

Environmental sustainability practices in South Asian university campuses: an exploratory study on Bangladeshi universities

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Abstract Environmental sustainability practices in universities can play an important role in helping society form a sustainable future. In this study, the roles that Bangladeshi universities play in terms of sustainability practices on their campuses are scrutinized, as well as the challenges these universities face. The existing research on campus sustainability practices in Asia is reviewed, and a new exploratory study is put forth on environmental sustainability practices in the higher education institutions of a developing country—Bangladesh. The Campus Sustainability Assessment Framework used in Canadian universities was taken as basis for determining potential environmental management indicators. Results show that environmental management practices (i.e., environmental education, research, governance and operations) are present only to a very limited extent in higher education institutions in Bangladesh.

Keywords Campus sustainability · Developing countries · Asia · Bangladeshi universities

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1 Introduction

The discussion on campus sustainability began in the late 1960s, highlighting essentially that higher education institutions can play a significant role in transforming education and society toward a sustainable future (Cars and West 2015; Coops et al. 2015; Dagiliute and Liobikiene 2015; Disterheft et al. 2015; Evangelinos et al. 2009; Nair et al. 2013; Price 2005; UNESCO 2005). The importance of the role of education in fostering environmental protection and conservation was recognized in the Stockholm conference of 1972 (Lozano et al. 2013, 2015; Moganadas et al. 2013). The Kyoto Declaration in 1993 increased campus sustainability activity by encouraging higher education institutions to promote sustainability through reviewing their operations (Faghihi et al. 2015). In the last two decades, given the importance of this issue, higher education institutions around the globe have incorporated sustainability into their education, research, governance and physical operation systems (Bilodeau et al. 2014; Figueiro and Raufflet 2015; Jorge et al. 2015; Lauder et al. 2015; Ramos et al. 2015; Vagnoni and Cavicchi 2015; White 2014).

Despite the fact that a growing number of universities have placed strategic emphasis on promoting sustainability in recent years (Horhota et al. 2014), there remain significant challenges (Beringer et al. 2008; Bero et al. 2012; Davis and Wolski 2009; Krizek et al. 2012; Kurland 2014). To overcome the challenges, global policy frameworks can be connected with national policy frameworks to facilitate the strategic use of education in promoting sustainability (Cars and West 2015). For example, the United Nations, the Belgrade Charter and the Tbilisi Declaration, emphasize “Education for Sustainable Development (ESD)” throughout the world to promote “sustainable development” and encourage professors in higher education to think in new ways about the natural environment (Chhokar 2010; Corcoran and Koshy 2010; Fonseca et al. 2011; Tierney and Tweddell 2015).

ESD was first explained in Agenda 21 at the Earth Summit in Rio de Janeiro in 1992 (Sewilam et al. 2015). ESD plays a very important role in educating professionals and future leaders on sustainability issues (Amaral and Martins 2015; Disterheft et al. 2015; Sanusi and Khelghat-Doost 2008; Tierney and Tweddell 2015). Evangelinos et al. (2009) argue that socio-environmental problems need to be included in the research agendas of universities, which is possible through “Education for Sustainable Development.” Four hundred and twenty-nine universities have already signed the Talloires Declaration that emphasizes the need to incorporate sustainability into teaching, research and operations in higher education institutions (Adlong 2013; Stubbs 2013; Thomas 2004). The primary motivation of the Talloires Declaration is concern over environmental degradation (Finlay and Massey 2012; Too and Bajracharya 2015). More than 600 universities have committed to sustainable development initiatives around the globe (Fisher 2003); however, progress toward sustainability in higher education campuses is not only unsatisfactory but also extremely slow (Saadatian et al. 2013). The question then arises: What progress has been made by universities in Asian countries in the area of campus environmental sustainability?

1.1 Campus environmental sustainability in developed countries

“Greening initiatives” have been widely accepted on university campuses in North America, Australia and Europe for the past two decades (Arroyo 2015). “Greening the campus” has been a dominant objective in North America as some universities have signed

the Talloires Declaration (Beringer et al. 2008) and/or have also followed the Campus Sustainability Assessment Framework (or similar frameworks) (Helferty and Clarke 2009).

