Sustainability practices at higher education institutions in Asia

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Abstract

Purpose – It is still unclear how Asian universities incorporate the theory or practice of sustainable development (SD) in their research and education programmes. To address this gap, the purpose of this paper is to report on a study that has examined how universities in Asian countries handle and address matters related to SD.

Design/methodology/approach – The study used a bibliometric analysis and an online survey-method. The online survey data were analysed through descriptive analysis and one-sample student's *t*-test.

Findings – The study indicates that there is considerable variation among the Asian countries regarding sustainability practices in higher education institutions (HEIs). The HEIs in far eastern countries, such as Indonesia, Malaysia and Thailand are perceived to demonstrate more sustainability practices.

Research limitations/implications – Even though a substantial number of participants participated in the survey, it did not cover all Asian countries. The online survey was carried out over a limited period of time, and not all HEIs in the field may have received information about the study.

Practical implications – Asia is the largest continent facing a number of sustainability challenges. In this context, the contribution of HEIs is very important. The findings of the current study may serve as a baseline for Asian HEIs to take more initiatives towards SD goals, as HEIs are responsible for the education and training of hundreds of thousands of students who will be occupying key positions in industry, government or education in the coming years.

Originality/value – The study contributes to the existing literature in two distinct ways. First, it was possible to develop a comprehensive instrument to measure sustainability practices in HEIs. Second, this study has filled the gap of the scarcity of studies regarding sustainability practices in HEIs in Asia.

Keywords Sustainability, Higher education institutions, Drivers, Challenges, Education for sustainable development

Paper type Research paper

1. Introduction

Due to the fragile and vulnerable ecosystem in Central Asia, climate change in this region has advanced more intensely and quickly than in other parts of the world (Asadullah *et al.*, 2020). It is, thus extremely important to undertake critical sustainable development (SD) measures and actions to improve the situation that is engulfing Asia (Czvetkó *et al.*, 2021). The transition towards diversification in energy sources and clean energy generation will enable Asia to reduce its dependence on fossil fuels, thereby minimising the associated negative environmental impacts and responding to one of the biggest challenges of SD in the region (Roslan, 2021).

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Realising the critical role of higher education in advancing the agenda of SD, different universities have taken varied initiatives. In their survey of 642 business schools, Wu *et al.* (2010) noted that many universities had included sustainability courses in different academic programmes. As a response to the United Nations (UN) Agenda 21 to education for SD (ESD), universities from different countries have signed Talloires Declaration to promote higher ESD (HESD) at political and policy levels (Michelsen, 2015). SD has advanced at an evolutionary pace in Asia, in tandem with the SD goals (SDGs). Sustainability practices within higher education institutions (HEIs) in Asia have also followed suit since the Johannesburg Summit in 2002, which focussed on the special role of education systems in facilitating, envisioning and leading change towards sustainability. The Kyoto declaration made in 1993 for campus sustainability through the efficient use of water, energy, awareness and conservation in HEIs has also brought about much sustainability awareness and action among institutions of higher learning in the region (Faghihi *et al.*, 2015).

In conceptualising sustainability practices within HEIs, the research conducted by Heinen (1994), Lozano García *et al.* (2006) and Leal Filho *et al.* (2017) revealed that many of these practices have been adopted within theoretical, evolutionary and reformative dimensions, providing support to widespread discussions and dissemination of ideas for promoting SD at HEIs. In recent years, sustainability challenges have also been emphasised in all sectors as predominant social practices across the educational sector (Calder and Clugston, 2003; Lozano, 2006; Franco *et al.*, 2018).

Environmental sustainability, operational resources, such as water, waste and energy consumption and unsustainable human behaviours continue to constitute concerns in HEIs and are identified as thematic questions (Tierney *et al.*, 2015). In ensuring ESD, it remains critical within this context to identify its barriers and solutions, design courses and research materials, and plan and allocate finances to balance its importance and urgency, and these actions have become great challenges for many countries (Dlouhá *et al.*, 2017). The launch of the SDGs has ensured that education for sustainability becomes critical to the sustainability agenda (Beynaghi *et al.*, 2016; Vásquez *et al.*, 2015).

Literature indicates that a range of initiatives have been carried out at Asian universities to contribute towards SDGs (Blanco, 2021; Liu and Gao, 2021; Okubo *et al.*, 2021; Su and Chang, 2010; Chang, 2013; Xiong and Mok, 2020). Despite the rapid progress in the field of SD in Asia, there is a lack of studies on the extent to which sustainability is implemented at HEIs in the region, where a review of the literature combined with a survey, allow to identify and document the diversity of initiatives undertaken today in this context. There is also a scarcity of comprehensive instruments measuring sustainability practices in HEIs and the developed survey instrument in the light of the study framework will contribute to address that gap. In particular, this study focusses on understanding current sustainability practices and trends in research, teaching and institutional commitments in Asian HEIs. The findings of this study will be instrumental in assisting HEIs in Asia to formulate institutional sustainability policies and guidelines in key areas, such as institutional strategy, teaching and research.

The study used bibliometric analysis and an online survey to understand as follows:

- The commitment of Asian HEIs to sustainability;
- The practices of Asian HEIs as teaching organisations, responsible for the education of students as knowledge multipliers for SD; and
- The practices of HEIs as places for research and as think tanks for a sustainable society.

2. Sustainable development and higher education institutions in Asia

Sustainability at universities plays an integral role in shaping the present and future sustainable societies.

Asian universities are currently adopting strategies to ensure sustainability. Members of the Asian Universities Alliance have implemented sustainability in four main domains that include substantial course delivery, research aligned with the sustainability agenda, innovative green campuses and community engagement and partnership in implementing the sustainability agenda (Liu and Kitamura, 2019). Asian universities aim to pursue sustainability, as illustrated below.

Historically, Malaysia started implementing sustainability through the goal established in public policy documents that sought to eradicate hunger in the country (Economic Planning Unit, 2017). For the 17 SDGs to be achieved based on systematic and measurable progress, a favourable environment was created from several global symposia involving multiple stakeholders and participatory governance (United Nations, 2020). Malaysia has also invested in the promotion of renewable sources of energy, with the intention of meeting the growing demand for this resource, explained by the population growth and technological development in the region (Shaikh *et al.*, 2017).

In India, a developing South Asian country, sustainability science is slowly being introduced to universities and is being implemented in an attempt to progress towards the UN SDGs. Universities are trying to reshape their curriculum to include SD within their current setup. The emphasis is placed on sustainability education to allow India to move towards achieving total sustainability (Priyadarshini and Abhilash, 2020). The Indian School of Business, for instance, encourages the development of competitive projects and strategies based on sustainable management, which will have a positive impact on both universities and society to increase their legitimacy (Miotto *et al.*, 2020). Interestingly, the study of Albareda-Tiana *et al.* (2018) found that Indian campuses are focussed on a few academic parameters (Jain *et al.*, 2013). They lack a contextual assessment system for SD and require adequate indicators, especially for those focussed on administrative management, research and extension, generating an absence of holistic SD.

According to Nousheen *et al.* (2020), Pakistan is one of the first countries to adopt the UN 2030 Agenda for SD, and from 2017 onwards it has implemented for the first time an educational policy aimed at ESD. Parvez and Agrawal (2019) argued that HEIs act within mechanisms that have their own governance and economic and cultural systems. Though not legally designated as such, ESD may be seen taking place in a developing country like Bangladesh through different pathways of learning.

