Development of Sustainable Development Goals Disclosure Index for Higher Education Institutions

Yussri Sawani[1], Corina Joseph[2*], and Siow Hoo Leong[3]

[1, 2] *Faculty of Accountancy, Universiti Teknologi MARA Cawangan Sarawak, Malaysia*
[3] *College of Computing, Informatics and Mathematics, Universiti Teknologi MARA Cawangan Sarawak, Malaysia*

[1]*yussrii@uitm.edu.my;* [2]*corina@uitm.edu.my;* [3]*leongsh@uitm.edu.my*

*Corresponding Author

ABSTRACT

The objective of this paper is to develop a sustainable development goals disclosure index for higher education institutions (HSDI). The paper covers an inclusive evaluation of international and national guidelines and literature relating to disclosures about sustainable development goals information. Content analysis is employed to extract and classify the SDG-related indicators from these sources. A scoring method is proposed to measure the HSDI based on the indicators. The final four categories of each SDG, with a total of 187 indicators that are up for assessment, have been developed into an instrument. The proposed HSDI is to measure the commitment undertaken by Malaysian higher education institutions in realising the SDG agenda. It is the first version of such index designed for use by institutions of higher education. This paper addresses the concerns that are relevant to the best practices that higher education institutions might implement to achieve the SDGs. Higher *education institutions in other countries might follow this concept and implement it in their programs.*

INTRODUCTION

Over the last few decades, sustainable development (SD) has become a universal political and social interest. In 2015, the notion of sustainable development evolved and began to match with the United Nations' 17 Sustainable Development Goals (SDGs). At this stage, the United Nations (UN)'s 193 member countries agreed on an inclusive agenda of 17 Sustainable Development Goals (SDGs), often known as the "2030 Sustainable Development Goal Agenda", which are explicitly committed to future generations to raising their standard of living sustainably. These 17 goals include various topics, from climate change and poverty to health and well-being and quality education (Nikolaou & Tsagarakis, 2021; Blasco et al., 2021).

The 2030 SDGs Plan boosts Malaysia's sustainable development agenda as it strives towards high-nation status. Malaysia's SDGs were mapped into its national development plan. The RMK 11 and 12 Malaysia Development Plans feature SDG ideas. The RMK 12 addressed the SDGs through economic empowerment, environmental sustainability, and social reengineering (EPU, 2021). This three-dimensional approach will solidify the implementation of Shared Prosperity Vision 2030 (SPV 2030).

The Malaysian government established a National SDG Council in 2016 to institutionalise its 2030 SDGs commitment. The Economic Planning Unit (EPU) Director General chairs the National Steering Committee (NSC), which supports the council. The council plans and monitors SDG implementation in Malaysia and reports to the UN through the High-level Political Forum. The EPU of the Prime Minister Department coordinates Sustainable Development (SD) projects like the SDGs. Malaysia has enabled systematic and measurable implementation of the 17 SDGs. All specified activities include establishing a National SDG Roadmap to guide the 2030 SDGs Agenda and implementing the SDG initiative under RMK 11.

Higher education institutions (HEIs) champion education, research, and innovation contributing to society, the economy, and social reform (Blasco et al., 2021). Higher education institutions must centralise the SDG 2030 agenda in their value creation processes, comprehensively integrate SD elements into their systems, and lead the culture shift towards quasi reasoning (Caputo. et al., 2021). Such activities can improve sustainable development action and decision-making. Higher education institutions base teaching, research, and third-mission activities on their worldwide sustainable development (Ceulemans et al., 2015; Lozano et al., 2015). Higher education institutions contribute to the SDGs and promote them in their fields (Rosen, 2020; Vilalta et al., 2018). They can handle these concerns due to their leadership, education, research, and invention. Higher education institutions must address all SDGs holistically (Kestin et al., 2017). Higher education institutions implement active SDG development policies through their activities, raise awareness of their importance in achieving the SDGs, and teach other actors, especially young people, the skills and mindset to contribute to these challenges.

Higher education institutions must demonstrate SDG commitment. Current technology requires higher education institutions to declare their SGD activities on their websites for rapid and effective information delivery (UNSDN, 2021). As a result, SDG disclosure on the HEIs' websites is a valuable and effective tool for communicating higher education institutions' initiatives and long-term progress to national and international communities, improving accountability, transparency, and performance. Coercive pressure from websites can be used to communicate SDG information to stakeholders (Midin et al., 2017). To promote HEIs' sustainable development approach, engage stakeholders. Stakeholder participation through disclosure can improve higher education institutions' sustainable development decisions (Joseph et al., 2021a).

Despite the website's effectiveness and cost as a tool for information dissemination, reporting sustainability practices were infrequent and unsystematic (Son-Turan & Lambrechts, 2019) due to HEIs' divergent sustainability indicators. This reporting discrepancy must be resolved to make HEI sustainability disclosure comparisons more meaningful. Over time, SDG reporting quality has improved, although quantitative and forecast information is scarce (Hummel & Szekely, 2022). Son-Turan and Lambrechts (2019) advocate integrating sustainability into teaching and

curriculum through university policies and regulations to support future SDG activities.

Interest in the SDGs has grown as universities incorporate them into their sustainability strategies. Higher education institutions can meet stakeholders' growing accountability expectations by disclosing their impact on economic, environmental, and societal issues, improving accountability, transparency, and performance (De Iorio et al., 2022). Limited data exist on how academic institutions translate global goals into specific objectives, strategies, and activities, limiting the number of institutions involved and the value of the provided information (Nicolò et al., 2021). Nicolò et al. (2021) highlight the difficulty of evaluating higher education institutions' complicated results due to the absence of statutory reporting requirements or specified norms, particularly for public sector enterprises with high intangibles.