Many Canadian universities have sustainability officers as part of their commitment to enhanced sustainability on university campuses (Clarke and Kouri 2009; Lidstone et al. 2015). In fact, several universities, including the University of Northern British Columbia (Smyth et al. 2010), the University of British Columbia (Coops et al. 2015), Dalhousie University (Clarke 2006), the University of Waterloo (Moudrak and Clarke 2012), the University of Guelph and the University of Toronto (Brinkhurst et al. 2011), Brock University (Mitchell 2011) and the University of Calgary (Fonseca et al. 2011), have all been cited as strong examples.

The American Colleges and Universities President's Climate Commitment (ACUPCC) initiative was launched in 2006, giving campus sustainability greater emphasis in higher education institutions in the USA (Horhota et al. 2014; Vance and Boss 2012). Campus sustainability initiatives have been undertaken on many university campuses in the USA to reduce negative environmental impacts (Levy and Marans 2012), e.g., the University of Hawaii at Manoa (Cusick 2008), Arizona State University (Wiek et al. 2014), City University of New York (Jiji et al. 2015), Furman University (Horhota et al. 2014), Texas A&M University, Duke University and Virginia Tech (Celik et al. 2014).

The Australian Vice-Chancellors' Committee (AVCC) issued a policy highlighting commitment to sustainable development and acknowledging the leading role of universities with regard to campus sustainability (Hancock and Nuttman 2014). In Australia, several universities have formal commitments and strategic plans to integrate environmental sustainability on their campuses, including the University of Newcastle (Walton and Galea 2005), Monash University (Stubbs 2013) and the University of Sydney (Baboulet and Lenzen 2010). Furthermore, the University of Technology, Sydney (UTS), started on its journey toward sustainability by signing the Talloires Declaration in 1990 (Atherton and Giurco 2011).

Similarly, many European universities have environmental policies, environmental coordinators and sustainability management systems, for instance Swedish Malardalen University (von Oelreich 2004; Sammalisto and Arvidsson 2005), the University of Glamorgan, UK (Price 2005), Plymouth University, UK (Winter and Cotton 2012), the University of Leeds, UK (Townsend and Barrett 2015), the University of Luneburg, Germany (Beringer 2007), and the University of Maribor, Slovenia (Lukman et al. 2009), to name a few.

1.2 Campus environmental sustainability in Asia

This study examines campus environmental sustainability in Asia based on a condensed version of the Campus Sustainability Assessment Framework (CSAF) (Cole 2003; SYC n.d.). This condensed framework is used to investigate campus environmental sustainability indicators from the knowledge section (new faculty orientation, faculty sustainability training, sustainability research expenditure and courses with sustainability content), the governance section (university government policies and university financing on sustainability) and environmental management of operations section (water efficiency, solid waste management efficiency and energy efficiency). Too and Bajracharya (2015) argue that the sustainability strategies of a sustainable university should span across education, research and campus operations (i.e., waste, energy and water). Moreover, Vasquez et al. (2015) reveal that higher education institutions have been incorporating sustainable development strategies into teaching, research, infrastructure and campus

operations. Dyer and Dyer (2015) argue that higher education has a very important role to play in moving society toward sustainability. However, what role are Asian universities playing in moving society toward sustainability? The relevant literature provides several insights in this matter.

1.2.1 Knowledge

There are some campus sustainability assessment indicators that exist in the knowledge section of the CSAF to examine the presence of new faculty orientation, faculty environmental sustainability training, environmental sustainability research expenditures and courses with environmental sustainability content in higher education institutions (SYC n.d.). In Asia, leadership on sustainability topics can in fact be found in educational institutions (Kantabutra and Saratun 2013). Students can choose environmental sustainability courses and programs (e.g., Amran et al. 2010; Macrory 2013; Naeem and Neal 2011; Salequzzaman and Davis 2003; Tahir 2001) based on curriculum models and research that incorporate into education the greening of campuses (Salequzzaman and Stocker 2000; Savelyeva and McKenna 2011; Su and Chang 2010). For example, the Korean Green Campus Association is currently working with more than 20 universities in order to improve sustainability education on campuses with the slogan “reduce, reuse, recycle” (Ryan et al. 2010). Universities in Thailand and Sri Lanka offer graduate courses in environmental education, and universities in the Philippines have accepted an “Education for Sustainable Development” policy (Bhandari and Abe 2000; Galang 2010; Tahir 2001). Taiwan’s government has allocated resources to support its educational institutions in becoming more sustainable (Su and Chang 2010).