In Bangladesh, on the other hand, the mandate of education as a way of educating people for economic success has been exceeded. Bangladeshi universities lack both formal and informal governance to address the issue of sustainability. The limited efforts include a simpler orientation programme about sustainability that targets teachers, staff and students equally (Hossain and Mohammad, 2015). While this effort seems a theoretical one, its practice remains more difficult to implement. As Alam *et al.* (2021) argued, the mushrooming in the private university sector has resulted in a sustainability crisis, even though both public and private sector universities do not emphasise it. In this context, and to meet the global benchmark in Bangladesh, a formal education policy on sustainability is recommended (Hoque *et al.*, 2017).

In Cambodia, urban planning measures and policies aimed at sustainably managing land use are being implemented, ensuring that the rapid population growth in urban areas occurs in a way that does not cause negative environmental impacts (Lord, 2020). Through more participatory governance, the Philippines seeks to implement sustainability on research in

HEIs, as it understands that the HEIs act as living labs, and thus contribute to the creation of more sustainable forms of management, which will positively impact the entire environment around them (Blanco, 2021).

Conversely, in more developed Asian countries, sustainability is well implemented. A study in Hong Kong found that the universities integrated resources and efforts to ensure sustainability at their campuses. Eight university grant-funded institutions signed the Hong Kong Declaration to recognise the importance of HEIs in the path towards sustainability. The declaration aimed to incorporate sustainability into the learning and teaching processes and the curriculum. Furthermore, it promoted the green operations of universities, such as decreasing water usage, waste, energy and greenhouse gas (GHG) emissions. Additionally, it provided a method for universities to be held accountable for their actions (Xiong and Mok, 2020).

Chinese universities have placed emphasis on SD. Most universities have used a phased plan to move towards sustainability. The multi-step approach was adapted as the sustainability needs of the world changed. Phase 1 occurred early in 1993–2005 to prepare universities. Phase 2 promoted conservation-oriented campus construction. Finally, Phase 3 moved onto green campuses. These initiatives were supported by the Chinese Government and other organisations (Liu and Gao, 2021).

Taiwan's Government has also taken initiatives by allocating resources to the HEIs (Su and Chang, 2010; Chang, 2013). Okubo *et al.* (2021) reported that the Japanese Government is poised to build a new educational curriculum that allows participants to learn practices and develop skills that contribute to a sustainable society (Onuki and Mino, 2009). It also hosted the United Nations Educational, Scientific and Cultural Organization World Conference on Education for Sustainability in Nagoya 2014 (Fredriksson *et al.*, 2020).

As evidenced by the studies presented above and also illustrated in Table 1, Asian HEIs place a strong emphasis on SD. This study's review of studies on sustainability innovations in Asian HEIs found that ongoing research and development has not only focussed on curricula and pedagogical novelties but also has been a core feature of research and development work, campus estate management and institutional practices. The cases highlighted in Table 1 showcase some of the established sustainability practices of HEIs in Asia that have been documented within the literature. This extensive collection of data reveals the focus and impacts of pursued initiatives in various domains of knowledge, showing that Asia is in fact advancing towards SD.

In the context of Asian HEIs, this review shows some gaps in the literature, e.g. lack of coherence/connection between the various SD efforts being pursued in HEIs, thematic gaps with some subjects being more focussed than others, some countries are better represented regarding SD research than others. At the same time, this study highlights the scarcity of articles specifically focussing on sustainability at HEIs in Asia. All this illustrates the need to invest in additional SD studies in Asian countries. Additionally, this study reports on a survey that serves the purpose of better understanding sustainability practices and identifying current trends in Asian HEIs. In the authors' opinion, this study is innovative, as it includes the development of a comprehensive instrument to measure sustainability practices, addressing a sample from a significant number of Asian countries. The questions included in the survey assist in clarifying the SD engagement in Asian HEIs.

3. Methodology

3.1 Approach used in the bibliometric analysis

Bibliometric analysis techniques are increasingly used to understand the knowledge structure and trends in academic fields. Among other things, they can show what topics

N.	Case title	Case focus	Case impact	Reference
1	Sustainability education and a new master's degree: The Master of Sustainability Science: the Graduate Programme in Sustainability Science (GPSS) at the University of Tokyo	The set-up of a new master's degree at the University of Tokyo, in Japan, the Master of Sustainability Science, linking up academic stakeholders interested on SD research	Experiential learning and skills-oriented practical courses, which are key in developing the skill set and sensibility required of upcoming leaders	Onuki and Mino (2009)
2	Sustainability, blended learning and the undergraduate communication skills classroom: Negotiating engineering undergraduates' expectations and perceptions	Exploring the perceptions and expectations of undergraduate engineering students at Universiti Teknologi PETRONAS, Malaysia, on the potential of using the blended learning approach to incorporate sustainability within the Professional Communication Skills module	Increased learner awareness in environmental, social and cultural dimensions of sustainability, development of sustainability literacy and capacity for self-directed learning	Sivapalan (2017)
3	Engineering ESD in Malaysia: Student Stakeholders Perspectives on the Integration of Holistic Sustainability Competences Within Undergraduate Engineering Programmes	Gauging Universiti Teknologi PETRONAS, Malaysia final year engineering students views on the development of engineering ESD competence indicators for inclusion within undergraduate engineering programme module learning outcomes	The voices of student stakeholders are critical in developing sustainability focussed graduate learning outcomes. It also suggests that students view sustainability as an important competence to acquire in preparing them to enter the engineering workforce in Malaysia	Sivapalan (2016)
4	Inquiry into sustainability issues by preservice teachers: A pedagogy to enhance sustainability consciousness	The integration of sustainability education in the "Research Methods in Education" course for preservice teachers using an inquiry-based learning approach at the Lahore College for Women University in Pakistan	There is much potential for teacher education programmes to employ inquiry-based learning as a vehicle to enhance sustainability consciousness	Kalsoom and Khanam (2017)
5	From piecemeal to holistic: Introducing sustainability science in Indian Universities to attain UN-SDGs	The infusion of sustainability within Indian institutions of higher learning has been found to be holistic in nature. Innovative models of integration are seen as a way forward	The infusion and diffusion models proposed in this work is projected to assist Indian HEIs to accelerate the inclusion of sustainability within course offerings, further promoting progress in achieving the UN SDGs	Priyadarshini and Abhilash (2020)

(*continued*)

Table 1.
Case studies on sustainability practices at HEIs in Asia

N.	Case title	Case focus	Case impact	Reference
6	Understanding Gender Differences in Students' Perceptions of Competency Certification for Enhancing Sustainability in Higher Education	Exploring differences between male and female students from K University in Korea on their perception of competency certification programmes to enhance the sustainability of Korean higher education	For Korean institutions of higher education to be sustainable, the universities should look into developing systematic competency certification policies that address the needs of the students as well as of society, besides bridging the workforce gender gap	Lim *et al.* (2020)
7	Fostering sustainability through education, research and practice: a case study of TERI University	The development of the Environmental Studies and Resource Management post-graduate programme at TERI University, India, using blended learning pedagogy	The use of blended learning pedagogy and an interdisciplinary approach has paved the way for curriculum innovation for SD integration	Jain *et al.* (2013)
8	Greening of campus through waste management initiatives	Effects of 3R waste management initiatives on the AIT campus community in Thailand	While 3R can bring about positive effects on attitudes towards waste management, volunteerism, coupled with regulatory and incentive approaches brings about better behavioural changes towards waste management practices	Tangwanichagapong *et al.* (2017)
9	A critical assessment of the HESD from students' perspectives – a Chinese study	An investigation of the awareness of students from Shandong University, China, on sustainability and their views on HESD, i.e., Higher Education Sustainability Initiative (HESI)	Key HESI priorities of students were mostly environmentally focussed, with social aspects, such as campus security and disability access also found to be important	Yuan and Zuo (2013)
10	SD concept in the chemistry curriculum: an exploration of foundation students' perspective	Investigation of the knowledge, attitude and behaviours of foundation (pre-university) chemistry students in a local university in Selangor, Malaysia on the concept of SD	Innovation is required within teaching and learning practices at the pre-university level, taking into account learner perspectives and needs	Kanapathy *et al.* (2019)

(*continued*)

Table 1.

