

Barriers in restructuring university curriculum for a sustainable future

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Abstract

In recent years, increasing awareness about resource depletion and the need created for its preservation have emphasized the concept of Sustainable Development (SD) across the globe. Although sustainable development became famous after the Brundtland Commission report 1987, many higher educational institutions in the world have not yet sufficiently introduced SD to their systems. The purpose of the study is to identify and validate the barriers faced in incorporating sustainability in the curricula content of various higher education courses in the context of Indian educational institutions, globally acclaimed for their standard of education. The paper also presents solutions developed by analyzing the survey instrument as suggested by the respondents to overcome the barriers that may arise in the process of curriculum change.

Keywords: sustainability, higher education, curriculum, barriers, India

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1. Introduction

In last few decades, sustainability issues gain increasing importance among government, corporations and consumers across the globe. To remain competitive on the growth chart, companies have begun to focus on their strategies to reduce environmental impact of their products and services. Hiring efficient personnel with sustainable orientation have become the need of the hour. Responding to the current situation, higher education has undergone rapid change. Increasing awareness and responsiveness towards sustainable development have encouraged higher educational institutions to incorporate sustainability in their practices. Sustainable Development (SD) as a concept became famous after the Brundtland Commission report (WCED) in its publication “Our Common future”, 1987. After Halifax Consultation (1991), the role of higher education has been exemplified and rooted more importance with UN Decade of Education for Sustainable Development (UNESCO, 2005).

In this decade an increasing number of educational institutions adopted sustainable development agenda showing sustainable oriented behaviour towards the society and various stakeholders (Waas et al., 2010). Higher educational institutions have been realized as the platform to impart sustainable development responsibilities, where students are being prepared to empower themselves as quality citizen to support green and sustainable economies. In addition, it is desirable that students graduating from universities must have a deeper insight about the relevance and future challenges of sustainable living. Thus, universities and other higher educational institutions from different parts of the country have started including sustainability as a major part of their course curriculum. However, any curricular change, including development and inclusion of mandatory sustainability studies, is not an easy task and very few institutions have truly succeeded (de la Harpe and Thomas, 2009; Jones et al., 2008). In context of Indian higher educational institutions offering professional and technical education, the study attempted to validate pre-defined set of barriers for the integration of sustainability in higher education extracted and adapted from (Verhulst and Lambrechts, 2014).

2. Literature Review

2.1.Sustainable Development in Higher Education

The question of how we can achieve sustainability has become a key point of the debate at various conferences and summits (Barth et al., 2014; Müller-Christ, G. et al., 2014). Though the consensus of opinion is rising about inclusion of sustainable development at governmental level but educational institutions need to play a vigorous role in this noble effort (Leal Filho, W., 2011). The role of higher education in creating a sustainable future has been high lightened in several reports and journals but universities have not succeeded to incorporate sustainability sufficiently into the curriculum and to educate future decision- makers to act in a sustainable manner for the long term interests of the society (Currie et al., 2010; Herzig and Moon, 2013). This consequence has drawn a growing attention in reconstructing the curricula of higher education. Redesigning of higher education curricula calls for more debate especially regarding the level of future citizen's competencies to deal with complex issues in a more responsible and sustainable way.

Academic institutions are changing their mission, vision, and edifying practices in order to better cope with growing concerns about social and environmental issues (Md Shahbudin et al., 2011). Higher educational institutions (HEIs) have acted as social change agents (Lozano et al., 2013a; Stephens and Graham, 2010) endeavouring the sustainability objective. Lozano (2006) defined sustainable development as “a change process, in which the societies improve their quality of life, reaching dynamic equilibrium between the economic and social aspects, while protecting, caring for and improving the natural environment. This integration and equilibrium among these three aspects must be taught and transferred from this generation to the next and the next”. Wals (2013) recognized higher education institutions (HEIs) as the source to make more systemic changes towards sustainability.

With Agenda 21(Chapter 36) emphasizing higher education's role in achieving sustainable development (UNCED, 1993), universities has received growing attention at both national and international levels. Higher educational institutions (HEIs) incorporating sustainability into their curricula have risen in the last decade (Lozano, 2010). Few among the others are still in the process of finding various means to integrate sustainability into their curricula (Rusinko, 2010). Previous research has shown that higher education institutions (HEIs) apply various