Malaysia has no dashboard or one-stop centre to monitor SDG projects. The Department of Statistics Malaysia's SDG indicator at http://mysdg.dosm.gov.my/indicator shows data availability in a relevant department but not SDG indicator data. Some indications were incomplete and needed improvement. For instance, SDG 4.7.1 requires mainstreaming global citizenship education and education for sustainable development in national education policies, curricula, teacher education, and student evaluation. Thus, HEIs need SDG disclosure guidelines or indices to close the gap between SDG expectations and practices. The index might also measure HEIs' SDG disclosure and set a good practice.

The SDG Disclosure Index can influence education policy and inspire HEIs to incorporate sustainability into their curricula and research, supporting a more sustainable Malaysia. This study may set standards for HEIs and help the government improve SDGs' strategic objectives in development plans.

LITERATURE REVIEW

Sustainable Development Goal Reporting

Sustainable development goal reporting refers to organisations disclosing their contributions to the United Nations' SDGs in their sustainability reports. The current trend in SDG reporting is characterised by the increasing adoption of SDG reporting practices by organisations worldwide. Organisational factors such as size, economic performance, intangibility, sustainability commitment, external assurance, and corporate governance attributes have influenced the adoption of SDG reporting (Rosati & Faria, 2019). The UN Global Compact and the Global Reporting Initiative (GRI) recognise the enabling role of SDGs in promoting sustainable consciousness and corporate actions (Izzo et al., 2020). Additionally, there is a growing emphasis on integrating SDGs into reporting frameworks and the need for clear definitions and requirements for SDGs and key performance indicators. The trend also involves evaluating global SDG interactions and assessing progress towards achieving the SDGs (Kroll et al., 2019). However, there are concerns about the superficial engagement with the SDGs by many organisations, leading to a process of "SDG-washing" (Heras-Saizarbitoria et al., 2021). Overall, the current trend in SDG reporting reflects the increasing recognition of the importance of sustainable development and the need for organisations to align their strategies and actions with the SDGs.

Sustainable development goal reporting in Higher Education Institutions (HEIs) has recently gained significant attention. HEIs have recognised their role in sustainable development and have started integrating the SDGs into their programs and projects. Adopting SDG reporting allows HEIs to align their activities with the global sustainability agenda and demonstrate their commitment to addressing societal challenges (Useh, 2021). However, the implementation of SDG reporting in HEIs is still in its early stages, with limited quantity and quality of sustainability reporting (De La Poza et al., 2021). There is a need for well-defined reporting structures and topics to effectively map and evaluate HEI performance concerning the SDGs (Monteiro et al., 2023).

Overall, the current trend in SDG reporting in HEIs highlights the increasing recognition of the importance of sustainability and the need for HEIs to align their activities with the SDGs. However, there is still a long way to go regarding comprehensive and transparent reporting that effectively captures HEIs' contributions to sustainable development (De La Poza et al., 2021). HEIs must develop clear reporting frameworks, integrate sustainability into their curricula, and engage in meaningful partnerships to achieve the SDGs (Albareda-Tiana et al., 2018).

Sustainable Development Goal Reporting Standards

Organisations must follow sustainable development goal reporting criteria. Organisations can link their activities with global sustainability goals using the SDGs (Griggs et al., 2013). Organisations can show their commitment to social issues and the SDGs by reporting on them (Rosati & Lourenço, 2019). However, a minority of corporations include the SDGs in their reports, emphasising the need for more apparent incentives and rules to stimulate SDG investment (Rosati & Faria, 2019). Larger, publicly traded, and sustainable industries are likelier to report on the SDGs (Elalfy et al., 2021). Integrating the SDGs into disclosure can improve business sustainability and advance sustainable development (Izzo et al., 2020).

The Global Reporting Initiative (GRI) Standards are used to report on sustainable performance and incorporate the SDGs (Legaspi, 2023). Global organisations, including publicly listed financial institutions, use GRI Standards (Legaspi, 2023). The SDSN SDG Impact Assessment Tool, designed by the Sustainable Development Solutions Network (SDSN), is another popular reporting format (Lu-Gonzales et al., 2023). Several organisations also use the G4 Guidelines or GRI Standards Reporting Framework to include SDGs in the sustainability reporting (Heras-Saizarbitoria et al., 2022). These standards and procedures ensure complete and honest reporting on organisations' SDG progress.

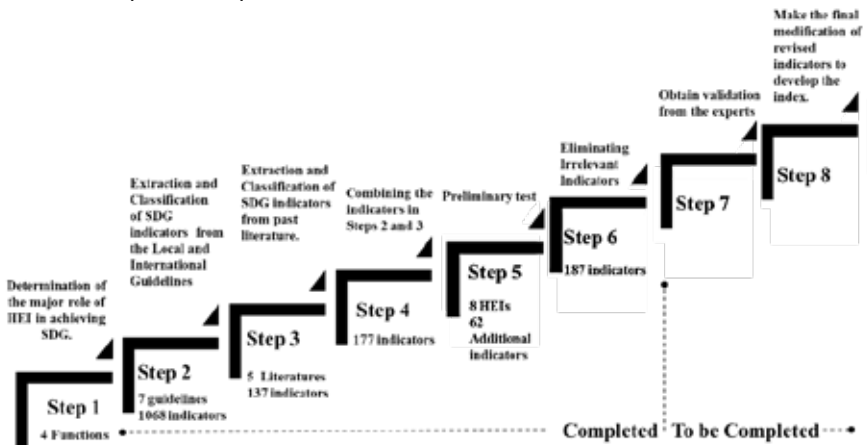The current SDG reporting requirements stress thorough, transparent reporting that effectively captures organisations' sustainable development efforts. The GRI provides a well-established framework for sustainability reporting, including SDG requirements (Dilling, 2010). The SDGs are still not fully aligned with reported performance, and reporting organisations contribute little to them (Avrampou et al., 2019).