N.	Case title	Case focus	Case impact	Reference
11	Environmental management accounting in the Taiwanese higher education sector: Issues and opportunities	Management of environmental costs associated with the usage of water, electricity and paper within the Taiwanese higher education context	Environmental performance management from an accounting perspective has been limited within the Taiwan university context. Factoring such a practice in would enable better management of the environmental costs borne by universities	Chang (2013)
12	Contributing to Sustainability Education of East Asian University Students through a Field Trip Experience: A Social-Ecological Perspective	The use of field trips to advance ESD within an east Asian university context in Korea	Field trips, coupled with a social-ecology approach has the potential to promote ESD and EE	Yoon *et al.* (2016)
13	Sustainability initiative for a Malaysian university campus: living laboratories and the reduction of GHG emissions	GHG emissions within urban universities are present, but under researched in developing countries such as Malaysia	Campus operations and research activities within urban university campuses are possible sources of GHG emissions, and reduction methods should thus be approached accordingly	Yusoff *et al.* (2021)
14	Green Campus initiative and its impacts on quality of life of stakeholders in Green and Non-Green Campus universities	Differentiating sustainability practices and observed quality of life perspectives of stakeholders of green and non-green campuses in Thailand	The adoption of UI GreenMetric World University Ranking within campuses in Thailand could boost sustainability practices and improve quality of life	Tiyarattanachai and Hollmann (2016)
15	Strategic Options for Campus Sustainability: Cluster Analysis on HEIs in Japan	10-year evaluation of campus sustainability initiatives of universities in Japan	While the implementation of sustainability is largely lacking, asset management or networking are areas with potential for campus sustainability implementation, particularly for small institutions	Ikegami and Neuts (2020)

(*continued*)

Table 1.

N.	Case title	Case focus	Case impact	Reference
16	Does GATS' Influence on Private University Sector's Growth Ensure ESD or Develop City "Sustainability Crisis" – Policy Framework to Respond COP21	In response to COP21, a "carbon neutrality" policy framework for the sector has been proposed as a means of addressing the sustainability challenge	While the greenery index has decreased dramatically, the night light and heat indices have unexpectedly increased, which is associated with the growth and expansion of the private university sector	Alam *et al.* (2021)

Notes: 3R = reuse, reduce and recycle; AIT = Asian Institute of Technology; HESI = Higher Education Sustainability Initiative; GATS = General Agreement on Trade in Services

Table 1.

have received more attention in the literature. Different software tools, such as CiteSpace and SciMAT have been developed for this purpose, which mainly focusses on the thematic evolution of scientific fields. VOSviewer was used in this study because it allows for the identification of major thematic focus areas and their interlinkages. In addition, the interface of the software and its outputs are user friendly (van Eck and Waltman, 2010). The objects of analysis are the bibliographic data of publications indexed in the Web of Science (WoS), a well-known scientific database for archiving peer-reviewed academic literature. To select relevant studies for inclusion in the analysis, the authors first designed a broad-based search string that covers terms related to sustainability education and research in Asia. This search string is presented in Table 2. The literature analysis was undertaken on 28 February 2021 and returned 1,648 publications. The search included all research indexed in the WoS between 1900 and 2021. Titles and abstracts of these articles were screened to select those related to the scope of this study. In the end, 1,158 articles were selected for analysis through VOSviewer. Of the different bibliometric analyses offered by VOSviewer, the term co-occurrence analysis was selected, as it provides information about the thematic focus of a research area (Callon *et al.*, 1983). The output of this analysis is a network of nodes and links, where node size and link width are proportional to the frequency of occurrence of terms and the strength of the connection between two terms, respectively. Terms that are close to each other form clusters that represent thematic focus areas (van Eck and Waltman, 2010).

(TS = (("sustainab*") and ("universit*" OR "higher education institut*" OR "college*") and ("asia*" OR "Bangladesh*" OR "Bhutan*" OR "Brunei*" OR "Cambodia*" OR "Chin*" OR "India" OR "Indonesia*" OR "Japan*" OR "Lao*" OR "Malaysia*" OR "Maldives" OR "Mongolia*" OR "Myanmar*" OR "Nepal*" OR "Korea*" OR "Pakistan*" OR "Philippin*" OR "Singapor*" OR "Sri Lanka*" OR "Taiwan*" OR "Thai*" OR "Timor*" OR "Vietnam*" OR "Kazakhstan*" OR "Russia*" OR "Tajikistan*" OR "Turkmenistan*" OR "Uzbekistan*" OR "Afghanistan*"))) AND LANGUAGE: (English)	Indexes = SCI-EXPANDED, SSCI, A&HCI, ESCI Timespan = 1900–2021

Table 2.
Search string for the bibliometric analysis

3.2 Online survey

For the exploratory component, an online survey was applied to establish how HEIs in Asia address sustainability. The invitation to contribute to the survey was open, and only persons interested on the topic took part. Based on previous extensive literature review, as well as knowledge from researchers working in this area and region, the questionnaire was developed to comprise 12 questions and 4 main sections, aiming at simplicity as follows:

Part 1 – The commitment of HEIs to sustainability.

Commitment towards a sustainable use of resources.

Commitment towards a sustainable organisation.

Part 2 – HEIs as teaching organisations, responsible for the education of students as knowledge multipliers for SD.

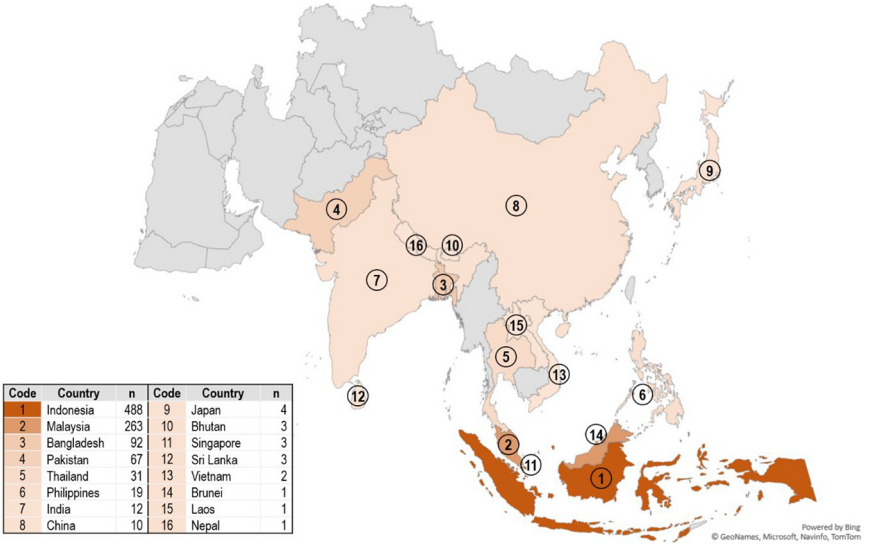
Part 3 – HEIs as places for research and as think tanks for a sustainable society.