Despite the fact that other local universities in Malaysia do not offer sustainability programs (Amran et al. 2010; Bhandari and Abe 2000), Universiti Sains, Malaysia, has introduced an innovative MBA that specializes in sustainable development (Naeem and Neal 2011). Although sustainability issues in education in Malaysia is at the emergent phase, country-wide campus sustainability has yet to receive much attention from academic researchers (Moganadas et al. 2013). In Pakistan, some universities have established a department of environmental studies (Tahir 2001). In India, TERI University (TU) operates a “green campus” located at Vasant Kunji, New Delhi, and also signed “Rio+20 Declaration of Higher Educational Institutions” in 2012 (Jain et al. 2013; Wang et al. 2013). In addition, environmental education is considered by the Indian government to be a crucial element in its development strategy (Chhokar 2010). In 2010, Universitas Indonesia (UI) developed an online “Green Metric” world university ranking that provides opportunities for each university to investigate its strengths and weaknesses in promoting campus sustainability (Suwartha and Sari 2013; Universitas Indonesia 2015). Universiti Putra Malaysia is ranked 17th out of 407 universities, and it is the top ranked Asian university (Universitas Indonesia 2015). Furthermore, Universiti Sains Malaysia (USM) chose sustainability as a platform to transform higher education for a new sustainable future (Foo 2013). While Asia does contribute to the greening of education, more comprehensive policies are still needed (Ryan et al. 2010).

An international sustainable campus network (ISCN) supports colleges and universities in the exchanging of information, ideas and best practices for achieving sustainable campus operations (ISCN 2013). Indeed, reports of some Asian universities are available online (ISCN 2013); for example, the University of Hong Kong’s report and progress on its sustainable campus efforts are available online (Hong Kong University 2014). There remain challenges to integrating and implementing education for sustainable development

in universities (Fry and Bi 2013; Lo 2013; Naeem and Neal 2011; Salequzzaman and Stocker 2000; Shamsuddoha et al. 2012; Tahir 2001). However, additional staff training and communication on environmental issues in higher education institutions is recommended and strongly suggested by the studies (Jain and Pant 2010; Macrory 2013; Tahir 2001).

1.2.2 Governance

The governance section of the CSAF examines the existence of university governance policies related to environmental sustainability as well as to university financing of environmental sustainability (SYC n.d.). A sustainability policy is one element of a university's sustainability governance documents that also include plans, strategies and reports (Lidstone et al. 2015). In addition, environmental and sustainability content is included in university policies on Asian university campuses (Galang 2010). Jain and Pant (2010) argue that a certain management structure and a monitoring system must be set up to ensure successful implementation of an environmental policy on university campuses, in order to reduce various negative environmental impacts. It is also recommended to set up solid environmental education policies and to obtain accreditation regarding campus greening (Bhandari and Abe 2000; Ryan et al. 2010; Sinha and Subramanian 2013). Several studies (Lo 2013; Ting et al. 2012) reveal strategies and systems that can be implemented to build a sustainable university campus; generally, these include obtaining top-management commitment.

1.2.3 Environmental management of operations

The environmental management of operations section of the CSAF includes the installation of water-efficient fixtures, the existence of LEED-certified buildings, recycling, renewable energy production or usage and efforts at reducing energy consumption (SYC n.d.). Some Asian universities are committed to the idea of a sustainable campus and thus address topics such as ecotourism and green landscaping on campus (Ting et al. 2012). In India, Initial Environmental Review (IER) and Strengths, Weaknesses, Opportunities and Threats (SWOT) analyses have been used in identifying environmental issues on university campuses (Jain and Pant 2010). Most Chinese higher education institutions take a “top-down” approach to incorporating sustainable development into the physical operation of the institution (Yuan and Zuo 2013).