methods to change and transform the traditional market oriented teaching into sustainability related pedagogy (Alcaraz, 2010; Godemann et al., 2011; Orlitzky and Moon., 2010). Incorporating sustainability related content i.e sustainable development, corporate social responsibility, sustainable entrepreneurship, leadership, climate change, energy conservation, waste treatment, environment studies etc. into the curricula of higher education (Stubbs and Schapper, 2011; Rusinko, 2010; Bremer and Lopez-Franco, 2006; Ceulemans and De Prins, 2010; Pappas et al., 2013; Savelyeva and McKenna, 2011; Stewart, 2010; Watson et al., 2013) has been observed in last few years. Four main approaches have been presented to incorporate sustainability into the higher education curricula (Lozano et al. 2014). These approaches includes coverage of some environmental issues in an existing course, developing a specific sustainability course, developing sustainable development as a concept in regular disciplinary courses or/and as a specialization within the framework of each faculty. Through the process of incorporation of sustainability into the course curriculum, institutions are able to generate new knowledge and contribute to developing competencies and raising awareness towards sustainability issues.

2.2.Barriers to change while incorporating sustainability in higher education curriculum

Change in the curriculum of higher education towards sustainability is not an easy task. Adding sustainability as a new requirement means changing the criteria in the whole decision-making process chain. Velazquez et al. (2005) points out many factors that could obstruct the integration of sustainability oriented curriculum. Earlier, a number of studies have identified and described barriers for change and critical success factors in higher educational system (Lambrechts et al., 2009; Lozano, 2006; Mazhar et al., 2014; Wright and Horst, 2013, Lozano et al. 2013b).

Table 1 has been presented based on literature review (Verhulst & Lambrechts, 2014) which provides an overview of barriers identified and classified into three groups: lack of awareness, structure of education and lack of resources. In the context of incorporating sustainability in curriculum, the list of barriers identified is static in nature; which does not consider the realism of changing conditions over time.

Table 1: Barriers in incorporating sustainability into the university curriculum (Verhulst & Lambrechts, 2014)

	LOA1. Consideration of SD as little or no relevance in curriculum.
	LOA2. Lack of sustainability oriented policies.
	LOA3. Insecurity and threat to academic credibility from the faculty members.
Lack of Awareness	LOA4. Lack of understanding of Sustainable Development concepts and definitions.
	LOA5. Lack of faculty training.
	LOA6. Lack of interest and participation.
	LOA7. Lack of support from the top management.
	SME 1. Conservative disciplinary university structure.
	SME2. Inefficient communication
	SME 3. Resistance to change.
Structure of Education	SME 4. Focussed on short-term goal.
	SME 5. Lack of interdisciplinary research and education.
	SME6. Overcrowded curriculum
	SME7. Content-based learning
	LR1. Lack of physical place
	LR2. High work pressure and lack of time.
	LR 3. Lack of consistent legislation LR4.
Lack of Resources	. Lack of access to information. LR 5.
	Lack of performance indicators. LR6.
	Lack of financial support.
	LR7. Technical problems

3. MEASUREMENT INSTRUMENT

The survey instrument was segmented into three sections. The first section consists of

respondents' demographic characteristics. Second section includes the statements related to the barriers faced in incorporating sustainability in university curriculum extracted and adapted from (Verhulst and Lambrechts, 2014) under three broad factors: lack of awareness, structure of education and lack of resources. A five-point Likert scale was used ranging from 1 to 5, indicating [1] Very Low, [2] Low, [3] Medium, [4] High and [5] Very High, where '1' stands for strong disagreement and '5' represents strong agreement (Lin and Huang, 2012; Wang et al., 2013). The third section is comprised of open-ended questions sought to suggest solutions to overcome the confronted barriers. The instrument was tested and validated.

3.1.Data Collection

The data has been collected through both online and offline mode as per the circumstances in different higher educational institutions offering varied streams of professional studies. The suitable samples felt for the study are the faculty members who are directly involved either in preparing curriculum and delivering sustainability related content to the students. The questionnaire was presented and sent via email to a total number of 288 faculty members among which 103 responses has been received indicating a response rate around 35%. But the study considers 90 responses as usable eliminating the rest because of its incomplete information. The survey data computation have been done and used for further result analysis.

4. Result Analysis

4.1.The measurement model

The mean and standard deviation calculated for each variable are presented in Table 2. Initially, Exploratory Factors Analysis (EFA) was employed to validate the variables of each factor. According to Lehmann (1988), the significant factor loadings derived by exploratory factor analysis demonstrate convergent validity, while the Cronbach alphas (α) indicate satisfactory internal consistency (Fornell and Larcker, 1981). The factor used to measure lack of awareness consisted of seven variables with Cronbach Alpha(α) 0.92. The structure of management education consisted of seven variables with Cronbach Alpha 0.92. The factor used to measure lack of resources present five variables excluding two variables, mentioned as lack of physical place (LR1) and technical problems (LR7) which were eliminated due to low factor loading (<0.5) with a Cronbach Alpha 0.91. Rest of the factor loadings as shown in

Table 2 exceeds the threshold value of 0.5 (Lehmann, 1988) exhibiting acceptable measurement properties. At the same time, reliabilities for all three factors measured with Cronbach's alpha (α) were above 0.90.