Part 4 – Challenges and drivers of the implementation of sustainability-related initiatives at Asian universities.

The questionnaire was validated by a group of sustainability researchers and then shared with several networks of universities, such as the Inter-University SD Research Programme (IUSDRP, https://www.haw-hamburg.de/en/ftz-nk/programmes/iusdrp/) and the Promotion of Sustainability in Post-graduate Education and Research (ProSPER.Net, https://prospernet.ias.unu.edu/), which when combined they cover more than 70 universities in Asia. The study followed a convenience sampling methodology, as the researchers shared the survey with their networks and contacts.

The questionnaire remained active between March and April 2021 and collected 1,000 responses from 16 countries after data clean-up, as shown in Figure 1, removing countries, not in the area of study.

Indonesia and Malaysia rank among the highest responses to the survey, representing about 75% of the total responses. This is followed by Bangladesh, Pakistan, Thailand, the Philippines, India and China. Japan registered four responses, while Bhutan, Singapore and Sri Lanka provided three responses with each. Vietnam



Code	Country	n	Code	Country	n
1	Indonesia	488	9	Japan	4
2	Malaysia	263	10	Bhutan	3
3	Bangladesh	92	11	Singapore	3
4	Pakistan	67	12	Sri Lanka	3
5	Thailand	31	13	Vietnam	2
6	Philippines	19	14	Brunei	1
7	India	12	15	Laos	1
8	China	10	16	Nepal	1

Figure 1.
Participating countries and number of respondents (n) per country

registered two responses, while Brunei, Laos and Nepal registered one response each. It is very encouraging to see responses from as many as 16 Asian countries, considering the fact that this study was conducted under extraordinary circumstances during the COVID-19 pandemic. The 1,000 responses received had indeed exceeded the expectations of the research team.

The sample has an average age of 42 years and is rather balanced in terms of gender, i.e. 54% female, 45% male, 0.1% other, 1% prefer not to say. Half of the respondents listed post-graduation as the highest educational level, followed by 40% with tertiary education and 10% with secondary school or lower. Regarding their primary position at the university, almost three-quarters of the respondents are students, followed by 15% of Lecturers/Professors, 5% of administrative staff and 5% of researchers. Other indicated positions are staff workers at the institution.

To determine the HEIs' commitment towards the sustainable use of resources as sustainable organisations, as places of knowledge multipliers for SD, and as places for research and think tanks for a sustainable society, one-sample student's *t*-test was used. A mean score of "3.5" ($\mu_0 = 3.5$) was set as the minimum score indicator of commitment, knowledge multiplier and as think tank. In addition to the analysis of the overall data set, the data from the individual countries, with 30 or more responses, was also analysed, aiming to trace country-based differences in the responses.

4. Results

The results of both the bibliometric analysis and survey are presented in this section of the paper and are subsequently discussed in Section 5.

4.1 Bibliometric analysis

The term co-occurrence analysis shows that, in addition to the search terms (e.g. sustainability, universities and education), other terms, such as China, behaviour, climate change, performance, management, knowledge, model, systems, perceptions, innovation, policy, challenges, environmental sustainability, technology and GHG emissions have occurred more frequently. In addition to the dominance of China in this area (Niu *et al.*, 2010; Yuan and Zuo, 2013; Wang *et al.*, 2020), this indicates that sustainability practices at HEIs in Asia have a special focus on issues related to climate change (Perkins *et al.*, 2018; Scholz *et al.*, 2021), perception and behaviour (Janmaimool and Khajohnmanee, 2019; Yu *et al.*, 2017; Sivapalan, 2016; Sivapalan, 2017; Ariffin and Ng, 2020; Kanapathy *et al.*, 2019), knowledge management and knowledge economy (Parveen *et al.*, 2021; Sutrisno and Pillay, 2015), technologies and innovation (Lee, 2012; Uwasu *et al.*, 2009; Yoon *et al.*, 2016) and challenges and barriers to ESD (Mian *et al.*, 2020; Sekhar, 2020).

As for thematic clusters, three major clusters can be identified. The red cluster at the bottom of Figure 2 shows that there has been a major emphasis on issues related to the efficient management of water and energy resources and on developing innovative scientific solutions that can contribute to climate change mitigation efforts (Ishak *et al.*, 2016; Kuehr, 2007). This includes focussing on issues, such as knowledge creation, mainstreaming sustainable resource consumption at universities (Anwar *et al.*, 2020; Ishak *et al.*, 2016), promoting collaboration for fostering innovative research (Cai *et al.*, 2019; Yao and Steemers, 2009), measuring and tracking performance using models and indicator frameworks (Ding *et al.*, 2019; Jauhar *et al.*, 2018) and investment in campus sustainability programmes, discussed under the green cluster.

Closely linked with the previous cluster, the right side of the green cluster shows that special attention has been paid to environmental sustainability initiatives such as campus sustainability programmes (Anthony Jnr, 2020; Tan *et al.*, 2014; Yusoff *et al.*, 2021; Tiyarattanachai and Hollmann,