Some Asian universities have also officially launched sustainable campus (including green building initiatives) in order to minimize their future carbon footprints (Jain and Pant 2010; Macrory 2013; Su and Chang 2010; Ting et al. 2012). In fact, Asian universities rank high on the ranking list of the GreenMetric World Ranking precisely because they are getting involved in the international green campus assessments (Universitas Indonesia 2015). In terms of challenges, some studies point to faulty electrical systems, roof damage, electricity consumption and waste management as the most urgent problems (Jain and Pant 2010; Olanrewaju et al. 2010), while another study discusses how a compact campus is a more sustainable campus (Razak et al. 2011). In summary, this literature review indicates that Asian campuses are emphasizing environmental sustainability programs in the academic arena, the governance systems and the day-to-day operations. As an exploration into one Asian country, this paper considers the progress that has been made by Bangladeshi universities in the area of campus environmental sustainability.

1.3 Environmental sustainability in Bangladeshi universities

Bangladesh is a South Asian country which gained independence from Pakistan in 1971 (Sobhani et al. 2009). The era of modern environmentalism began in 1972 when Bangladesh joined in UN Stockholm Conference on Human Environment (Hasan 2000). Islam (2002) reports that the Bangladeshi government set up a full-fledged Ministry of Environment and Forests (MoEF) in the 1980s for the protection and conservation of the natural environment. Bangladesh is considered one of the countries in the world most susceptible to climate change, because it possesses an extremely fragile natural environment (Aminuzzaman 2010; Muhith 1999). According to the People's Report on Bangladesh Environment (Rahaman et al. 2001), serious degradation of the air, water and soil is having adverse consequences on economic activities, and environmental pollution is now an area of growing concern (Belal and Roberts 2010). Salequzzaman and Stocker (2000) argue that Bangladesh can respond to environmental degradation through environmental education and the development of career paths in fields related to sustainable development. Environmental education can also play a vital role in developing environmentally conscious citizens and leaders (Salequzzaman and Davis 2003). In short, there is an enormous opportunity for the expansion of environmental education in Bangladesh (Bhuiyan et al. 2010). Bangladeshi university graduates have failed to play an effective professional role in handling environmental issues, due to the lack of standard sustainability content in higher education (Shamsuddoha et al. 2012), in spite of the fact that some Bangladeshi universities such as Sylhet Shahjalal University of Science and Technology, North South University, Independent University and the Bangladesh University of Engineering and Technology (BUET) do offer environmental courses (Salequzzaman and Davis 2003; Tahir 2001).

The above discussion points out the extremely important role that environmental sustainability practices on university campuses play in making “Sustainable Campuses” and providing “Education for Sustainable Development” (ESD) in Bangladesh. The interpretation of the term “sustainable campus” is typically focused on minimizing the environmental impacts of universities (Too and Bajracharya 2015). A review of the literature shows that there are six factors which contribute to environmental sustainability on university campuses: (i) green campus operation measures; (ii) campus administration, organization and leadership; (iii) teaching, research and service; (iv) campus-wide actions and activities; (v) institutional assessment of campus sustainability measures; and (vi) established methods for overcoming barriers (James and Card 2012).

These six factors are considered in the conceptual framework for the present study in examining whether and how Bangladeshi universities practice environmental sustainability on their campuses. To date, studies and applications have mainly been conducted in developed countries. Few studies on campus environmental sustainability have been done in developing South Asian countries. For this reason, this study is an important contribution to the extant literature.

The goal of this paper is to explore the environmental sustainability practices in a developing South Asian country—Bangladesh, and to see whether topics within the CSAF are applicable in this context. To that end, the empirical research questions posed by this study are:

- RQ1 Can a simplified version of the Campus Sustainability Assessment Framework (CSAF) be applied to assess environmental management in Bangladeshi universities?
- RQ2 What are the barriers to implementing environmental sustainability practices in Bangladeshi universities?

