INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 7, Issue 11, (2017) E-ISSN: 2222-6990

The Review of Sustainability Model and Indicators for Higher Education Institutions in Malaysia

Mohd Zamri Husaini & Ahmad Jusoh

Business Administration Department, Faculty of Management, Universiti Teknologi Malaysia Malaysia

DOI Link: http://dx.doi.org/10.6007/IJARBSS/v7-i11/3555

Published Date: 23 November 2017

Abstract

Sustainability's issues in higher education have been discussed and presented in many conferences around the world. In Malaysia, the knowledge and implementation of sustainability concept and model are relatively at the beginning stage. Hence, the development of sustainability indicators in Malaysia higher education institution context is vital. The objective of the research is to review the sustainability model of higher education and to find the sustainability indicators proposed by the models of sustainability for higher education institutions in Malaysia. Three models of sustainability proposed were studied which are; the fully integrated system, managerial model and adaptable model. The methodology of this research is to compile literature of sustainability models and sustainability indicators to answer the research questions. Result shows that there are six sustainability indicators from the three models which are; research, administration, operation, community engagement, outreach and partnerships, assessment and reporting, and sustainability in campus. Furthermore, this paper also elaborates and discusses each of the indicators.

Keywords: Sustainability, Sustainable Development, Education, Higher Education, Sustainability Indicators.

Introduction

Higher education institutions have become more competitive to keep pace with the 21st century challenges. Higher educational institutions (HEIs) are leading social and cultural changes from the forefront through research-based findings (Lozano, 2006). There are many issues involved with higher education institutions especially from western countries concerning on the impact of future environment, economy and social aspects (Wang W.S & Ching G.S., 2015). One of the main facets which may gain the potential of competition among institutions is the development of sustainability practices suitable to the culture and problem of the institutions.

The number of higher education institution (HEI) engaged with sustainable development elements are increasing every year. It contributes sustainable development in teaching,

research, local engagement and global community (Andy, et.al, 2003). In the 7th Malaysia Plan (Malaysia, 1996) the policy on sustainable development in Malaysia describes the measures taken to emphasize on sustainable development during earlier Malaysia Plan to maximise Malaysia's ability to develop the sustainability's aspect.

In general, there are many sustainability indicators that have been developed at the national level in many countries in the world especially in higher education institutions. However, there still lacks of indicators that can measure sustainability in higher education institutions (Viebahn P, 2002). Thus, the effort to develop the instrument has become a major priority to most higher education institutions (Clugston, 2000).

The sustainability indicators among higher education institutions in Malaysia is still new and not in a common practices. There is still lack of literature reviews and researches on developing sustainability indicators in Malaysia's higher education institutions. One of the main universities in Malaysia which has successfully developed their sustainability indicators is Universiti Sains Malaysia (USM).

USM has been awarded an APEX (Accelerated Programme of Excellence) university status in 2008. In order to ensure better quality outcome in monitoring and evaluation system, USM has established a sustainability program named USM-APEX sustainability Strategy and Roadmap. By establishing the SMART (Specific, Measurable, Attainable, Relevant, Time-bound) sustainability indicators, USM has successfully developed the USM APEX: Sustainability Indicators which consists of teaching, research, outreach, campus sustainability, corporate greening and education for sustainable development (ESD) (Govindran & Kanayathu, 2008). However, the timelines of the indicators need to be renewed as the time measured is only covered for short-term (2010-2011), mid-term (2011-2013) and long term (2014). So, there is a need to come out with a new criteria or indicators that can fit on current issues in higher education. Moreover, the indicators that have been established are only focusing on all aspects and mission of USM and are not applicable to the whole or other institutions.

Moreover, problems also occurred when choosing the suitable or appropriate indicators to monitor and assess the efforts undertaken by higher learning institution. The lack of suitable indicators may result in the lack of a clear view on the current situation of sustainability (Lambrechts *et al*. 2009; Lozano *et al*. 2013). This may help the sustainable communities to easily access the overall progress towards sustainable development in their organizations as there still unsuitable and inappropriate sustainability tools in the market. Some scholars exposed that the number of universities engaged with sustainability is still small compared to the total number of universities in the world. From 14,000 universities in the world (IAU, 2011), only 15 universities have published their sustainability reports (Lozano, 2011).