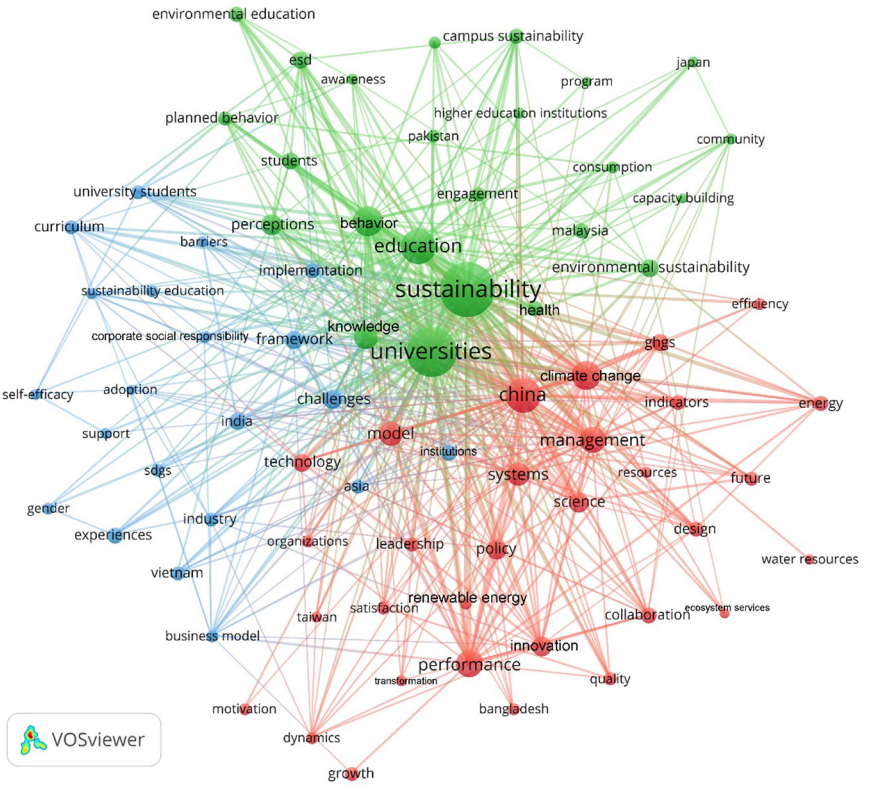


Figure 2.
Bibliometric clusters for co-occurrence term

2016; Ikegami and Neuts, 2020). Such campus sustainability and living lab initiatives can also provide societal benefits and promote sustainability by engaging different community stakeholders and enhancing community knowledge and awareness (Tiyarattanachai and Hollmann, 2016; Zhu *et al.*, 2020). Terms on the left side of the cluster indicate that behaviour change and awareness-raising benefits of sustainability and environmental education (EE) are also widely recognised. In fact, it is likely that the enhanced environmental awareness will lead to pro-environmental behaviour (Janmaimool and Khajohnmanee, 2019; Yu *et al.*, 2017).

Finally, the blue cluster, which includes less frequently occurring terms, is mainly focussed on challenges and barriers to the adoption and implementation of ESD programmes. One noteworthy challenge is a paradigm shift towards a multi- and trans-disciplinary curriculum that is aligned with the sustainability agenda and requires a balanced coverage of different issues (Down, 2006; Qu *et al.*, 2020). Other potential barriers could be budget limitations for curriculum reform and teacher training, lack of previous experiences and limited real world examples, limited mechanisms for experience sharing and also students' preference for traditional disciplinary courses (Aleixo *et al.*, 2018; Down, 2006; Rampasso *et al.*, 2019; Weiss and Barth, 2019). Finally, evidence shows that Asian universities are not appropriately oriented towards corporate social sustainability principles, and this may have negative effects on efforts aimed at integrating sustainability education into university programmes (Rehman *et al.*, 2019).

4.2 Survey

In addition to the bibliometric analysis, an empirical survey with the stakeholders from universities in Asia was carried out. The survey's goal was to gather stakeholder perspectives on Asian HEIs' commitment to sustainability, their role as knowledge multipliers for SD, their role in advocating research and development and critically thinking about sustainability, and the various challenges that Asian HEIs face. The survey data was analysed in accordance with the study parameters described in the introductory section of the results, and later, in the discussion. The survey analysis was conducted to determine the following:

- Sustainability Initiatives in Asian HEIs.
- Commitment towards a sustainable use of resources.
- Commitment towards a sustainable organisation.
- HEIs as knowledge multipliers for SD.
- HEIs as places for research and as think tanks for a sustainable society.
- Perceived challenges to the efforts of implementing sustainability-related initiatives in HEIs.
- Perceived drivers for the implementation of sustainability-related initiatives at HEIs.

The results of the survey analysis are presented below and discussed in the following section, at the light of the relevant literature on the subject.

4.2.1 Sustainability initiatives in Asian higher education institutions. The data analysis (Table 3 and Figure 3) indicate that the study respondents strongly perceive that HEIs in Asia have implemented sustainability initiatives with reference to having a SD policy, a sustainability office, sustainable campus programme, and to publishing about sustainability, supporting SDGs, advancing sustainability and participating in sustainability rankings.

Although the overall responses (86.32%) suggest that HEIs in Asia have taken on sustainability initiatives, responses from Bangladesh and Pakistan do not suggest the same. The country-specific data indicate that only 56.79% of respondents from Bangladesh and 54% of respondents from Pakistan perceive that their universities have taken on initiatives for sustainability. Moreover, only 36% of respondents from Bangladesh and 45% from Pakistan maintained that their HEIs publish sustainability reports.

4.2.2 Commitment towards a sustainable use of resources. The data analysis in Table 4 indicates that the perceived commitment of Asian HEIs towards a sustainable use of resources is less than the expectations. However, the country-specific analysis in the same Table 4 indicates that HEIs in Indonesia, Malaysia and Thailand are perceived as being committed towards the sustainable use of resources. The situation is different in Bangladesh and Pakistan, where HEIs are not perceived as committed towards the sustainable use of resources.

Table 3. Sustainability initiatives at Asian HEIs (%)

Item	Yes	No
My university has a SD policy	89.7	10.3
My university has a green/sustainability office	80.9	19.1
My university has a campus greening/sustainable campus programme	89.6	10.4
My university has sustainability/EE programmes	87.1	12.9
My university periodically publishes sustainability reports	76.5	23.5
My university supports the SDGs	94.0	6.0
My university has taken measures to pursue sustainability in procurement	86.4	13.6
My university participates in Green/Sustainability rankings	86.4	13.6
Overall	86.32	13.68

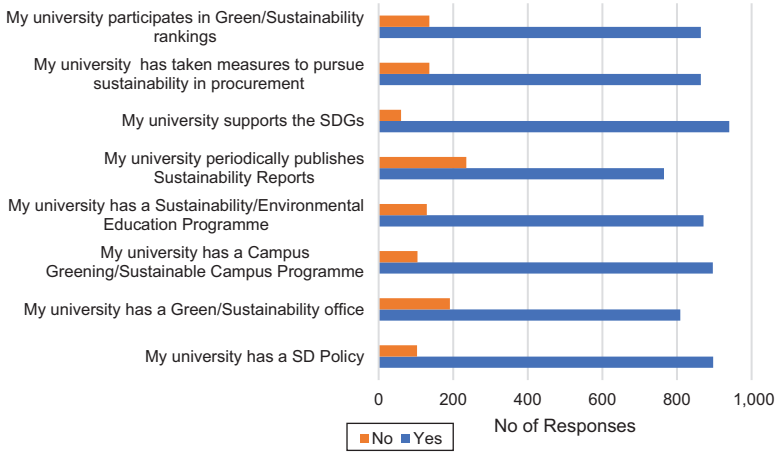


Figure 3. Sustainability initiatives in Asian HEIs

Country		Mean score, *t*-test value and interpretation
Asian countries	Mean score	$\mu_1 = 3.39$
	t-test value	$t\ (999) = 3.168$
	Interpretation	Perceived commitment of HEIs towards sustainable use of resources is LESS than the expectations
Bangladesh	Mean score	$\mu_1 = 2.15$
	t-test value	$t\ (91) = 12.966$
	Interpretation	Perceived commitment of HEIs towards sustainable use of resources is LESS than the expectations
Indonesia	Mean score	$\mu_1 = 3.64$
	t-test value	$t\ (487) = 3.056$
	Interpretation	Perceived commitment of HEIs towards sustainable use of resources is HIGHER than the expectations
Malaysia	Mean score	$\mu_1 = 3.47$
	t-test value	$t\ (262) = 0.462$
	Interpretation	Perceived commitment of HEIs towards sustainable use of resources is HIGHER than the expectations
Pakistan	Mean score	$\mu_1 = 2.6$
	t-test value	$t\ (66) = 6.02$
	Interpretation	Perceived commitment of HEIs towards sustainable use of resources is LESS than the expectations
Thailand	Mean score	$\mu_1 = 4.18$
	t-test value	$t\ (30) = 5.2$
	Interpretation	Perceived commitment of HEIs towards sustainable use of resources is HIGHER than the expectations

Table 4. Commitment towards sustainable use of resources in HEIs

4.2.3 Commitment towards a sustainable organisation. The data analysis in Table 5 indicates that the perceived commitment of Asian HEIs towards a sustainable organisation is above the expectations. However, the country-based analysis in the same Table 5 indicates that HEIs in Pakistan are not perceived as being committed towards a sustainable organisation.

