves an open space in its scheme to include those environmental, social, and economics initiatives that were not found in the literature review as well as all those that will be created and implemented in the future.

Table# 1 summarizes each initiative with their common practices identified in the study. It should take into account that others practices can be added to this list.

Table 1 Sustainability initiatives & practices summary

Initiative	Practices
<i>Energy Efficiency</i>	<ol style="list-style-type: none"> 1. Energy audits 2. Energy-efficient lighting retrofit or upgrade 3. Buildings insulation 4. High-efficient equipment installation and maintenance 5. Movement sensors and timers installation 6. Energy facts cultural awareness 7. Course scheduling 8. Solar panel installation 9. The use of wind and geothermal alternative sources of energy 10. Energy use policy 11. Green computing

<i>Global Climate Change</i>	<p>12. Elaboration of the university greenhouse inventory</p> <p>13. Cultural awareness</p>
<i>Water Efficiency</i>	<p>14. Water audits</p> <p>15. Repairing or replacing leaky faucets and others plumbing reparations</p> <p>16. Pipe maintenance</p> <p>17. Low-flow showerheads and toilets retrofit,</p> <p>18. Flush valves installation</p> <p>19. Automatic faucet retrofit</p> <p>20. Improvement of irrigation practices</p> <p>21. High-efficiency cooling system installation</p> <p>22. Sewage treatment facilities</p> <p>23. Water conservation awareness</p> <p>24. Sprinkling systems installation</p> <p>25. Water use policies</p>
<i>Composting</i>	<p>26. Trench</p> <p>27. Vermicomposting</p> <p>28. Composting toilets</p> <p>29. Cultural Awareness</p>
<i>Transportation and Commuting</i>	<p>30. Purchasing of highly efficient vehicles</p> <p>31. Running shuttle services</p> <p>32. Car-pooling programs</p> <p>33. Installation of bicycle parking racks</p> <p>34. Raising the awareness among the campus</p> <p>35. Creating policies</p> <p>36. Replacing fuel vehicles with electric vehicles</p> <p>37. Using of alternatives to fossils fuel, such as diesel or propane</p>

	<p>38. Discussions with public officials to improve public transportation</p> <p>39. Promoting financial incentives to use mass transit to get to work</p> <p>40. Creation of transportation policies</p> <p>41. Introducing university parking fees</p>
<i>Hazardous Waste Management</i>	<p>42. Sharing material between labs</p> <p>43. Making audits for getting comprehensive data</p> <p>44. Improving chemicals storage practices</p> <p>45. Coordinating material purchasing</p> <p>46. Using micro-scale methods in chemistry lab courses</p> <p>47. Doing chemical tracking</p> <p>48. Creating policies</p> <p>49. Substituting hazardous materials with non or less hazardous materials</p>
<i>Non Hazardous Waste Management</i>	<p>50. Reduction,</p> <p>51. Reuse,</p> <p>52. Recycle</p> <p>53. Cultural awareness</p>
<i>Green Buildings</i>	<p>54. Old buildings are remodeled or reconstructed taking into account environmental considerations.</p> <p>55. Intelligent buildings do not contain hazardous materials in their walls, roofs, floors, and peripherals.</p> <p>56. Solar panels feed the energy needed.</p> <p>57. Energy and water conservation systems</p>

	<p>are in place.</p> <p>58. The equipment used in their interiors is highly efficient.</p> <p>59. Furniture is made with environmental friendly materials.</p> <p>60. The quality of the interior air is monitored with high quality ventilation systems,</p> <p>61. Landscaping promotes biological diversity.</p>
<i>Dining Services</i>	<p>62. Improving the quality of the food served in universities dining halls such as vegetarian and low cholesterol dishes</p> <p>63. Composting leftovers</p> <p>64. Purchasing of organic food</p> <p>65. Buying from local family businesses</p>
<i>Integrating Pest Management</i>	<p>66. Reducing their dependence on highly toxic pesticides</p> <p>67. If needed pesticides, improving good application practices</p>
<i>Environmentally Preferable Procurement</i>	<p>68. Buying environmentally friendly products</p> <p>69. Buying items in bulk</p> <p>70. Returning packaging to vendors</p> <p>71. Creating procurement policies</p> <p>72. Making centralized purchases</p> <p>73. Requesting small amounts of hazardous materials</p> <p>74. Renting services rather than buying</p>

	<p>equipment</p> <p>75. Foster local economies</p>
<i>Natural Heritage</i>	<p>76. Picking up garbage from rivers, forest, and green areas</p> <p>77. Culture awareness campaigns</p> <p>78. Landscaping activities</p> <p>79. Monitoring activities</p> <p>80. Restoring parks</p>

Helping efforts: networks and organizations

The motivation for implementing sustainability initiatives usually goes beyond a particular campus. Key people promoting sustainability in higher education institutions have joined efforts in order to assist each other in the successful implementation of their initiatives. They exchange information and make efforts to raise awareness on campus communities.