1.4 Framework for campus sustainability

For the purpose of this study, we have reviewed sustainable campus literature, tools and models in order to find a theoretical framework. Shriberg (2002) emphasizes that most of the eleven cross-institutional sustainability assessment tools are historical and descriptive. Considering the strengths and weaknesses of the different tools for measuring campus sustainability (Shriberg 2002) and the potential of the Campus Sustainability Assessment Framework (CSAF) as a tool for assessing campus sustainability, it is the CSAF that was selected as the best choice, in agreement with the outcome of Cole's (2003) research (Beringer 2006; Cole 2003; Fonseca et al. 2011). As of 2009, the CSAF was in active use on over 30 Canadian university campuses (Helferty and Clarke 2009). Owing to the fact that university administrators complained that the CSAF was too long, the Sierra Youth Coalition developed the CSAF Core (Cole 2003; SYC n.d.). This document contains a reduced set of core indicators including: health and well-being, community, knowledge, governance, economy and wealth, water, materials, air, energy, and land (SYC n.d.). This subset of indicators is easier to use for researchers who are assessing campus sustainability for the first time.

Since this exploratory study is especially concerned with environmental sustainability as assessed on Bangladeshi campuses, an even smaller set of topics was chosen based on the insights of two of the authors who have worked in Bangladeshi colleges and universities. More specifically, this smaller set contained four indicators from the knowledge section, two indicators from the governance section, one indicator from the water section, two from the energy section and two from the materials section. These indicators were then revised, such that the researchers could simply note in "yes/no" fashion if the initiative existed or not, rather than collecting more complex measurement data. The results section further details these exact indicators.

2 Methods

In this research, Bangladesh was selected as the sample country for two reasons: On the one hand, higher education is considered a crucial tool for the country's socioeconomic development (Alam et al. 2007); on the other hand, Bangladesh is facing the challenges of increasing environmental degradation (Rahaman et al. 2001). There are six heavily environmentally polluted districts (hot spots) in Bangladesh: Dhaka, Chittagong, Gazipur, Khulna, Narayanganj and Bogra. When viewed together, these six hot spots add up to more than 50 % of the national pollution load (Islam and Miah 2003). Two of the authors of the present study are from the Chittagong district of Bangladesh and have work experience in two different academic institutes in this same district. Consequently, they wondered whether a simple version of the Campus Sustainability Assessment Framework (CSAF) could be applied to assess environmental management in Bangladeshi universities, and if so, what the barriers would be in implementing environmental sustainability practices in Bangladeshi universities.

These research questions were addressed by means of a structured questionnaire, providing qualitative research. Then, in order to respond to both research questions, sample universities were selected in Chittagong for two main reasons: First, only Chittagong has the combination of different types of universities (e.g., general universities, specialty universities in Science and Technology and the first liberal arts university for women in

Asia—which is one of only international universities in Bangladesh); and second, all the private universities have their main campuses in Chittagong, which made it possible to get the access to the personnel, both administrative and faculty members, for data collection.

There are 13 public and private universities located in Chittagong district, Bangladesh. All 13 universities were contacted by a co-author to participate in interviews; however, only six universities agreed to participate in this study. They are Chittagong University (CU), Premier University (PU), the University of Science and Technology Chittagong (USTC), the University of Information Technology and Science (UITS), Begum Gul Chemon Ara Trust University Bangladesh (BGCTUB) and Southern University Bangladesh (SUB).

From each of the six universities, one or sometimes two interviewees were selected from faculty members and/or administrators who are familiar with the campus environmental sustainability initiatives. In order to avoid the non-response bias, interviewers assured the respondents that the collected data would be kept completely confidential and will be used for academic purpose (since the information is somewhat sensitive). Moreover, interviewers also assured that the information provided would be viewed as part the whole sample and would not be scrutinized individually. Despite these facts, seven universities did not participate in the study under the pretext of their internal policy. This unwillingness of participating in the study can be inferred as the potential respondent's apprehension of facing challenges from senior administration (in case of disclosure of any information that might be problematic for their organizations).