Organisations should develop strategies that address multiple SDGs and consider their impact (Avrampou et al., 2019). Sustainable development goal reporting standards help organisations align their activities with the global sustainability agenda. SDG reporting is progressing, but organisations need more incentives, norms, and reporting mechanisms to invest in the SDGs. SDG reporting is more probable at larger HEIs with stronger sustainability implications. Integrating the SDGs into disclosure practices can assist HEIs in managing sustainability and achieving the SDGs.

METHODOLOGY

The HEI SDGs Disclosure Index (HSDI) was developed to measure the level of SDG disclosure for HEIs. Based on previous studies as the main references (Joseph et al., 2022; Joseph et al., 2021a; Joseph. et al., 2021b; Puertas & Bermúdez, 2020), this study employs several steps in the development of the index as illustrated in Figure 1.

Figure 1
HSDI Development Steps

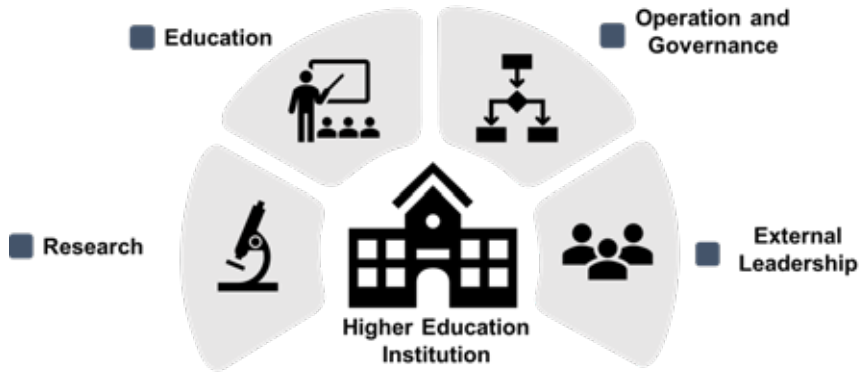The following are the steps taken in developing the HSDI.

Step 1: Determination of the major role of HEI in achieving SDG

This step identified the SDG disclosures that pertain specifically to HEIs. Although many institutions across sectors can commit to the SDGs, HEIs play a unique role due to their educational mission, research capabilities, campus operations, and long-term impact potential (Amoako, 2023; De Iorio et al., 2022). Higher education institutions can effectively contribute to sustainable development by integrating the SDGs into their main activities.

The four main functions of HEIs concerning the SDGs are Education for Sustainability (EfS), Research, Campus Greening, and Community Outreach (Liu et al., 2022). Similarly, in 2020, the Sustainable Development Solutions Network (SDSN) (UNSDN, 2021) published a report on the role of HEIs in achieving the 2030 Sustainable Development Goals (SDGs). The report emphasises that HEIs are crucial in addressing today's complex global challenges and achieving the SDGs. The report identifies several ways HEIs can contribute to the SDGs, including Teaching and Learning, Research and Innovation, Operations and Campus Management and Collaboration and Partnerships.

Higher education institutions are recognised as important players in achieving the SDGs (Caputo. et al., 2021; Elmassah et al., 2022) and are expected to contribute to their achievement through these four functions. HEIs are responsible for widening student education for citizenship ethics, tackling social and educational inequalities, disseminating research results, and providing academic and research expertise to meet economic, social, and cultural needs. Therefore, this study's HEI SDG Disclosure index was categorised into four main functions of HEI in Achieving SDG 2030. Figure 2 illustrates the four main functions: are Research, Education, Operation and Governance and External Leadership.

Figure 2
Functions of Higher Education Institution

Step 2: Extraction and Classification of SDG indicators from the Local and International Guidelines outlining indicators for the four main functions identified in Step 1

This step extracted and classified seven (7) guidelines that provide whole and partial SDG indicators. The SDG indicators were analysed based on the four main functions of HEIs from Step 1. Table 1 shows the basis of the analysis of the indicators. The assessments on the SDG indicators from the guidelines identified a total of 1068 indicators that are dominated by the SDSN 2021, followed by the Times Higher Education (THE) Impact ranking 2021.

Step 3: Extraction and Classification of SDG indicators from past literature

This step reviewed five (5) articles that developed whole and partial SDG indicators in the public and private sectors. This step identifies SDGs indicators to be included in the HSDI. The articles reviewed are Alawneh et al. (2019), Joseph et al. (2022), Joseph et al. (2021a), Nhemachena et al. (2018) and Susilowati et al. (2022). The procedure begins by reading and familiarising with the index developed in the literature to understand the content thoroughly. Next, the indexes' key concepts, themes, or ideas were codified, assigning categories to particular sections or passages based on their content. The data were subsequently analysed by investigating the

frequency and patterns of the identified themes or concepts. A total of 137 indicators were obtained in this analysis.