Research Objectives

The objective of this paper is to review the sustainability model of higher education and to find out the sustainability indicators for higher education institutions in Malaysia.

Research Questions

What are the sustainability indicators for higher education institutions in Malaysia?

Literature Review

Higher Education and Sustainability

According to Lozano (2006), higher education institutions are leading through education of intellectuals, leaders and future makers. Numerous literature reviews discussed and focused on sustainability in universities. Several scholars defined sustainability in their own dimensions and perfectives. Velazquez et. al (2006) defined sustainability in university refers to environment, economic and social aspects. This involves the activities of minimizing the environmental impacts, the use of resources and health effects.

On the other hand, (Cole, 2003) said to create sustainable university, universities should have responsibility to protect the health and well-being of humans as well as the ecosystem. Other scholars (Alshuwaikhat & Abu, 2008) suggested that some sustainability activities such as to conserve energy and resources, to reduce waste and to promote social justice.

Sustainability's Model in Higher Education

This part will discuss three sustainability's models in higher education. The three models are fully integrated system from Cortese (2003), managerial model from Velazquez et. al (2006) and adaptable model from Francisco et. al (2015). Next, the following subsection reviews the three models as well as their frameworks especially in terms of the sustainability indicators and other aspects applied within the model.

Fully Integrated System

Cortese (2003) defined the university as a four-dimensional system consisting of education aspects, research aspects, campus operations aspects and community outreach aspects. He stressed that the roles of higher education should make sustainability as an integral part of operation, planning, design of facility, purchasing, and investment to the formal curriculum, conducting the research as an integral part of learning and educational experience and finally, having responsible to get involvement of local and communities.

In earlier study on general practices of higher education, he claimed that activities of teaching, research, operation and relationships with local communities in higher institutions were separated and not connected. However, the research found that all activities were connected, interrelated and needed between one another. In university, students will learn and experience everything around them within their learning institutions. This may make them healthier, good socially vibrant and stable, economic secure, and environmentally sustainable. Cortese (2003) also suggested in order to achieve sustainability in the 21st century educational experience, learning content requires interdisciplinary systemic thinking, dynamics and the analysis of disciplines and professional degrees. The illustration of the fully integrated system is shown in Figure 1.

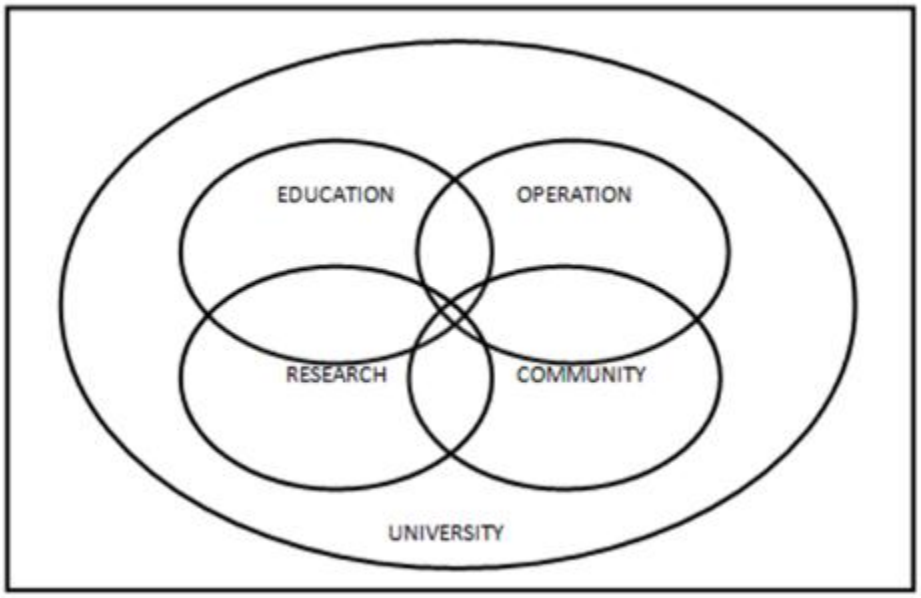

Figure 1 :- A Fully Integrated System Model (Cortese, 2003).

Managerial Model

Managerial model formed by Velazquez et.al (2006) after their research data collected from eighty higher education institutions in the world. This model depicts a structural framework comprising of four phases; the sustainability vision of the university (Phase one), the mission (Phase two), sustainability committee (Phase three) and sustainability strategies (Phase four).