For the campuses that provided two interviewees, results were combined into one entry for the university. This was possible because there were no contradictory responses, though sometimes one interviewee was able to respond to a question that the other had left blank. The interviews were recorded with permission of the participants and transcribed for further analysis. Then the transcripts were coded by one of the by-selecting significant sections from the participants' statements (Hahn 2008). Some of these relevant parts from the transcripts are included in the discussions as supporting quotations. During data analysis, each sample university and participant was labeled with a unique identification number, for example U1 for one specific university and P1 for a participant from that university.

3 Results

The results section is divided into three parts; the first part shows the results related to the knowledge indicators (see Table 1); the second part shows the results related to the governance and wealth and economy indicators (see Table 2); and the last provides the water, materials and energy indicators (see Table 3). After each table, there is information detailing Bangladeshi university practices, along with some quotations from the responses.

3.1 Bangladeshi university practices: knowledge

The sample Bangladeshi universities do not offer new faculty and staff orientation programs. Three of the universities organize training programs related to sustainability issues for faculty and staff, but the other three do not have such training programs. In response to the research question: Is there a sustainability training program in your faculty (including on and off campus workshops, seminars, conferences)? P3, a faculty member of U3,

Table 1 Addressed key sustainability indicators of the CSAF relating to knowledge in Bangladeshi universities *Source:* Field interviews

Number	Indicators	Research units						Results
		U 1	U 2	U 3	U 4	U 5	U 6	
K-1	New faculty orientation exists	X	X	X	X	X	X	Yes (0) No (6)
K-4	Faculty environmental sustainability training exists	X	X	√	X	√	√	Yes (3) No (3)
K-11	Environmental sustainability research expenditures exist	X	X	√	X	√	√	Yes (3) No (3)
K-17	Courses with environmental sustainability content exist	√	X	X	√	X	√	Yes (3) No (3)

Table 2 Addressed key sustainability indicators of the CSAF relating to sustainability policy governance in Bangladeshi universities *Source:* Field interviews

Number	Indicators	Research units						Results
		U 1	U 2	U 3	U 4	U 5	U 6	
G-1	University governance policies related to environmental sustainability exist	X	X	X	X	√	√	Yes (2) No (4)
G-7	University financing of environmental sustainability exists	U*	X	X	X	√	U*	Yes (1) No (3) Unknown (2)

* indicates unknown unit

Table 3 Addressed key sustainability indicators of the CSAF relating to environmental management practice in Bangladeshi universities *Source:* Field interviews

Number	Indicators	Research units						Results	
		U 1	U 2	U 3	U 4	U 5	U 6		
W-7	Water-efficient fixtures installed		√	√	√	X	√	√	Yes (5) No (1)
M-1	LEED-certified buildings exist	X	X	X	X	X	X	X	Yes (0) No (6)
M-9	Recycling exists		X	√	√	√	√	√	Yes (5) No (1)
E- 1	Renewable energy production and/or usage	X	X	√	√	X	√	√	Yes (3) No (3)
E-8	Reduction in energy consumption efforts exists		√	√	X	√	√	√	Yes (5) No (1)

replied: “U3 has some sustainability training programs in our faculty (both on and off campus)” and one of the faculty members of U5 stated: “Though few, we always try to arrange such workshops, seminars and conferences relating to sustainability.” There are limited financial resources to conduct research on campus sustainability issues in three universities, and limited financial resources in the other three universities for sustainability research. In addition, sustainability-related courses are offered in three universities, while the other three do not offer such courses.

3.2 Bangladeshi university practices: governance

Most of the universities located in Chittagong do not have an overarching campus environmental management policy. In response to the research question: Does the university have a campus environmental management policy? A senior administrator of U2 replied: “U2 does not have any environmental policy, though steps are taken based on necessity,” and U5 claims to have a campus environmental management policy, although a written campus environmental management policy could not be obtained upon request.