4.2.4 Higher education institutions as knowledge multipliers for sustainable development. The data analysis in Table 6 indicates that HEIs in Asia are perceived as knowledge

Country		Mean score, *t*-test value and interpretation
Asian countries	Mean score	$\mu_1 = 3.996$
	t-test value	$t\ (999) = 18.04$
	Interpretation	Perceived commitment of HEIs towards a sustainable organisation is ABOVE the expectations
Bangladesh	Mean score	$\mu_1 = 3.32$
	t-test value	$t\ (91) = 1.85$
	Interpretation	Perceived commitment of HEIs towards a sustainable organisation is UP to the expectations
Indonesia	Mean score	$\mu_1 = 4.21$
	t-test value	$t\ (487) = 21.58$
	Interpretation	Perceived commitment of HEIs towards a sustainable organisation is ABOVE the expectations
Malaysia	Mean score	$\mu_1 = 3.996$
	t-test value	$t\ (262) = 9.24$
	Interpretation	Perceived commitment of HEIs towards a sustainable organisation is ABOVE the expectations
Pakistan	Mean score	$\mu_1 = 3.243$
	t-test value	$t\ (66) = 2.12$
	Interpretation	Perceived commitment of HEIs towards a sustainable organisation is NOT UP to the expectations
Thailand	Mean score	$\mu_1 = 4.37$
	t-test value	$t\ (30) = 8.78$
	Interpretation	Perceived commitment of HEIs towards a sustainable organisation is ABOVE the expectations

Table 5.
Perceived commitment of HEIs towards a sustainable organisation

Country		Mean score, *t*-test value and interpretation
Asian countries	Mean score	$\mu_1 = 3.75$
	t-test value	$t\ (999) = 8.77$
	Interpretation	HEIs are HIGHLY perceived as knowledge multipliers for SD
Bangladesh	Mean score	$\mu_1 = 3.07$
	t-test value	$t\ (91) = 4.14$
	Interpretation	HEIs are NOT knowledge multipliers for SD
Indonesia	Mean score	$\mu_1 = 3.92$
	t-test value	$t\ (487) = 11.36$
	Interpretation	HEIs are HIGHLY perceived as knowledge multipliers for SD
Malaysia	Mean score	$\mu_1 = 3.797$
	t-test value	$t\ (262) = 5.78$
	Interpretation	HEIs are HIGHLY perceived as knowledge multipliers for SD
Pakistan	Mean score	$\mu_1 = 3.02$
	t-test value	$t\ (66) = 3.81$
	Interpretation	HEIs are NOT knowledge multipliers for SD
Thailand	Mean score	$\mu_1 = 4.42$
	t-test value	$t\ (30) = 8.42$
	Interpretation	HEIs are HIGHLY perceived as knowledge multipliers for SD

Table 6.
HEIs as knowledge multipliers for SD

multipliers for SD. However, country-specific analysis in Table 6 indicates that HEIs in Bangladesh and Pakistan are not perceived as knowledge multipliers for SD.

4.2.5 Higher education institutions as places for research and as think tanks for a sustainable society. The data analysis in Table 7 indicates that HEIs in Asia are perceived as places for research and as think tanks for a sustainable society. The country-specific analysis

Country		Mean score, *t*-test value and interpretation
Asian countries	Mean score	$\mu_1 = 3.86$
	t-test value	$t\,(999) = 11.76$
	Interpretation	HEIs are HIGHLY perceived as places for research and think tanks for a sustainable society
Bangladesh	Mean score	$\mu_1 = 3.07$
	t-test value	$t\,(91) = 4.046$
	Interpretation	HEIs are NOT perceived as places for research and think tanks for a sustainable society
Indonesia	Mean score	$\mu_1 = 4.13$
	t-test value	$t\,(487) = 17.25$
	Interpretation	HEIs are HIGHLY perceived as places for research and think tanks for a sustainable society
Malaysia	Mean score	$\mu_1 = 3.84$
	t-test value	$t\,(262) = 6.37$
	Interpretation	HEIs are HIGHLY perceived as places for research and think tanks for a sustainable society
Pakistan	Mean score	$\mu_1 = 2.887$
	t-test value	$t\,(66) = 4.45$
	Interpretation	HEIs are NOT perceived as places for research and think tanks for a sustainable society
Thailand	Mean score	$\mu_1 = 4.53$
	t-test value	$t\,(30) = 9.56$
	Interpretation	HEIs are HIGHLY perceived as places for research and think tanks for a sustainable society

Table 7.
HEIs as places for research and as think tanks for a sustainable society

in Table 7 indicates that respondents from Bangladesh and Pakistan do not perceive their universities as places for research and as think tanks for a sustainable society.

4.2.6 Perceived challenges to the efforts of implementing sustainability-related initiatives in higher education institutions. The data analysis (Figure 4) indicates that the lack of funding is perceived as a major challenge to implementing sustainability-related initiatives in Asian universities. The second most common challenge identified by the respondents is the lack of interest from students, followed by the lack of resources. Lack of support from the administration appeared to be the least identified challenge.

The country-based analysis (Figure 5) indicates that 7 of the 8 mentioned challenges received maximum responses from Bangladesh, indicating that the implementation of SD at

Figure 4.
Challenges for implementing sustainability in HEIs in Asia

HEIs in Bangladesh is very challenging. It is also interesting to note that a relatively small percentage of respondents from Thailand highlighted different challenges.

4.2.7 Perceived drivers for the implementation of sustainability-related initiatives at higher education institutions. Figure 6 indicates that the most important driver for implementing sustainability initiatives in Asian universities is the increased attractiveness to students, followed by sustainability culture among stakeholders and the possibilities to reduce costs. Favourable legislation was the least identified driver in the complete data set. However, it turned out to be the second most important perceived driver among Pakistani respondents (Figure 7). The respondents from Bangladesh (Figure 7) named "benefits to the organisation" as the most important driver, followed by "cost-cutting opportunities". The respondents from Indonesia (Figure 7) perceived "sustainability culture among stakeholders" as the major driver for implementing sustainability in their universities.