The model is developed based on a benchmarking process, results from the literature articles and the empirical study. The steps of achieving sustainability practices in the model are divided into four phases. In phase one, university should develop the sustainability vision for the university. Phase two needs the universities to find their sustainability mission and describe it in their mission statement. Next, phase three requires the universities to set up a sustainability committee which will create the policy, target and objectives of universities towards achieving sustainability. Lastly, in phase four, Velazquez et. al (2006) organized the sustainability indicators into four main strategies, which are education strategy, research startegy, outreach and partnership strategy and sustainability on campus strategy. These four indicators are the main pillars of sustainability strategies of the model. Baure (2004) suggested it is necessary to put all indicators of universities in gaining the effectiveness of sustainability practices.

The model also emphasizes on the continuous improvement efforts by applying the concept tool of Plan-Do-Check-Act (PDCA) promoted by W. Edwards Deming. Chase & Aquilano (2001) indicated that as a continuous process to achieve small improvement in management. Therefore, the process of implementing sustainability indicators in the model is designed to continuously work and should be made through incremental steps. The study found that there is on university has fulfilled the four phases proposed by the model. The sustainability strategies among the universities studied were different and did not fulfil the four strategies as listed in the model. Some universities emphasized on education while some of the others focused on outreach, research or on-campus operation. The whole sustainable university model is shown in Figure 2.

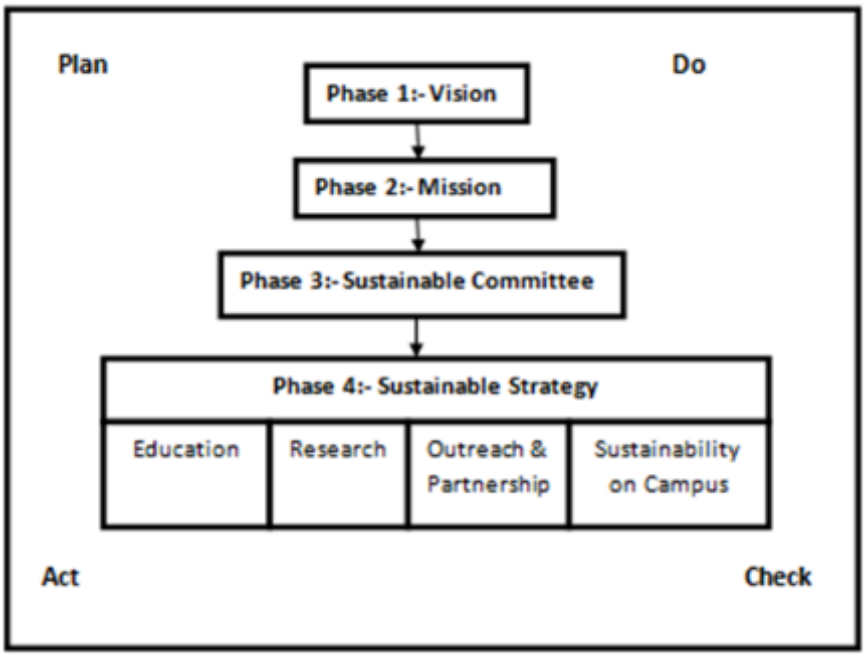

Figure 2:- The managerial model of sustainability (Velazquez et.al, 2006)

Adaptable Model

An adaptable model was introduced by Francisco et. al (2015) to assess sustainability in Chile's higher education institutions. The development of the model was based on the international declaration which gave them ideas to transform the requirement of institutional sustainability. Moreover, they also studied the sustainability indicators from previous models such as the model of Cortese (2003), Velazquez (2006) and Lozano (2006). These three models only focused on the well-being of the higher education without considering about the people behind the practices and how the practices are carried out. The model assigns four dimensions which are operation, education and research, public engagement and administration. These dimension are interrelated (Cortese ,2003 and Lozano, 2006) and need the integration of functions. Ten indicators of sustainability based on the study of Lozano (2013) linked to the dimensions as depicted in Figure 3 below.