Table 1
Basis for indicator analysis

	SDG Guidelines	Indicator Analysis
1.	THE Global Impact Ranking	Direct assessment of each SDG 1-17 indicators
2.	SDSN 2021	Direct assessment of each SDG 1-17 indicators and grouped into Research, Education, Operation and Governance and External Leadership
3.	GRI Topic Standards 2023	Assessment of indicators in GRI 201-207, GRI 301-308, GRI401-418 and grouped into Research, Education, Operation and Governance and External Leadership
4.	GRI G4	Assessment on G4 Specific Standard Disclosure for economic (EC1-EC9), environmental (EN-1-EN34), Social – Labour Practices and Decent Work (LA1-LA16), Social-Human Rights (HR1-HR12), Social-Society (SO1-SO11), Social-Product Responsibility (PR1-PR9). Analysis based on the indicator related to SDGs and the role of HEI and grouped into. Research, Education, Operation and Governance and External Leadership
5.	UI Green Matrices	Assessment of SDG indicators that are mapped to the guidelines. Analysis based on the indicator that is related to HEI and grouped into, Research, Education, Operation and Governance and External Leadership
6.	Malaysian SDG indicators 2021	Assessment of SDG indicators that are reported by the Department of Statistics Malaysia (DOSM). Analysis based on the indicators that are related to HEI and grouped into, Research, Education, Operation and Governance and External Leadership
7	UNDP ESG & Sustainability Guidelines	Assessment of indicators and grouped into Research, Education, Operation and Governance and External Leadership

Step 4: Combining the indicators in Steps 2 and 3

Each extracted indicator within the same SDG is classified into one of the four main functions of HEIs. The indicators within the same HEI function of an SDG are then further regrouped and renamed to form the distinct disclosure indicators of the HSDI. A total of 177 indicators were established. The disclosure indicators obtained from this step are also

termed the proposed indicators of the HSDI, which was finalised in the later steps after the preliminary test.

Step 5: Preliminary test

The purpose of the preliminary test is to ensure the validity and reliability of the instrument and that the instrument measures what it is supposed to measure (Joseph et al., 2021a). The results from the preliminary test were useful in identifying the relevancy and importance of the indicators included in the final draft of HSDI.

The preliminary test of the initial draft of HSDI was conducted on eight HEI websites in March 2023 before the actual data collection from the websites of the entire HEIs took place. The HEIs selected for the preliminary test comprised four (4) Public HEIs and four (4) Private HEIs, as depicted in Table 2. These HEIs were chosen as samples for the preliminary test due to the assumption that these HEIs are more established and probably with better advantage in having more resources in implementing SDG initiatives, and eventually, more SDGs initiative is reported on their websites. They were deemed to exhibit the "best" SDG practices among HEIs in the Malaysian context. The selection of these HEIS minimises the elimination of rare indicators that may not be relevant for the HEIs within a Malaysian context. The in-depth content analysis is conducted by assessing SDG disclosures on HEI's website to capture the maximum content of disclosures (Unerman, 2000). This approach allows the study to go beyond simple quantity measures and delve into the disclosed information's quality, comprehensiveness, and depth (Jizi et al., 2013).

This step analysed selected HEIs' websites based on the 177 indicators developed in Step 4 by measuring the content score. The content score was conducted by assigning a dichotomous score of "1" for the indicator disclosure and "0" otherwise. This process also identified additional indicators available on the website to be included in the development of HSDI. Table 3 presents several techniques used in searching content on HEIs websites.

Table 2
List of HEIs for Preliminary Test

No	Name of HEI	Category	URL
1.	Universiti Teknologi MARA	Public University	https://uitm.edu.my/index.php/en/
2.	Universiti Sains Malaysia	Public University	http://www.usm.my/
3.	Universiti Utara Malaysia	Public University	https://www.uum.edu.my/
4.	Universiti Teknologi Malayisa	Public University	https://www.utm.my/
5.	Sunway University	Private University	https://university.sunway.edu.my/
6.	Taylors University	Private University	https://university.taylors.edu.my/en.html
7.	Universiti Teknologi Petronas	Private University	https://www.utp.edu.my/
8.	Universiti Tenaga Nasional	Private University	https://www.uniten.edu.my/

Table 3
Technique in Searching the Content of HEIs Website

No.	Query	Techniques
1.	Word query	1. Go to the "search" function on the website. 2. The search result will provide links to the published information related to the word query. Examples of word queries are as follows: "SDG practices" "Sustainability initiatives" "SDG implementation" "SDG integration " "SDG projects" "SDG programs" "SDG benchmarks" "SDG indicators" "SDG performance" "Institutional policies for SDG practices" "SDG reporting" "SDG disclosure" "SDG research and publication" "SDG in the curriculum"
2.	Research	1. Go to the link to the research centre and asses for any research titles related to SDGs 2. Go to HEIs repository and search for any publications related to SDGs

3.	Education	1.	Assess the list of programs offered by the HEIs that are related to SDGs
		2.	Assess the courses offered in the academic programs that are related to SDGs
		3.	Further assessment of the course syllabus for inclusion of SDGs.
4.	Operation and Governance	1.	Asses the HEIs governance structure.
		2.	Assess the policies, initiatives and Standard Operating Procedure (SOP) related to SDGs
5.	External Leadership	1.	Asses the community projects
		2.	Asses the knowledge transfer programs
		3.	Asses the research collaborations
		4.	Asses the establishment of the Centre of Excellence

Based on the selected HEISs, 61 new indicators were identified. Some of the new indicators were found to be repeated and are common among the HEIs to almost all SDGs. Therefore, these new indicators were grouped as "other" categories. The remaining new indicators were later grouped based on a common theme or concept, resulting in 12 new indicators for the four main functions of HEIs referred to as actual disclosure (AD) in Table 4. The number of indicators for the HSDI totals up to 196 indicators.

Step 6: Eliminating Irrelevant Indicators

This step analysed the content score in step 5 and eliminated indicator scored "0". A total of eight (8) indicators were eliminated, and two duplicated actual disclosure (AD) indicators on "Centre for Sustainability Studies" were grouped into one indicator for "others", leaving a total of 187 final drafted indicators for HSDI for further expert validation. Table 4 presents the final drafted or proposed SDG indicators for the HSDI.