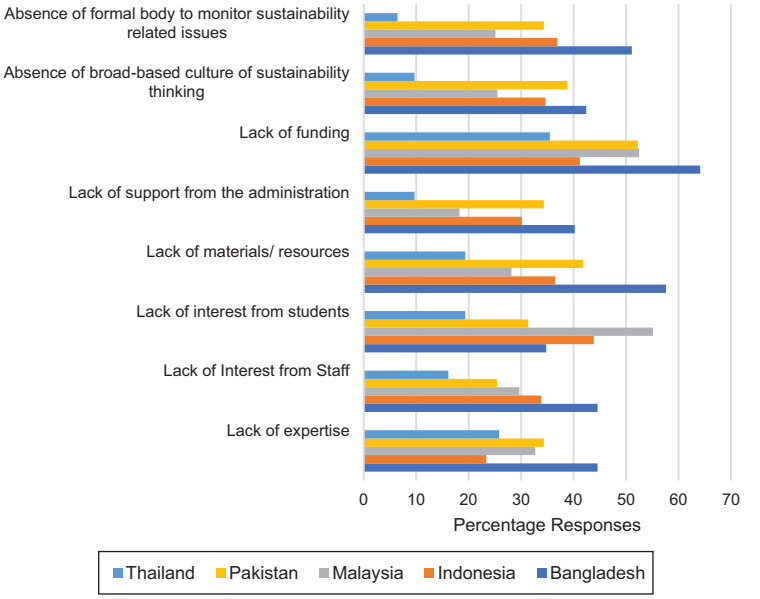


Figure 5.
Challenges for implementing sustainability in HEIs in Bangladesh, Indonesia, Malaysia, Pakistan and Thailand

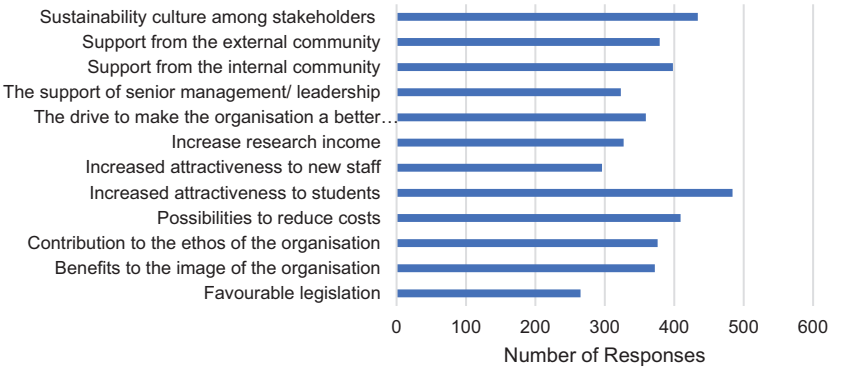


Figure 6.
Drivers for implementing sustainability in HEIs in Asia

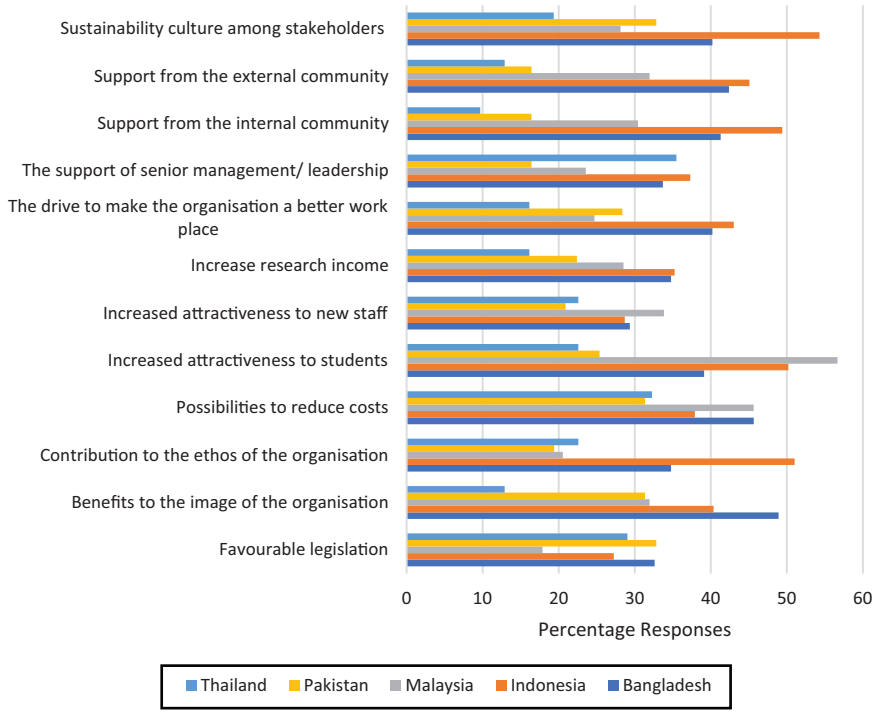


Figure 7. Drivers for implementing sustainability in HEIs in Bangladesh, Indonesia, Malaysia, Pakistan and Thailand

5. Discussion

The results of the bibliometric analysis showed that sustainability at HEIs in Asia are dominated by issues related to climate change and efficient management of resources for climate adaptation and mitigation (Perkins *et al.*, 2018; Scholz *et al.*, 2021; Ishak *et al.*, 2016; Kuehr, 2007). This indicates that universities in the region have made good contributions to training experts and policymakers that can lead efforts towards developing and implementing climate action plans. In terms of multiple sustainability dimensions, it was found that more attention has been paid to the environmental dimension and social, economic and institutional dimensions have received relatively less attention. While environmentally-focussed programmes, such as green campus initiatives and living labs (Anthony Jnr, 2020; Tan *et al.*, 2014; Yusoff *et al.*, 2021; Tiyarattanachai and Hollmann, 2016; Ikegami and Neuts, 2020) are important for achieving sustainability (Tiyarattanachai and Hollmann, 2016; Zhu *et al.*, 2020), the other dimensions are also important and deserve more attention. In fact, simultaneous consideration of socio-economic and institutional dimensions is critical for maximising the benefits of environmentally-focussed programmes and to ensure that they could be scaled up. The bibliometric analysis also highlighted major barriers towards integrating sustainability paradigms into HEIs in Asia. Noteworthy barriers are the dominance of disciplinary programmes, lack of budget for curriculum reform and students' preference for traditional disciplinary courses (Aleixo *et al.*, 2018; Down, 2006; Rampasso *et al.*, 2019; Weiss and Barth, 2019). While paradigm shifts at the level of university level are essential for addressing such barriers, it is clear that universities

alone would not be capable of addressing all issues involved in SD. Institutional support and market reforms are also needed and should be prioritised.

The results of the survey indicate that there is considerable variation among the Asian countries regarding sustainability practices in HEIs. The HEIs in far eastern countries, such as Indonesia, Malaysia and Thailand are perceived to demonstrate more sustainability practices. The mean scores of the responses from these countries were higher than the expectations, i.e. a mean score of 3.5. This indicates that HEIs in these countries have a commitment towards a sustainable use of resources and a commitment towards a sustainable organisation, act as knowledge multipliers for SD and serve as places for research and as think tanks for a sustainable society. These findings augur well with the notion of HEIs as catalysts for the advancement of SD and ESD, and they support previous research conducted in Malaysia, Indonesia and Thailand (Tangwanichagapong *et al.*, 2017; Tiyarattanachai and Hollmann, 2016). On the contrary, the mean scores of responses from Pakistan were lower than the expectations in the above-mentioned aspects. Similarly, the mean scores are lower in three out of four aspects in Bangladesh.

The high mean scores in Indonesia and Malaysia, in particular, may be explained in light of existing literature by Nomura (2009) and Shaikh *et al.* (2017). Focus on EE in Indonesian education dates back to 1996 when an EE network was established in Indonesia. In 1998, 45 organisations made a strategy and action plan to promote EE in Indonesia. As of 2009, there were 200 organisations working for EE (Nomura, 2009). A strong focus on EE in Indonesia might have influenced the higher education sector to take initiatives towards sustainability, especially when participating in the UN's Decade of ESD, which meant that the entire HEIs' curricula would be adapted to contemplate EE with a focus on the needs of society, environment, economy and culture (Parker, 2017).