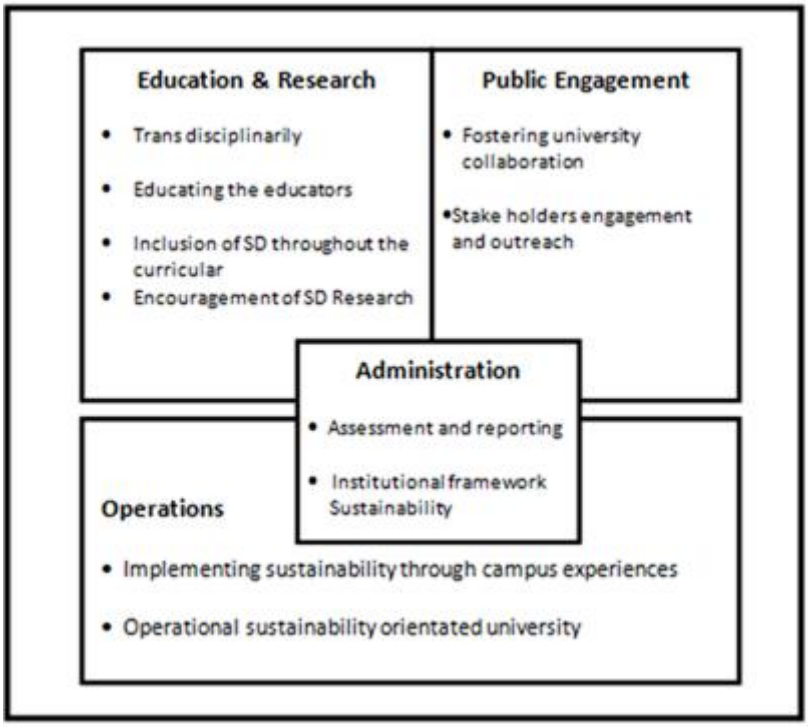

Figure 3:- The adaptable model of sustainability (Francisco et. al, 2015)

A Review of Sustainability Indicators

This part of the study is a review on sustainability indicators in higher education institution proposed by the sustainability models which have been discussed in the previous section. A detailed explanation on indicators of sustainability is provided along with the elaboration on the criteria of indicators. The following section is a review of sustainability indicators in higher education institutions.

This section reviews the sustainability indicators in the three models as shown in Table 1. From Table 1, it can be concluded that, almost all the three models proposed the same indicators. Education, research, community engagement, campus operation, assessment and reporting and outreach and partnership are the common indicators fostering sustainability in higher education. However, the model of fully integrated system by Cortese (2003) is still lacking in administration initiative as it focuses more on the relationship among the indicators in university and only highlighted on education, research, community and operation. Other than that, the indicators of assessment and reporting are still not emphasized by several models of sustainability.

Table 1:
A review analysis of sustainability indicators within the three models.

Models (Author)	Sustainability Indicators					
	Education	Research	Community Engagement	Administration	Assessment and Reporting	Campus Operation
Fully Integrated System Cortese, (2003)	✓	✓	✓	×	×	✓
Managerial Model Velazquez et.al (2006)	✓	✓	✓	✓	×	✓
Adaptable Model Francisco et. al (2015)	✓	✓	✓	✓	✓	✓

Education

There are several criteria representing education in sustainability. Lukman et. al (2010) highlighted five educational indicators for sustainability university ranking table which are the ratio of student or staff , the rate of graduation, international student, presence on the web and the rate of employment. Other than that, curriculum is one of the important elements in educational sustainability. According to Cockrell (2010), curriculum refers to the context of education which includes the formal and informal, planned aspects referring to knowledge content, skills and processes associated with academic disciplines; unplanned and hidden curriculum. The integration concept of sustainability curriculum has become an interesting discussion as well as the methods to practice (Boks & Diehl, 2006; Wemmenhove & de Groot, 2001). However, there is low researches incorporation of sustainability in university curriculum (Capdevila et al., 2002; Quist et al.2006; Thomas, 2004; Velazquez et al., 2005).

There are also less model and framework given as guidance for curriculum sustainable practices in university. However, there is one assessment tool which focuses specifically on curriculum known as Sustainability Tool for Assessing UNiversities' Curricula Holistically (STAUNCH). The STAUNCH system listed 36 broad criteria divided into four categories of sustainable dimensions; economics, social, environment and cross-cutting themes (Lozano, 2010; Lozano & Peattie, 2011). Another curriculum model developed by Tamara and James (2011) known as Global Seminar (GS) Model which highlights nine elements of curriculum for sustainable practices which are goal and objectives, stakeholders, organization, learning cycles, case study, web sites, assignment and grading, evaluation and newcomers mentoring.