Table 2: Descriptive statistics for the scales

Items	Mean	Standard Deviation	factor loading	Cronbach's alpha	Internal consistency	convergent validity (AVE)
LR2	3.478	.8770	.779	0.912	0.99	0.61
LR3	3.556	.8626	.634			
LR4	3.733	.7760	.728			
LR5	3.444	.8495	.918			
LR6	3.644	.8116	.819			
LOA1	2.80	.837	.642			
LOA2	2.87	.864	.980			
LOA3	2.78	.832	.791			
LOA4	3.03	.867	.776			
LOA5	3.10	.912	.860			
LOA6	3.08	.915	.814			
LOA7	2.92	.838	.662			
SME1	4.067	.6500	.733	0.928	0.99	0.64
SME2	4.055	.6424	.742			
SME3	4.011	.6447	.922			
SME4	4.022	.6356	.933			
SME5	4.012	.6088	.860			
SME6	4.067	.6500	.641			
SME7	4.144	.6458	.732			

The discriminant validity of the factors was identified by examining average variance extracted (AVE) value and correlation estimates. The inter correlation matrix demonstrated that the square root of AVE for each factor is higher than the inter-construct correlations (see Table 3). The criteria of discriminant validity are satisfying, as AVE for all the three factors is above 0.60 and internal consistency is above 0.90 (Fornell and Larcker, 1981). The measures of internal consistency and convergent validity (AVE) were greater than the recommended threshold values of 0.70 and 0.50 respectively (Nunnally and Bernstein, 1994; Streiner, 2003; Hair et al., 2009), thus satisfying the conditions of the test.

Table 3: Inter Construct correlations and square roots of AVE of constructs.

Factor Correlation Matrix				
Factor	LOA	SME	LR	
LOA	.780			
SME	.323	.800		
LR	.593	.432	.781	

Table 4 shows the fit statistics of confirmatory factor analysis for all the three factors. The examination of fit statistics recommends that the statistics of all the factors are almost within the recommended range indicating the acceptability measurement properties.

Table 4: Fit statistics for CFA for the factors

Fit Statistic s	Overall Model	Lack of Awareness (LOA)	Structure of Management Education (SME)	Lack of Resources (LR)	Recommended Range
Items	19	7	7	5	
(χ^2)/f	1.554	2.9	2.7	1	(1-3)
RMR	0.035	0.035	0.019	0.014	<0.05
GFI	0.9	0.9	0.88	0.978	>.90
CFI	0.937	0.942	0.946	0.97	>.90
RMSEA	.07				<0.08

From the above analysis, it can be stated that the barriers with high impact on the incorporation process is found to be the institute policies lacking in sustainability orientation. It can be also added, that the faculty members do not want to contribute and participate in such process because they believe their assigned job is enough in itself and additional work may create shortage of time in their regular effort.

4.2.Overcoming the Barriers

These are the solutions drawn based on summarizing the answers responded to the open ended questions mentioned in the survey instrument by the respondents taken into consideration for

the study.

1. Integrating sustainability issues into the multidisciplinary facet of the core subjects in the first year of every course, may it be professional course like engineering, medical, management etc. This will be fastest and a holistic way to deliver sustainability related content to all the students opting for higher education. This will induce a sustainable orientation throughout their course curriculum as it acts as a basic foundation for their further studies and specialization.
2. Faculty members are the referee with regard to the preparing, interpreting and delivering the curricular contents. They act as an ideal for many students who either try to imitate their practices and/ or follow the principles and teachings laid by their faculty model. Thus their roles become very important while integrating sustainability not only in curriculum but also to build a sustainable oriented future citizen. Any initiative seeking to promote sustainable development in higher education depends on the willingness and capability of faculty members. Capacity building for SD does not only require new or additional teaching staff but highly focuses on 'Educating the educators' existing in the academic institution. The training programme must be embedded in a special set of incentives so that additional time necessary to develop the subject matter and sustainability related didactical competencies are available with the faculty members.
3. Appreciation on the part of administration and by peer colleagues can also play a significant role than material incentives for the concerned persons involved in designing a modern and sustainable curriculum. It has been observed non financial incentives works more effectively than any other especially when it comes to teachers.
4. Restructuring the higher education curriculum by developing benchmark with those educational institutions which were found to be successful in integrating sustainability into the curriculum having a sound basis in the respective environmental and social sciences.
5. Education institutions are exposed to the different interests of various stakeholders, such as government, labor market and funding agencies. Experience shows that giving voice to and orchestrating the sustainability-related interests of different stakeholder groups can help key actors to build up pressure within and outside their institution to change for creating a bright and sustainable future.