Table 4
Proposed HSDI before validation

SDGs	Themed		Proposed Indicators
SDG1	Research	1.	Research conducted relating to issues related to poverty
		2.	Publications conducted relating to issues related to poverty
	Education	3.	Include in the curriculum topics related to the problem of poverty and methods for addressing it.

SDGs	Themed	Proposed Indicators	
		4.	Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers.
	Operation & Governance	5.	Supports for lower income students
		6.	Supports for lower income employees in meeting their basic needs
		7.	Retirement plan for employees
		8.	A statement of the resilience of the poor and those in vulnerable situations and reduction of exposure and vulnerability to climate related extreme events and other economic, social and environmental shocks and disasters
		9.	HEIs initiatives to improve the quality of life of the poor (motivational programs, entrepreneurship, guidance classes, etc.)
	External Leadership	10.	Community start-up financial and non-financial assistance
		11.	Programs for services access for the community (consultancy)
		12.	Policy addressing poverty
SDG2	Research	13.	Research conducted addressing issues related to hunger and food security.
		14.	Publications relating to issues related to hunger and food security
	Education	15.	Inclusion of subject or course content related to hunger or food security in a HEIs curriculum.
		16.	Training of curriculum and program developers on issues related to hunger and food security.
	Operation & Governance	17.	Student and staff food security and hunger programs
	External Leadership	18.	Programs of knowledge transfer to the community in relation to food security, farming and sustainable food production.
SDG3	Research	19.	Research or clinical study conducted addressing issues related to health and wellbeing
		20.	Publications relating to issues related to health and wellbeing
	Education	21.	Inclusion of subject or course content related to health and wellbeing.
		22.	Training of curriculum and program developers and other employees on issues related to health and wellbeing.

SDGs	Themed	Proposed Indicators
	Operation & Governance	23. Providing access to affordable health and wellbeing services on campus for students and employees
		24. <u>Programs</u> and practices are in place for dealing with occupational health and safety.
		25. Student medical insurance program
		26. Efforts to end epidemics of Covid 19, AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases
	External Leadership	27. Collaborations with other institutions to develop policies, and guidelines on health and well being
		28. Health outreach programs to students and communities.
SDG4	Research	29. Research conducted addressing issues related to quality education.
		30. Publications relating to issues related to quality education
	Education	31. Integrate the SDG (Quality Education) and the principles of ESD into all undergraduate and graduate courses.
		32. Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers.
		33. Encourage and support all student clubs and societies to engage with the SDGs and collaborate with each other on SDG-related events and activities.
		34. Sustainability / SDG related Journals
		35. Knowledge and skills acquisition for all learners to promote sustainable development,
	Operation & Governance	36. Provide SDG related support to students in terms of scholarship.
		37. Provide training for employees in improving quality education in upgrading employee skills and transition assistance programs.
		38. Student organisations and programs conducted related to sustainability
		39. Training centre establishment
	External Leadership	40. Promote and support long-life learning for the community.
		41. Collaborations with other organisations in training programs for the stakeholders

SDGs	Themed	Proposed Indicators
SDG5	Research	42. Research conducted addressing issues related to gender equality.
		43. Publications relating to issues related to gender equality
	Education	44. Integrate the SDGs (Gender quality) and the principles of ESD into all undergraduate and graduate courses.
		45. Proportion of female students in HEIS
	Operation & Governance	46. Policies related to gender equality, anti-discrimination and anti-sexual harassment
		47. Proportion of women by positions and salary
	External Leadership	48. Provide support to women NGOs
SDG6	Research	49. Research conducted addressing issues related to clean water and sanitisation.
		50. Publications relating to issues related to clean water and sanitisation
	Education	51. Integrate the SDGs (Clean water and sanitisation) and the principles of ESD into all undergraduate and graduate courses.
		52. Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers
		53. Structure courses around real-world collaborative projects
	Operation & Governance	54. The volume of water usage, recycling and wastewater
		55. Water conservation programs & implementation
		56. Policy on water conservation
	External Leadership	57. Provide training and guideline to the community relating to clean water and sanitisation.
		58. Collaborate with other organisations in providing training and water management programs to the community.
		59. Advocate the authority in water policy.
SDG7	Research	60. Research conducted addressing issues related to affordable and clean energy.
		61. Publications relating to issues related to affordable and clean energy
	Education	62. Integrate the SDGs (Affordable and Clean Energy) and the principles of ESD into all undergraduate and graduate courses.

SDGs	Themed		Proposed Indicators
		63.	Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers.
		64.	Structure courses around real-world collaborative projects
	Operation & Governance	65.	Number of smart and green buildings on campus
		66.	Energy consumption and intensity on campus
		67.	Renewable energy consumption and intensity on campus
	External Leadership	68.	Local community outreach for energy efficiency through energy efficiency services and assistance to low-carbon innovation
		69.	Policy development for clean energy technology
SDG8	Research	70.	Research conducted addressing issues related to decent work and economic growth.
		71.	Publications relating to issues related to decent work and economic growth
	Education	72.	Integrate the SDGs (Decent work and economic growth) and the principles of ESD into all undergraduate and graduate courses.
		73.	Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers
		74.	Structure courses around real-world collaborative projects
	Operation & Governance	75.	Level of employee satisfaction and engagement, as well as the institution's investment in staff career development and wellbeing programs.
		76.	Aligning employment, training and regulation policies to be consistent with commitments to equity and access strategies and targets
		77.	Report the level at which each formal joint management-worker health and safety committee typically operates within the organisation.
		78.	Student employability
		79.	Full and productive employment and decent work for all women and men, including young people and persons with disabilities (PWD), and equal pay for work of equal value