Research

Universities are nowadays compared between one another from the educational and research perspective, such as student to staff ratio, number of citations, or number of scientific publications. (Lukman et. al, 2010). Lozano et. al (2013) also found that the criteria of research should include the research centers, holistic thinking, interlinkages between

research and teaching, number of publications, number of patents, new knowledge and technologies and transdisciplinarity.

Furthermore, in most university ranking tables, they often stress on the importance of research and academic reputation as the main criteria for sustainable universities ranking. The number of publication of research, research expenses and library and the equipment are the common indicators to analyze and compare among the university ranking tables (Lukman, et. al 2010).

Community Engagement

Sustainable community is a dynamic process in which communities anticipate and accommodate the needs of current and future generations in ways that reproduce and balance local social, economic, and ecological systems, and link local actions to global concerns (Berke & Conroy, 2000). An observation done by Conroy and Beatley (2007) observed that community participation in sustainability programs is dynamic and intergenerational. Besides that, Sarkissian *et al.*, (2009), suggested that it would require multiplicity of components such as education, action, trust, inclusion and strong governance to develop an effective community engagement.

There are many studies focusing on sustainable development in community engagement in universities. A study on sustainable transportation planning, Krizek *et al.* (2007) observed that to promote walking and cycling, they need to be adequate facilities such as pavements, public spaces, wide curb lanes, a bicycle paths, secure parking and showers at the workplace. In contrast, research on sustainability in the higher education sector suggests that leadership to be an important driver to engage university community in sustainability (Teddei-Bringas *et al.*, 2008). Leadership plays a vital role to promote sustainability in community especially in identifying and creating professional connections and networks.

On the other hand, Linda & Bhishna (2015) developed sustainable campus community engagement framework also known as the 6-P community engagement in sustainability framework. This framework identifies the factors (both intrinsic and extrinsic) that would engage the community in sustainability programs. Based on their study, they identified that the rate of participation is one of the measures towards the successfulness of the community engagement programs. The framework represents the factors that are important in raising community participation levels in sustainability projects that come out with 6-Ps which are psychological, physical, personal, public perception, price and policies.

Administration

In the previous section, Velazquez et.al (2006) indicated that university should fulfill three phases of institutional framework before implementing their sustainability strategies. The framework consists of three phases starting with the development of university's vision, mission and sustainable committee. This involves the participation of all stakeholders and Lozano (2006) referred to the stakeholders as academic directors, professors and students who can make institutional decisions.

The institutionalization of university is one the main aspects of sustainability that should be fostered in higher education institutions. Lozano (2006) who studied the aspects of incorporation and institutionalization and how to overcome barrier in universities found that

the support from top management through university policies, university programs, financial aspects and the allocation of human resource is essential to foster sustainability. Besides that,

McKeown (2002) also listed 12 considerations of sustainability institutionalization in higher education.

Assessment and Reporting

Other aspects in sustainability administration are assessment and reporting. Lozano (2011) defined sustainability reporting as a voluntary activity that has two general purposes. The first purpose is to assess the current state of an organization's economic, environmental and social dimensions and another purpose is to communicate a company's efforts and sustainability progress to their stakeholders. Another scholar defines, sustainability reporting as the process of assessing and making periodic public disclosures of such information (Alberto et. al, 2011). Lozano (2003) proposed assessment and reporting as the new initiative of sustainable development model after reviewing the lack of the element in the model proposed by Cortese (2003).

The sustainability reporting guideline may guide the organization to produce their report based on the dimensions of sustainability. The Sustainability Tracking Assessment & Rating System (STARS), Global Reporting Initiative (GRI) and Graphical Assessment of Sustainability in Universities (GASU) provide sustainability reporting guidelines and have been used widely in many countries especially in higher education institutions.