6. A sustainability declaration and guidelines by the higher education institution can serve as one of the major internal drivers for the faculty and other members of the institution to stipulate the meaning of sustainability by initiating discussions about its incorporation into the business curriculum.

5. Conclusion

In relation to incorporation of sustainable development into the university course, assessment of curricular changes and identification of the concerned person having the power to do such changes must be done. This paper has studied few educational institutions in India, offering professional courses and manifest their research oriented pedagogy and standard of education. It is evidenced that these institutions have shown their interest in incorporating sustainability throughout their course curriculum. A common list of barriers hindering change toward sustainability has been presented. The analysis has been carried out using EFA and CFA to validate the identified factors. The results shows that the barrier highly affecting the incorporation process is to be overcome lack of an sustainability oriented policies at institution's level which reduce or give rise to the dearth of faculties interest and participation in this attempt.

Moreover, the faculty members should be allowed to be learners in this field. The presence of the present paradigms will otherwise continue to cause great barriers to change. To make such profound changes happen, not only institute's support is sufficient, progressive leadership, external pressure and recognition call for sustainability integration in management institutions.

References:

- Alcaraz, J.M., 2010. Sharing Information on Progress (SIP): a World of Inspiration, 1st Analysis Report Activities 2008 e June 2010. Barna Business School.
- Barth, M., Adombent, M., Fischer, D., Richter, S., Rieckmann, M., 2014. Learning to change universities from within: a service-learning perspective on promoting sustainable consumption in higher education. *J. Clean. Prod.* 62, 72e81.
- Bremer, M.H., Lopez-Franco, R., 2006. Sustainable development: ten years of experience at ITESM's graduate level. *J. Clean. Prod.* 14, 952e957.
- Ceulemans, K., De Prins, M., 2010. Teacher's manual and method for SD integration in

curricula. *J. Clean. Prod.* 18, 645e651. <http://dx.doi.org/10.1016/j.jclepro.2009.09.014>.

Currie, G., Knights, D., Starkey, K., 2010. Introduction: a post-crisis critical reflection on business schools. *Brit. J. Manage.* 21. Issue Supplement, S1eS5.

De La Harpe, B., Thomas, I., 2009. Curriculum change in universities: conditions that facilitate education for sustainable development. *J. Educ. Sustain. Dev.* 3 (1), 75-85.

Fornell, C., Larcker, D.F., 1981. Evaluating structural equations models with unobservable variables and measurement error. *Journal of Marketing Research* 18 (1), 39–50.

Godemann, J., Herzig, C., Moon, J., 2011. Integrating Sustainability into Business Schools: an Analysis of 100 UN PRME Sharing Information on Progress (SIP) Reports. In: ICCSR Research Papers Series, Nottingham.

Hair, J.F., Black, W.C., Babin, B.J., Black, W.C., 2009. *Multivariate Data Analysis*, seventh ed. Pearson Education.

Herzig, C., Moon, J., 2013. Discourses on corporate social ir/responsibility in the financial sector. *J. Bus Res.* 66 (10), 1870e1880.

Jones, P., Trier, C.J., Richards, J.P., 2008. Embedding education for sustainable development in higher education: a case study examining common challenges and opportunities for undergraduate programmes. *International Journal of Educational Research* 47 (6), 341-350.

Lambrechts, W., Van den Haute, H., Vanhoren, I., 2009. *Duurzaamhogeronderwijs.Appelvoorverantwoordonderrichten, onderzoeken en ondernemen (Sustainablehigher education. Appeal for responsible education, research and operations)*.Leuven, LannooCampus.

Leal Filho, W., 2011. About the role of universities and their contribution to sustainable development. *High. Educ. Policy* 24, 427e438.

Lehmann, D.R., 1988.An alternativeprocedureforaccessingconvergent and discriminant validity. *Appl.Psychol.Meas.*12 (4), 411–423.

Lozano, R., 2006. Incorporation and institutionalization of SD into universities: breaking through barriers to change. *J. Clean. Prod.* 14, 787-796.

Lozano, R., 2010. Diffusion of sustainable development in universities' curricula: an empirical example from Cardiff University. *J. Clean. Prod.* 18 (7), 637e644.