There are also several organizations such as: the National Wildlife Federation⁴ and the University Leaders for a Sustainable Future⁵ that collaborate with people interested through publications, consultation, workshops, training, and several other resources.

Sustainable Universities Assessment: diagnostics tools to explore the evolution of sustainable practices in universities.

The sustainable university model could not be completed properly without defining the appropriate instruments for monitoring, analyzing, and controlling the performance of sustainability initiatives. Otherwise, the model becomes a hypothetical structure with zero implementation value.

⁴ Internet site <http://www.nwf.org/campusecology/index.cfm>

⁵ Internet site <http://www.ulsf.org/>

Environmental Audits

Environmental audits, rather than sustainability audits, are one of the major control tools used by university leaders to gauge the sustainability performance of the institution. An environmental audit typically refers to a methodical examination and review of the environmental policies and practices on campus.

The U.S Environmental Protection Agency defines environmental auditing as a periodic, objective, and documented assessment of an organization's operations compared to audit criteria (16).

“At minimum, audit objectives should include assessing compliance with applicable environmental laws and evaluating the adequacy of internal compliance system to carry out assigned responsibilities.” (17)

By conducting an environmental audit, a university should develop a better understanding of the state of its operations according to compliance criteria.

Performing a campus environmental audit is the fourth recommendation on “*The Blueprint for a Green Campus*”⁶. This is based on potential benefits that audits could bring to universities such as helping to develop environmental policies, saving costs, enhancing the image of the university, and teach students about environmental management principles (18).

Sustainability Indicators

Sustainability indicators are one of the most important elements in an audit. Ideally, metrics should provide reliable, relevant, and useful information about one or several elements to be audited in the system.

“Sustainability indicators are being developed at the national level in many countries.” (19)

However, indicators to measure sustainability in higher education institutions are lacking

⁶ Document generate during the campus earth summit hosted by Yale University in 1994.

(20). In fact, the development of this kind of control instrument has become a major priority to universities (21).

Interpretation and use of sustainability indicators is a difficult task (22). On a small scale, the following example is intended to illustrate how considering indicators by themselves could lead to erroneous conclusions and imprecise lines of action.

Recycling initiatives are very popular on campus. In the United States alone, higher education institutions have an average recycling rate of 50% of waste generated (23), (24).

The most common sustainability indicators for recycling are total weight of the materials recycled (Tons / time), and money saved as avoidance costs in trash collection and disposal costs (\$/ per a period of time).

In the computer room of the Work Environment Department of the University of Massachusetts Lowell, students can print their assignments at no cost. Because recycling is believed to be a good practice to protect environment, people do not hesitate in wasting paper that will be recycled. In fact, the off-campus recycling program may be a good economic incentive for the University.

Contrary to the University of Massachusetts Lowell, the Industrial Engineering Department in the University of Sonora does not have in place a recycling program for paper. Students have to buy the paper that is going to be used in the computer room. They are encouraged to print assignments on both sides of the paper. When paper is wasted, it is gathered by students of the Sustainable Development Course to make toys that are delivered to poor children during Christmas (25).

Taking only into account the recycling rate indicator, the University of Massachusetts Lowell is more sustainable than the University of Sonora. At first glance, it could be said that the higher recycling rate, the more sustainable the university is. However, "Recycling itself tends to be dirty and energy intensive, so it is clear that as far as durable material goods are

concerned, repair, re-use, and renovation are even more desirable than recycling.” (26) Thus, as the reducing and reusing rate is higher in the University of Sonora, it could be stated that it is more sustainable than the University of Massachusetts Lowell.

This case demonstrated that the best use of indicators is for measuring the progress of initiatives more than comparison between initiatives or institutions. A higher recycling rate indicates that the recycling initiative is improving. In the same manner, a higher reusing rate indicates that the reusing initiative is getting better, but nothing else.

As same that in this case, if the path to sustainability were followed, it would find that some universities might be strong in one of the four strategies here described while others can be superior in another. Erroneously, some universities have themselves declared to be on top of the sustainability movement (27).

Positioning a university in any place on the scale is an asseveration difficult to defend and generally lacks arguments.

The Political Forces affecting the model

I have left until later an often neglected dimension of sustainability, politics. For illustrious economists, politics is the most important dimension for sustainability (28).