Campus Operation

Sustainability in campus operation is also another important facet in higher education sustainability. Based on literature finding, campus operations refer to energy emissions, greenhouse gases, waste, water, food purchasing, and transport, accessibility for disabled people, and equality and diversity (Lozano et. al, 2013). The issue of sustainability on campus operation is also related to green campus and green building. Alshuwaikhat & Abubakar (2008) highlighted that "*Green Buildings Initiatives*" as one of the approaches towards the construction of green campus, reduction of CO2 emissions (Flippin, 2000) and energy consumption (Medrano *et al.*, 2008). Besides that, Luis P. et. al (2015) suggested one of the main targets of sustainability efforts is energy consumption due to the fact that it brings about potential economic savings.

Conclusion

This paper explores the sustainability indicators within the three models. There are several important indicators such as education aspects, research and publications, community engagement, and administration, assessment and reporting, and campus operations that should be implemented in higher education institutions. This study provides some ideas on the concept of sustainability for university's stakeholders to implement its practices in their institutions. Besides that, this paper also discovers management aspects applied within the models framework such as university's mission and vision, sustainability committee and the Plan, Do, Check and Act (PDCA) tool.

Acknowledgement
Special acknowledgement to my supervisor Associate Professor Dr. Ahmad Bin Jusoh.

Corresponding Author
Associate Prof Dr. Ahmad Jusoh, ahmadj@management.utm.my
Business Administration Department,
Faculty of Management
Universiti Teknologi Malaysia

References

Alshuwaikhat, H.M. & AbuB., I. (2008). An integrated approach to achieving campus sustainability: assessment of the current campus environmental management practices, *Journal of Cleaner Production*, 16(16), 1777-1785.

Andy, J., Elizabeth W., Heloise B., & Sara P., Fiona Brookes (2003). Reporting For Sustainability, Guidance for Higher Education Institutions, *Forum for the Future.*

Bauer, L. (2004). *Bridging the great divide at UC Berkeley Environmental management sustainable universities*. Mexico: Monterrey.

Berke, P.R. & Conroy, M.M. (2000). Are we planning for sustainable development? An evaluation of 30 comprehensive plans, *Journal of the American Planning Association,* 66(1), 21-33.

Boks, C. & Diehl, J.C., (2006). Integration of sustainability in regular courses: experiences in industrial design engineering, *Journal of Cleaner Production,* 14, 932-939.

Capdevila, I., Bruno, J., & Jofre, L., (2002). Curriculum greening and environmental research coordination at the Technical University of Catalonia, Barcelona. *Journal of Cleaner Production.* 10 , 25-31.

Chase, R. & Aquilano R (2001). *Operation management for competitive advantage*. New York: McGraw Hill/Irving.

Clugston, R. (2000). Introduction In Sustainability and University life , In: *Filho W Leal, editor. Peter Lang: Frankfurt am Main, Berlin, Bruxelles. New York: Oxford, Wie, .*11-7.

Cockrell, R. (2010). *The Hidden Curriculum*, Yorkshire Publishing.

Cole, L. (2003). Assessing Sustainability on Canadian University Campuses: Development of a Campus Sustainability Assessment Framework. B.Sc dissertation. Canada: Royal Roads University.

Conroy, M. M. & Beatley, T. (2007). Getting it done: an exploration of US sustainability efforts in practice, *Planning, Practice & Research*, 22(1), 25-40.

Cortese, A. D. (2003). The critical role of higher education in creating a sustainable future, *Planning for higher education, March-May 2003,* 31(3), 15-22.

Filippín, C. (2000). Benchmarking the energy efficiency and greenhouse gases emissions of school buildings in central Argentina. *Building and Environment,* 35(5), 407-414.

Francisco, U. G., Cesar S.N., Solange R.L, & Vartan, I.M. (2015). Adaptable model for assessing sustainability in higher education, *Journal of Cleaner Production,* 107, 475-486.

Govindran, J. & Kanayathu, K. (2008), Systemic Transformation of Higher Education Institutions for a Sustainable Future: the Role of Indicators, Centre for Global Sustainability Studies, Universiti Sains Malaysia, Penang.

IAU (2011). World Higher Education Database. Palgrave Macmillan, Houndmills, Hampshire.

Krizek, K.J., Poindexter, G., Barnes, G. & Mogush, P. (2007). Analysing the benefits and costs of bicycle facilities via online guidelines, *Planning, Practice & Research*, 22(2), 197-213.

Lambrechts, W., Mulà, I., Vall, P. De, & Haute, H. Van Den. (2009). The Integration of Sustainability In Competence Based Higher Education :- Using competences as a starting point to achieve sustainable higher education, 1–22.