Lozano, R., Lozano, F., Mulder, K., Huisingh, D., Waas, T., 2013a. Advancing higher education for sustainable development: international insights and critical reflections. *J. Clean.*

Prod. 48, 3-9.

Lozano, R., Lukman, R., Lozano, F.J., Huisingh, D., Lambrechts, W., 2013b. Declarations for sustainability in higher education: becoming better leaders, through addressing the university system. *J. Clean. Prod.* 48, 10-19.

Lozano, R., Ceulemans, K., Seatter, C.S., 2014. Teaching organisational change management for sustainability: designing and delivering a course at the University of Leeds to better prepare future sustainability change agents. *J. Clean. Prod.* xxx, 1-11.

Mazhar, M.U., Bull, R., Lemon, M., Mallaburn, P., 2014. The current state of strategic carbon management within the UK higher education sector: leading the way forward?. In: *Proceedings of the 9th International Symposium on Sustainable Leadership*, 3e6 June 2014, Salzburg, Austria, pp. 148-160.

Md Shahbudin, A., Nejati, M., & Amran, A. (2011). Sustainability-based knowledge management performance evaluation system (SKMPES): linking the higher learning institutes with the bottom billions. *African Journal of Business Management*, 5(22), 9530- 9540.

Müller-Christ, G., Sterling, S., van Dam-Mieras, R., Adomßent, M., Fischer, D., & Rieckmann, M. (2014). The role of campus, curriculum, and community in higher education for sustainable development—a conference report. *Journal of Cleaner Production*, 62, 134-137.

Nunnally, J.C., Bernstein, J.H., 1994. *Psychometric Theory*, 3rd Eds. McGraw-Hill, New York, NY.

Orlitzky, M., Moon, J., 2010. Corporate social responsibility education in Europe: trends and comparisons. In: Swanson, D.L., Fisher, D.G. (Eds.), *Toward Assessing Business Ethics Education*. Information Age Publishing, Charlotte, pp. 143e176.

Pappas, E., Pierrakos, O., Nagel, R., 2013. Using Bloom's taxonomy to teach sustainability in multiple contexts. *J. Clean. Prod.* 48, 54e64. <http://dx.doi.org/10.1016/j.jclepro.2012.09.039>.

Rusinko, C.A., 2010. Integrating sustainability in management and business education: a matrix approach. *Academy of Management Learning and Education* 9(3), 507-519.

Savelyeva, T., McKenna, J.R., 2011. Campus sustainability: emerging curricula models in higher education. *Int. J. Sustain. High. Educ.* 12 (1), 55e66.

Stephens, J.C., Graham, A.C., 2010. Toward an empirical research agenda for sustainability in higher education: exploring the transition management framework. *J. Clean. Prod.* 18, 611- 618.

Stewart, M., 2010. Transforming higher education: a practical plan for integrating sustainability education into the student experience. *J. Sustain. Educ.* 1.

Streiner, D.L., 2003. Starting at the beginning: an introduction to coefficient alpha and internal consistency. *Journal of Personality Assessment* 80 (1), 99–103.

Stubbs, W., Schapper, J., 2011. Two approaches to curriculum development foreducating for sustainability and CSR. *International Journal of Sustainability inHigher Education* 12 (3), 259-268.

Velazquez, L., Munguia, N., Sanchez, M., 2005. Deterring sustainability in higher education institutions: an appraisal of the factors which influence sustainability in higher education institutions. *Int. J. Sustain. High. Educ.* 6 (4), 383e391.

Verhulst, E., & Lambrechts, W. (2014). Fostering the incorporation of sustainable development in higher education. Lessons learned from a change management perspective. *Journal of Cleaner Production*.

Waas, T., Verbruggen, A., Wright, T., 2010. University research for sustainable development: definition and characteristics explored. *J. Clean. Prod.* 18 (7), 629-636.

Wals, A., 2013. Sustainability in higher education in the context of the UN DESD: a review of learning and institutionalization processes. *J. Cleaner Prod.* 62, 8e15.

Watson, M.K., Lozano, R., Noyes, C., Rodgers, M., 2013. Assessing curricula contribution to sustainability more holistically: experiences from the integration of curricula assessment and students' perceptions at the Georgia Institute of Technology. *J. Clean. Prod.* 61, 106e116. <http://dx.doi.org/10.1016/j.clepro.2013.09.010>.

Wright, T., Horst, N., 2013. Exploring the ambiguity: what faculty leaders really think of sustainability in higher education. *Int. J. Sustain. High. Educ.* 14 (2), 209-227.