SDGs	Themed	Proposed Indicators
	External Leadership	80. The extent to which the institution collaborates with industry and government to promote policies and practices that support decent work and economic growth
		81. The institution's ability to attract and retain top talent in leadership positions in community projects
SDG9	Research	82. Research conducted addressing issues related to industry, innovation and infrastructure.
		83. Publications relating to issues related to industry, innovation and infrastructure.
	Education	84. Integrate the SDGs (industry, innovation and infrastructure) and the principles of ESD into all undergraduate and graduate courses.
		85. Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers
		86. Structure courses around real-world collaborative projects
	Operation & Governance	87. HEI support service in the development of the significant industry.
		88. HEI support service in the development of significant innovation.
		89. HEI support service in the development of infrastructure.
		90. Centre of Innovation
		91. Social Innovation & Community Projects
		92. Access to information and communication technology to provide universal and affordable access to the Internet
	External Leadership	93. Number of spin-offs for HEI and the community
		94. Work with the community to identify problems, options, and solutions and to assist in innovation, industry and infrastructure.
SDG 10	Research	95. Research conducted addressing issues related to inequalities.
		96. Publications relating to issues related to inequalities
	Education	97. Integrate the SDGs (inequalities) and the principles of ESD into all undergraduate and graduate courses.
		98. Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers

SDGs	Themed	Proposed Indicators
		99. Structure courses around real-world collaborative projects
	Operation & Governance	100. Report on the proposition of employees with disabilities and unrepresented groups
		101. Support services are provided for employees and students with disabilities and unrepresented groups.
		102. Policies related to anti-discrimination related to inequalities
		103. Establishment of a disability unit
	External Leadership	104. Providing a supportive, inclusive and safe working and learning environment for people from financially and socially disadvantaged backgrounds, people from rural and regional areas, people with disabilities, women in the workplace, people of diverse genders and sexualities and people from diverse cultural and faith communities
SDG 11s	Research	105. Research conducted addressing issues related to sustainable cities and communities.
		106. Publications relating to issues related to sustainable cities and communities
	Education	107. Integrate the SDGs (sustainable cities and communities) and the principles of ESD into all undergraduate and graduate courses.
		108. Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers
		109. Structure courses around real-world collaborative projects
		110. Initiatives to improve the quality of life of youths/students and the disabled (motivational programs, entrepreneurship, guidance classes, etc.).
	Operation & Governance	111. Public access to HEIs facilities
		112. Providing safe and affordable on-campus and/or university-supported housing
		113. Committing to ensure the campus always remains safe and green, and provides accessibility for all levels of mobility
		114. Working with local and state government to advocate for greater access to and provision of

SDGs	Themed	Proposed Indicators
		sustainable transport systems, including public transport and green transportation
		115. Policies related to sustainable cities and community
		116. Efforts to protect and safeguard the world's cultural and natural heritage
	External Leadership	117. Local authority collaboration regarding planning and development
		118. Committing to the development of and investment in the university's local community and areas of greatest influence (where possible)
SDG 12	Research	119. Research conducted addressing issues related to responsible production and consumption.
		120. Publications relating to issues related to responsible production and consumption
	Education	121. Integrate the SDGs (responsible production and consumption) and the principles of ESD into all undergraduate and graduate courses.
		122. Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers
		123. Structure courses around real-world collaborative projects
	Operation & Governance	124. Policy on ethical sourcing, consumption and disposal of waste materials
		125. Reports on ethical sourcing, consumption and disposal of waste materials
		126. Food waste reduction programs on campus
		127. Food waste utilisation programs
	External Leadership	128. Develop guidance and syntheses of knowledge on particular responsible consumption and production.
		129. Advocate for action by other sectors and governments for the importance of responsible consumption and production and the need to address them.
SDG 13	Research	130. Research conducted addressing issues related to climate action.
		131. Publications relating to issues related to climate action
	Education	132. Integrate the SDGs (climate action) and the principles of ESD into all undergraduate and graduate courses.

SDGs	Themed	Proposed Indicators
		133. Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers
		134. Education, awareness-raising and human and institutional capacity improvement on climate change mitigation, adaptation, impact reduction and early warning.
	Operation & Governance	135. Policy related to greenhouse gas emissions
		136. Report on level of GHG emissions
		137. Reports on HEIs initiative to reduce and mitigate GHG emissions
		138. Climate change strategies, measures and impacts
	External Leadership	139. Develop guidance and syntheses of knowledge on particular climate actions.
		140. Advocate for action by other sectors and governments for the importance of climate actions and the need to address them.
SDG 14	Research	141. Research conducted addressing issues related to life below water.
		142. Publications relating to issues related to life below water
	Education	143. Integrate the SDGs (life below water and the principles of ESD into all undergraduate and graduate courses.
		144. Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers
		145. Structure courses around real-world collaborative projects
	Operation & Governance	146. Policy related to conservation of life below water
		147. Reports on HEIs initiative to conserve life underwater
	External Leadership	148. Develop guidance and syntheses of knowledge on water ecosystems, sustainable fisheries and conservation of the ocean.
		149. Advocate for action by other sectors and governments for the importance of life underwater and the need to address them.
SDG 15	Research	150. Research conducted addressing issues related to life on land.
		151. Publications relating to issues related to life on land.
	Education	152. Integrate the SDGs (life on land) and the principles of ESD into all undergraduate and graduate courses.