Linda T., & Bhishna B. (2015). Sustainable campus: engaging the community in sustainability, *International Journal of Sustainability in Higher Education,* 16(1), 57-71.

Lozano, R. (2003). *Sustainable development in higher education. Incorporation, assessment and reporting of sustainable development in higher education institutions*. Master thesis, IIIEE, Lund University.

Lozano, R. (2006). Incorporation and institutionalization of SD into universities: breaking through barriers to change. *Journal of Cleaner Production*, 14(9-11), 787-796.

Lozano, R., (2010). Diffusion of sustainable development in universities' curricula: an empirical example from Cardiff University, *Journal of Cleaner Production*, 18(7), 637-644.

Lozano, R. (2011). T*he state of sustainability reporting in universities. International Journal of Sustainability in Higher Education,* 12(1), 67-78.

Lozano, R. & Peattie, K. (2011). Assessing Cardiff University's curricula contribution to sustainable development using the STAUNCH system. *Journal of Education for Sustainable Development*, 5(1), 115-128.

Lozano, R., Lukman, R., Lozano, F.J., Huisingh, D., & Lambrechts, W., (2013). Declarations for sustainability in higher education: becoming better leaders, through addressing the university system. Journal Cleaner Production, 48, 10-19.

Luís, P. Amaral, Nelson M., & Joaquim B. G. (2015). Quest for a sustainable university: a review, International Journal of Sustainability in Higher Education, 16(2), 155-172.

Lukman, R. Krajnc, D. & Glavic, P. (2010). University ranking using research , educational and environmental indicators ; Centre for Higher Education Development Ranking Forum of Swiss Universities. *Journal of Cleaner Production*, 18(7), 619–628.

Malaysia (1996). The Seventh Malaysia Plan, 1996-2000. Government Printer, Kuala Lumpur.

Marta, A., Leal, S., & Miranda, U. (2016). Conceptualization of sustainable higher education institutions , roles , barriers , and challenges for sustainability : An exploratory study in Portugal. *Journal of Cleaner Production*, Retreived from https://doi.org/10.1016/j.jclepro.2016.11.010

Medrano, M., Castell, A., Fontanals, G., Castellón, C. & Cabeza, L.F. (2008). Economics and climate change emissions analysis of a bioclimatic institutional building with trigeneration and solar support, Applied *Thermal Engineering*, 28(17-18), 2227-2235.

McKeown R. (2002). Education for sustainable development toolkit. Knoxville, Tennessee: University of Tennessee.

Quist, J., Rammelt, C., Overschie, M., & de Werk, G., (2006). Backcasting for sustainability in engineering education: the case of Delft University of Technology. Journal of Cleaner Production. 14(9-11), .868-876.

Sarkissian, W., Hofer, N., Shore, Y., Vajda, S. & Wilkinson, C. (2009). *Kitchen Table Sustainability: Practical Recipes for Community Engagement with Sustainability*, Publication: Earth Scan, London.

Tamara S., James R. M., (2011). Campus sustainability: emerging curricula models in higher education. *International Journal of Sustainability in Higher Education*, 12(1), 55-66.

Teddei B., J.L., Esquer P. J. & Platt C., A. (2008). ISO 14001 and sustainability at universities: a Mexican case study. *Management of Environmental Quality: An International Journal*, 19(5), 613-626.

Thomas, I. (2004). Sustainability in tertiary curricula: what is stopping it happening? *International Journal of Sustainability in Higher Education*, 5(1), 33-47.

Velazquez, L., Munguia, N., Platt, A. & Taddei, J. (2006). Sustainable university: what can be the matter?. *Journal of Cleaner Production*, 14(9-11), 810-819.

Viebahn P. (2002). An Environmental Management Model For Universities: from Environmental Guidelines to Staff Involvement. *Journal of Cleaner Productio*n, 10, 3-12.

Wang W. S. & Ching G. S. (2015). Developing Sustainability Indicators for Higher Education Institutions in Taiwan, *International Journal of Information and Education Technology,* 5(12), 905-909.

Wemmenhove, R. & De Groot, W.T. (2001). Principles for university curriculum greening. An empirical case study from Tanzania. International Journal of Sustainability in Higher Education, 2, 267-283.