3.3 Bangladeshi university practices: operations

LEED-certified buildings do not exist on any of the sample university campuses in Bangladesh. P1, who is a faculty member of the Department of Geography and Environmental Studies in U1 said: “There is no policy for solid waste reduction, no reuse of solid waste, no recycling measures in this university.” According to a senior administrator of U2: “Solid waste is dumped in containers on the university campus, and Chittagong City Corporation Transport helps to remove and recycle it.” A faculty member of U4 explained: “The university is using intranet and extranet to reduce paper waste and has measures for composting dust.” One faculty member of U1 mentioned: “Unfortunately we do not have any renewable energy systems.” The interviewee comments above show some of their thoughts on hazardous waste management practices (reduction, reuse and recycling measures) in the university campuses. The present research was also meant to explore the greenhouse gas that is emitted from major on-campus sources: air conditioners, refrigerators, transportation and generators; however, adequate measures in mitigating greenhouse gas emission have not been taken by any of the university authorities.

4 Discussion

This research set out to answer two questions: Can a simplified version of the Campus Sustainability Assessment Framework (CSAF) be applied to assess environmental management in Bangladeshi universities? What are the barriers to implementing environmental practices in Bangladeshi universities? This discussion section is in two parts: a synopsis of the findings related to the two research questions, including an examination of the implications and the limitations of the methodology used, and finally, some suggestions for future research directions.

4.1 Synopsis of findings for research question 1 and discussion: CSAF and practices of sustainability in universities

In general, the CSAF can be used to assess to Bangladeshi universities, with some caveats. Awareness of the CSAF as a concept among interviewees was explored, and framework topics were found to hold different meanings for different interviewees. Some interviewees felt that campus sustainability was a new endeavor for their universities. In addition, other participants observed that the CSAF indicators are only feasible for developed countries, owing to their greater financial resources. It was challenging to establish an effective communication around CSAF indicators among interviewees; for example, LEED, which is the United States Green Building Council (USGBC)'s Leadership in Energy and Environmental Design (LEED) program, was not always known to the interviewees. Furthermore, results indicate that only a few seminars and workshops on the issue of sustainability are conducted by the universities, so perhaps a more nuanced indicator is needed.

The UN Decade on Education for Sustainable Development (UNDESD) has emphasized the need for a commitment by educational institutions to educate all students about the necessity of sustainability around the globe (Wynsberghe and Moore 2015). However, no such commitment was found among the institutions of higher education in the present research. From the relevant literature, it can be noted that many US universities have a mission to promote the idea of sustainability among faculty and students (Tu et al. 2015). Even though most of the sampled universities of this study do not have a written environmental management policy, many interviewees report that lately more attention has been given by university authorities to issues of environmental sustainability.

Dagiliute and Liobikiene (2015) argue that university policies promoting environmental sustainability must be more consistent and continuous, rather than fragmented and occasional. In the course of this research, it became apparent that solid waste reduction, reuse of solid waste, recycling measures, use of renewable energy, etc., are not practiced adequately in the sample universities. There are in fact about 200 environment-related regulations that deal with the protection of the natural environment in Bangladesh (Khan 2000). The main objectives of environmental regulations are the prevention and control of environmental pollution and the conservation of natural and cultural resources (Chowdhury 1999). These regulations are clearly not being enforced adequately on university campuses. The reality in Bangladesh is that environmental pollution is not in check (Hoque and Clarke 2013; Hoque et al. 2014). Despite the fact that higher education institutions have become engaged in sustainable practices all over the world (Lo 2015), the current findings point out that some of the CSAF indicators measure phenomena that exist in a very limited scope in Bangladeshi universities. In order to fall into step with the many universities that have signed declarations agreeing to implement sustainability through environmental curricula and research all over the world during recent decades (Manzanal et al. 2015), Bangladeshi universities need to engage in more sustainable practices.