In Malaysia, sustainability-related initiatives can be witnessed at the governmental level as well as within the higher education sector. Foo (2013) highlighted that Malaysian universities (e.g. USM, Universiti Putra Malaysia, Universiti Malaysia Pahang, Monash University, Malaysia) are committed towards sustainability. The same author states that USM has mechanisms to protect multiple ecosystems and conserve resources. In addition, the universities are committed to including sustainability elements in their courses, and there is an increase in university publications regarding sustainability and climate change (Foo, 2013). The findings from the current study also confirm that HEIs in Malaysia are committed to sustainability practices, mainly by making issues about sustainability more attractive to their students. This is further supported by previous studies conducted in both public and private HEIs in Malaysia (Sivapalan, 2016, 2017; Kanapathy *et al.*, 2019; Yusoff *et al.*, 2021).

Thailand has a national roadmap on sustainable consumption and production and has implemented green product procurement through governmental organisations and universities. In addition, compulsory EE in schools is a part of the 20-year National Strategy of Thailand (Mungkung *et al.*, 2021). It is also important to note that this implementation process could be faster if the region had greater financial support, as the lack of it was mentioned as one of the biggest challenges. National-level policies related to green consumption and production and education could be the reasons for sustainability practices at HEIs in Thailand, as shown in the current study.

Contrary to Indonesia, Malaysia and Thailand, sustainability education or EE have not been emphasised at the policy level in Pakistan (Kalsoom *et al.*, 2017). As a result, there is little evidence of sustainability practices with reference to sustainability-focussed curricula, research, stakeholder's engagement and governance (Habib *et al.*, 2021). The results of the current study are in line with the findings of Habib *et al.* (2021) and Zahid *et al.* (2020). It is also important to note that although there are fragmented efforts regarding the

incorporation of sustainability-focussed pedagogical interventions in HEIs in Pakistan (Kalsoom and Qureshi, 2021; Nousheen *et al.*, 2020; Kalsoom and Khanam, 2017), the findings from the current study indicate that these interventions are scarce and not enough to shape the HEIs as places for research and as think tanks for a sustainable society. One of the practices used is the adaptation of curricula with the aim of making students more participatory, the same measure that is being taken in other countries, as previously mentioned in the case of Indonesia. Recent studies indicate that private universities in the country are more likely to offer education focussed on sustainability due to the financial support they receive, the infrastructure, the ability to make decisions in a shorter period, and the ease of promoting changes, reforms or restructuring, unlike public universities that depend only on the support of public policies (Zahid *et al.*, 2020).

This study's findings further support earlier research in the context of Bangladesh (Hoque *et al.*, 2017). The researchers found that environmental sustainability practices were very limited in institutions of Bangladesh. Green practices are used by a small fraction of universities to enhance sustainability. The present study's findings also reveal a lack of sustainability strategies in Bangladesh's HEIs. The study's findings, thus indicate that the respondents from Bangladesh identified maximum challenges regarding the implementation of SD initiatives in HEIs. This explains the reasons for the lower mean score values of Bangladesh in the different aspects of sustainability (Tables 4–7). As a result, a new national higher education policy framework is urgently needed, one that is backed up by cross-ministerial collaboration on SDGs and ESD. Given the importance of the SDGs' and ESD's aims, a redesigned national higher education policy framework should address topics like sustainability issues, the role of innovation and the policy framework for the green revolution as soon as possible (Alam *et al.*, 2021).

This study, which focusses on sustainability practices in Asian HEIs, provides a number of lessons for higher education advancement for SD in the global and Asian contexts.

Firstly, the empirical evidence shows a substantial degree of involvement by Asian universities in this fundamentally important area of scholarship. This evidence goes further to suggest the increasing need for Asian perspectives and voices to be heard and recognised in international dialogues and platforms on ESD within the global higher education landscape. The results of this study also suggest that there are varying degrees of acceptance and advancement of sustainability practices within the Asian higher education system.

6. Conclusions

This study represents an attempt to foster a better understanding of how sustainability issues are perceived and considered by HEIs in Asia. This research has allowed us to identify the fact that various degrees of emphasis are attached to sustainability, with quite high levels of responses about the degree to which universities are active in this area.

Regarding the perceived commitment towards SD, the country-based analysis involving Bangladesh, Indonesia, Malaysia, Pakistan and Thailand shows that countries, such as Indonesia, Malaysia and Thailand are very active in this respect, whereas in Bangladesh and Pakistan the HEIs do not seem to have shown substantial engagement in this area. Such a negative trend is also seen in regard to how HEIs in Bangladesh and Pakistan perceive their roles as knowledge multipliers on SD. In all of the countries, a lack of funding seems to be a common problem that should be addressed.

The research has some limitations. One of them is the fact that it did not cover all Asian countries, even though it collected a significant number of responses from participants. A further limitation of the study is that there is a variation in the number of respondents between countries, possibly due to a wider promotion of the study in specific areas of knowledge. Also,

the online survey was carried out over a specific period of time, and it is possible that some universities that are active in the field did not receive information about the study.

The originality of this study resides on the comprehensive instrument developed to assess the SD engagement observed in Asian HEIs currently, particularly relevant when considering this specific region with a scarcity of studies on the subject. To the best of the authors' knowledge, the information on the commitment of HEIs towards sustainable use of resources, a sustainable organisation and whether HEIs see themselves as knowledge multipliers for SD are issues not tackled in previous studies in an integrated way. Additionally, the study did not only identify the problems and barriers to sustainability among HEIs in Asia but also the drivers.

The implications of this paper are threefold. Firstly, it provides a comprehensive overview of how SD is seen and perceived among HEIs in Asia. Secondly, it illustrates the diversity of initiatives that are currently undertaken by universities in the region. Moreover, the study shows some of the constraints universities experience when pursuing SD-related initiatives.

Despite these constraints, the study succeeded in collecting information from 1,000 respondents from 16 Asian countries, a very significant and representative rate of responses. The research, therefore, provides a welcome addition to the literature, as it documents and promotes experiences on SD in Asian HEIs, identifying the differences seen between the addressed countries. It is suggested that further research in the region be advanced with specific cases, which may analyse specific-related aspects, such as curriculum innovation and campus greening.

In terms of implications for policy and practice, the study has identified some areas which need attention. For instance, while acknowledged that individual institutions should have their own strategic priorities and trajectories, sustainability should be a fundamental thought process and core component of all decision-making processes, institutional policies and practices. Although the findings of this research show that certain countries within the region have a slight advantage over others in terms of executing and advancing sustainability practices within its higher education system, ongoing work within countries that are not as well organised must not be dismissed.

In terms of recommendations, one key component is that partnerships for sustainability education and capacity building in the region should be intensified. Also, as advocated by Shiel *et al.* (2016), efforts are recommended to facilitate more inclusive participation of HEIs in sustainability efforts in Asia. In addition, cross-country activities aimed at enhancing resource access, professional development and knowledge sharing are also highly recommended. As a result of this research, it can be seen that Asian universities already play an important role in advancing SD and the Agenda 2030 goals. To enhance the impact of these initiatives, concerted and sustainably coordinated efforts among key stakeholders are required at all levels.

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