SDGs	Themed	Proposed Indicators
		153. Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers
		154. Structure courses around real-world collaborative projects
	Operation & Governance	155. Policy related to the conservation of life on land
		156. Reports on HEIs initiative to conserve life on land
	External Leadership	157. Sustainable management of land for agriculture and tourism (educational outreach)
		158. Collaboration for shared land ecosystems
		159. Work with policymakers to identify problems, options, and solutions and to assist in policy evaluation.
SDG 16	Research	160. Research conducted addressing issues related to peace and strong institutions.
		161. Publications relating to issues related to peace and strong institutions.
	Education	162. Integrate the SDGs (peace and strong institutions) and the principles of ESD into all undergraduate and graduate courses.
		163. Provide training on the SDGs and ESD to all curriculum developers, course coordinators and lecturers
		164. The company explicitly discloses the policies and practices on training and development programs for its employees.
	Operation & Governance	165. Policy related to keeping peace and strong institutions
		166. Report on the initiatives of HEIs in keeping a piece and strong institutions
		167. University's principles and practices on ethics, corruption and bribery
		168. Establishment of an integrity unit
	External Leadership	169. Develop guidance and sharing of knowledge to the communities on the piece and strong institutions.
		170. Advocate for action by other sectors and governments for the importance of the piece and strong organisations.
SDG 17	Research	171. Collaborative research addressing issues related to SDG

SDGs	Themed	Proposed Indicators
		172. Collaborative publications relating to issues related to SDGs
	Education	173. Building strategies and culture that openly supports developing, maintaining and enhancing partnerships both internally and externally
		174. Report whether training requirements also apply to third-party organisations providing security personnel.
	Operation & Governance	175. Facilitate cross-sectoral collaboration and partnerships on solutions to addressing the challenges of specific SDGs
		176. Actively work with collaborators to support the implementation of the SDGs within the university through teaching, research, and operations.
		177. Number of sustainability associations, networks, and national or international advocacy organisations in which the HEI participates with a significant role
	External Leadership	178. Relationships with NGOs and government for SDG policy
		179. Work with policymakers to identify problems, options, and solutions and to assist in policy evaluation.
		180. Advocate for action by other sectors and governments for the importance of the SDGs and the need to address them.
Others		181. SDG/ Sustainability Policy/ Pledge/ Values
		182. SDG Governance
		183. Dedicated Sustainability/SDG Website
		184. HEI Publication repository***
		185. Research centre establishment
		186. Quantitative reports on SDG-related research (Disclosure of research grants)
		187. Centre for sustainability studies

Step 7: Obtain validation from the experts

This step requires indicator validation by experts among academics and practitioners. This step involves interviews with experts for this study, while research ethics approval is obtained from the university's Research Ethics Committee.

Step 8: Final modification of revised indicators

To obtain the SDG disclosure index's validity, an assessment instrument's validity is assessed through interrater reliability and expert judgment validation (Hartanto et al., 2019). Assessing interrater agreement is crucial to ensure the consistency and validity of the coding process in various research domains. Interrater coding is conducted to assess the agreement or reliability between two or more coders in categorising the index's indicators. The interrater agreement of this study is estimated using the coefficient kappa (κ) (Luhmann et al., 2012). The coefficient kappa (κ) is a statistical measure to assess interrater agreement or reliability. It considers both the observed agreement between raters and the agreement expected by chance. The range of possible values for the kappa coefficient is typically between -1 and 1, with higher values indicating greater agreement. It considers both the observed agreement between raters and the agreement that would be expected by chance. The interpretation of the kappa coefficient varies depending on its value. For example, a kappa value less than 0 indicates no agreement, while values between 0.21 and 0.4 indicate fair agreement, values between 0.41 and 0.6 indicate moderate agreement, values between 0.61 and 0.8 indicate substantial agreement, and values between 0.81 and 1.0 indicate almost perfect agreement, and negative value represents disagreement (Cohen 1998). Final modification will be conducted based on feedback from the experts on the indicators for HSDI.

SCORING OF HSDI

The scoring of the HSDI of an HEI is adopted using an unweighted approach, where each index indicator is given a score of '1' if the indicator is disclosed and '0' if otherwise.
The total HSDI score can be mathematically expressed in the equation as follows:

$$HSDI = \frac{\sum X_{ij}}{n_j}$$

Where: $HSDI$ = Total score of the SDG Disclosure.

n_j = number of indicators expected for higher education institutions.

X_{ij} = "1" if the university disclosed the indicator and "0" if otherwise.

The score level is scaled and rated by adapting the rating scale used by Joseph et al. (2018) based on the percentage of HSDI scores calculated by dividing the number of scores by the total number of 187 HSDI indicators multiplied by 100. The level of disclosure is scaled "Poor" (0.00 to 0.20), "Fair" (0.21 to 0.40), "Satisfactory" (0.41 to 0.60), "Good" (0.61 to 0.80) and "Outstanding" (0.81 to 1.00). This index can measure the SDG disclosure level of HEIs in the SDG research area. It can be used as the dependent variable in future research on analysing factors influencing SDG reporting.

CONCLUSIONS

As societal awareness of a sustainable development agenda remains low, creating an HSDI for higher education institutions is appropriate. The websites of higher education institutions (HEIs) could be used as a strategic tool to disseminate SDG information to stakeholders. The inclusion and participation of stakeholders is essential for advancing the nation's agenda for sustainable development. Higher education institutions can enhance their decision-making regarding sustainable development activities by encouraging greater stakeholder engagement through disclosure. In reality, HEIs, as the primary providers of human capital, are in a superior position to promote sustainable development. The HSDI indicators can be used to evaluate performance in the rating system, likely resulting in increased accountability and transparency in the academic sector. Lastly, the HSDI could be expanded and modified based on other research contexts, such as disclosures by other training academies or vocational educational establishments regarding their commitment to the SDGs. This index can be used in future research to analyse factors that influence SDG reporting and improve the effective reporting of SDG performance.