4.2 Synopsis of findings for research question 2 and discussion: barriers of campus sustainability

A clear lack of adequate knowledge among interviewees toward campus sustainability issues and their implementation procedures was observed. During the interviews, an apparent lack of commitment by top-management toward campus sustainability issues was

made obvious by the fact that managers are not taking adequate measures to bring about sustainability programs in their universities. Interviewees also expressed the view that the top-management of universities does not have adequate financial support in order to introduce sustainability programs in both the academic arena and daily operations. As reported by Posner and Stuart “All campus sustainability efforts face the challenge of having more good ideas than resources available to implement them” (Posner and Stuart 2013, p. 274). In this respect, the universities of Bangladesh are similar to other universities in terms of resource availability in implementing campus sustainability. James and Card (2012) reveal that those higher education institutions which have achieved successful sustainability have overcome financial barriers by making sustainability initiatives an internal budget priority. The literature review indicates that the National Science Council of Taiwan offers additional funding for sustainability research (Su and Chang 2010). The Bangladesh Universities Grants Commission (UGC), which is the authority that can allocate financial resources to public universities, should support additional budget for universities to implement campus sustainability programs. In the USA, some universities have overcome financial barriers to environmental sustainability programs through alternative funding sources, for example US energy trust funds, local utility rebates, tax incentives, and energy service company performance contracts (James and Card 2012; Monastersky 2007). Green revolving funds—that provide financing to parties within an organization for implementing energy efficiency, renewable energy and other sustainability projects that generate cost savings—have also recently gained considerable traction in universities (Maiorano and Sava 2015).

Contrary to the fact that a good number of international conventions, treaties and protocols relating to the conservation and protection of the natural environment have been signed and ratified by the Government of Bangladesh (Alam et al. 2008; Gain 1998), local universities are not supporting the Bangladeshi government to fulfill its commitment toward the international community in protecting the natural environment, because these universities are simply not practicing environmental sustainability on their campuses.

5 Conclusion

This paper offers an overview of campus sustainability efforts in South Asian universities, more precisely, universities in Bangladesh, with a particular focus on environmental education, research, governance and operations. It details an exploratory study concerning campus environmental sustainability on university campuses at Chittagong, Bangladesh. These empirical findings highlight the current situation at those universities with respect to knowledge, governance and operations, and also the barriers that the campuses face in pursuing environmental sustainability initiatives. This study also provides an understanding of the current campus sustainability situation across several South Asian countries, where campus sustainability programs are emphasized in both the academic arena and the daily operations, albeit to a limited extent. There are examples of leading universities in South Asia completing sustainability reports that meet with international standards, showing that a certain level of standardization of the CSAF topics and applicability of the CSAF indicators is possible on South Asian university campuses.

Moreover, while the findings of this present study are specific to the CSAF, they would be equally relevant for the STARS tool, or any of the other developed-country development assessment tools that would fit South Asian university campuses. The potential of the

CSAF indicators for use on university campuses in a developing country context is assessed, and it was found that some of the CSAF measures are satisfied to a very limited extent on Bangladeshi university campuses. The barriers to achieving environmental sustainability on university campuses in a developing country were also under scrutiny, and some were indeed found, for example the lack of top-management commitment and of financial resources.

The findings of this study provide authentic information to policy makers of developing countries about the existing situation of campus sustainability, so that they can formulate strategies and programs to better implement Education for Sustainable Development (ESD) in developing countries. This paper responds to the call for more studies on campus sustainability in other countries, in order to achieve a global understanding of sustainability in higher education institutions (Wright and Horst 2013). The current study also responds to Jones suggestion for researchers to look at how sustainability management academics can most effectively contribute to higher education leadership (Jones 2014). This study, the first to our knowledge to address campus sustainability issues in Bangladeshi universities, adds to the emerging body of research in “Higher Education for Sustainable Development” (HESD) (Adombent et al. 2014).

One limitation of this investigation is that it focused solely on a particular district of Bangladesh, and all sample universities were from that region; however, this limitation provides direction for new research to investigate campus sustainability in other universities of the country. In this regard, the Graphical Assessment of Sustainability in Universities (GASU) tool (Lozano 2006) can be used effectively, since it facilitates comparisons of benchmarks among different universities’ efforts toward sustainability. Hence, this tool can be used for comparing the present results with future work; moreover, a longitudinal comparison of the sustainability efforts and achievements among sample universities can be possible by utilizing this tool.

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