Higher education institutions are characterized by their complex and intricate webs of political forces. If any university member were to decide to implement a sustainability initiative, he/she would take into account that success in a democratic organizational structure where each person means a vote, regardless of his/her productivity, requires not only good sustainability initiatives but also good political relations with him/her colleagues and university administrators.

To a certain degree, the campus is a political battlefield where some people see their rights being affected with the implementation of projects that demand changes in behaviors, routines, environments, and inclusive in personal beliefs.

Solving problems of unsustainability on campus will require good practices at all levels of the university. Everything needs to be negotiated rather than dictatorially imposed. It brings people face to face in order to reach agreements.

Tenure in a university represents not only a guarantee of employment (29) but also a strong source of political power. In fact, “it is sometimes more important to have the support and oversight of a senior administrative body than a set of guiding environmental principles.”

(30)

In every institution, the political environment has become an important issue that affects every aspect of the organization. Sustainability is seen as an icon of political correctness (31).

The political conditions of the university determine the degree of commitment to sustainability in practice. If the commitment is concerted and genuine, universities will favor implementation over rhetoric.

Continuous improvement: Plan – Do – Check – Act

This model emphasizes that sustainability initiatives must be based on a continuous improvement.

Promoted by W. Edwards Deming, the PDCA cycle is a useful tool to coordinate continuous improvements efforts. The first stage of the PDCA cycle calls for identifying what is going wrong and generating ideas for solving the problems of unsustainability. Following, people responsible for sustainability initiatives must test the selected proposal in a small scale. This minimizes costs if the proposed changes do not work.

Check refers to review if the proposed changes are achieving the desired result or not.

Finally, next step is to implement those tasks that solve the problem or improve the efficiency of an initiative. However, the cycle does not finish there. It is always necessary to begin the cycle again to back to identify new and better methods.

The implementation of the model must not be a static process for generating a particular initiative. Therefore, the four phases of the model are seemed as a series of iterations that continuously seeks improving the sustainability of the institution.

DISCUSSION

The sustainable university model presents a clear perspective about how people responsible for sustainability initiatives get from their initial momentum to advanced steps in the process to become a sustainable university. However, it is important to understand that currently, in most universities, there is a general dearth of adequate conditions for the establishment and compliance of all the phases of the model. For that reason, it is not intended to be a rigid and complex structure. On the contrary, the model is designed to be used by university community member as an initial framework for exploring strategies, insights, and lessons that can be discussed, adapted, used, and transferred by people responsible for sustainability initiatives in higher education institutions to fit unique situations on their universities. Implementing the sustainable university model is a process of continual improvement in environmental, social, and economic performance that should be made through incremental steps.

Based on the findings in this manuscript, I have defined a sustainable university as:

“A higher education institution, as a whole or as a part, that addresses, involves and promotes, on regional or global level, the minimization of environmental, economics, societal, and health negative effects in the use of their resources in order to fulfill its main functions of teaching, research, outreach & partnership, and stewardship among other as a way to helping society make the transition to sustainable life styles .”

For pragmatic purposes, this definition does not matter much. Sustainability means different things to different people; then, each university should define its own concept of sustainable university.

A few universities have amended its mission to incorporate sustainability concerns in it, others have created environmental policies, ones prefers to foster education for sustainability

while other aim their efforts at outreach, research, or sustainability on campus strategies, but none of the universities studied has all the elements considered in this model. In a certain way, it represents an acknowledgement that it can no longer be assumed that incorporate sustainability into a higher education institution is an easy and direct task.

There is a long way to go before achieving sustainability. However, all the energy, dedication, time, and resources invested by the university members in universities around the world have given many fruits. Although little measurable, there have been progress. The circumstances underlying the issues are changing, new knowledge has emerged, more universities members are aware of the damage of unsustainable practices, and values on campuses have evolved. At least, more students, professors, and others university community members are committed to helping society make the transition to sustainable life styles.

Actual indicators have end-of-pipe approaches that generally gauge only one aspect of sustainability, but sustainability indicators should rather be linked with the origin of waste or pollution, at the sources. Generally, these metrics are data that originate from a utility bill.

An integrative indicator that considers the whole life-cycle of a material from its purchasing to its disposal would evaluate much better the sustainability performance of universities.

Unfortunately, higher education institutions are a long way from design effective sustainability indicators.

In a broad perspective, it does not make sense to compare and rank higher education institutions with each other because the goal is to make the world society more sustainable and not only one specific university more sustainable. Competition could lead universities to oppose each other instead of collaborating among each other.

If superior performance is the goal, it can also be reached through studying the best internal and external practices. Benchmarking is an alternative strategy for gaining peer recognition.

Sharing our best sustainability practices shall legitimize the quality of our initiatives and also contribute to helping society make the transition to sustainable life styles.

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