CONTRIBUTIONS OF AUTHORS

The authors confirm the equal contribution in each part of this work. All authors reviewed and approved the final version of this work.

REFERENCES

Alawneh, R., Ghazali, F., Ali, H., & Asif, M. (2019). A new index for assessing the contribution of energy efficiency in LEED 2009 certified green buildings to achieving UN sustainable development goals in Jordan. *International Journal of Green Energy*, *16*(6), 490-499.

Albareda-Tiana, S., Vidal-Ramentol, S., & Fernandez-Morilla, M. (2018). Implementing the sustainable development goals at University level. *International Journal of Sustainability in Higher Education*, *19*(3), 473-497. https://doi.org/10.1108/ijshe-05-2017-0069

Amoako, K. O. (2023). Sustainability reporting on the websites of public and private universities in Ghana. *International Journal of Sustainability in Higher Education*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/IJSHE-12-2021-0509

Avrampou, A., Skouloudis, A., Iliopoulos, G., & Khan, N. (2019). Advancing the Sustainable Development Goals: Evidence from leading European banks. *Sustainable Development*, *27*(4), 743-757. https://doi.org/10.1002/sd.1938

Blasco, N., Brusca, I., & Labrador, M. (2021). Drivers for Universities' Contribution to the Sustainable Development Goals: An Analysis of Spanish Public Universities. *Sustainability*, *13*(1), 89. https://doi.org/10.3390/su13010089

Caputo., F., L., L., & Pizzi, S. (2021). The contribution of higher education institutions to the sdgs—an evaluation of sustainability reporting practices. *Administrative Sciences*, *11*(3), 97. https://doi.org/10.3390/ADMSCI11030097

Ceulemans, K., Molderez, I., & Van Liedekerke, L. (2015). Sustainability reporting in higher education: A comprehensive review of the recent literature and paths for further research. *Journal of Cleaner Production*, *106*, 127-143. https://doi.org/10.1016/j.jclepro.2014.09.052

Cohen, J. (1998). *Statistical power analysis for the behavioural science* (2nd ed.). Lawrence Erlbaum Associates.

De Iorio, S., Zampone, G., & Piccolo, A. (2022). Determinant Factors of SDG Disclosure in the University Context. *Administrative Sciences*, *12*(1), 21. https://doi.org/10.3390/admsci12010021

De La Poza, E., Merello, P., Barberá, A., & Celani, A. (2021). Universities' reporting on SDGs: Using the impact rankings to model and measure

their contribution to sustainability. *Sustainability*, *13*(4), 1-30, 2038. https://doi.org/10.3390/su13042038

Dilling, P. F. A. (2010). Sustainability reporting in a global context: What are the characteristics of corporations that provide high quality sustainability reports an empirical analysis. *International Business & Economics Research Journal (IBER)*, *9*(1). https://doi.org/10.19030/iber.v9i1.505

Elalfy, A., Weber, O., & Geobey, S. (2021). The Sustainable Development Goals (SDGs): a rising tide lifts all boats? Global reporting implications in a post SDGs world. *Journal of Applied Accounting Research*, *22*(3), 557-575. https://doi.org/10.1108/JAAR-06-2020-0116

Elmassah, S., Biltagy, M., & Gamal, D. (2022). Framing the role of higher education in sustainable development: a case study analysis. *International Journal of Sustainability in Higher Education*, *23*(2), 320-355. https://doi.org/10.1108/IJSHE-05-2020-0164

EPU. (2021). *Sustainable Developments Goals*. Retrieved on 22 October 2021 from https://www.epu.gov.my/en/sustainable-development-goals

Griggs, D., Stafford-Smith, M., Gaffney, O., Rockström, J., Öhman, M. C., Shyamsundar, P., Steffen, W., Glaser, G., Kanie, N., & Noble, I. (2013). Sustainable development goals for people and planet. *Nature*, *495*, 305-307. https://doi.org/10.1038/495305a

Hartanto, H., Rusilowati, A., & Kartono, K. (2019). The developing assessment instrument in critical thinking ability for fifth grade of elementary school in thematic learning. *Journal of Educational Research and Evaluation*, *8*(2), 123-132. https://doi.org/10.15294/jere.v8i2.36685

Heras-Saizarbitoria, I., Urbieta, L., & Boiral, O. (2021). Organizations' engagement with sustainable development goals: From cherry-picking to SDG-washing? *Corporate Social Responsibility and Environmental Management*, *2* (29), 316-328. https://doi.org/10.1002/csr.2202

Heras-Saizarbitoria, I., Urbieta, L., & Boiral, O. (2022). Organizations' engagement with sustainable development goals: From cherry-picking to SDG-washing? *Corporate Social Responsibility and Environmental Management*, *29*(2), 316-328. https://doi.org/https://doi.org/10.1002/csr.2202

Hummel, K., & Szekely, M. (2022). Disclosure on the sustainable development goals – evidence from Europe. *Accounting in Europe*, *19*(1), 152-189. https://doi.org/10.1080/17449480.2021.1894347

Izzo, M. F., Ciaburri, M., & Tiscini, R. (2020). The challenge of sustainable development goal reporting: The first evidence from Italian listed companies. *Sustainability*, *8*(12), 3494. https://doi.org/10.3390/su12083494

Jizi, M., Salama, A., Dixon, R., & Stratling, R. (2013). Corporate governance and corporate social responsibility disclosure: Evidence from the US banking sector. *Journal of Business Ethics*, *125*, 601–615. https://doi.org/10.1007/s10551-013-1929-2

Joseph, C., Madi, N., Janggu, T., Rahmat, M., & Mohamed, N. (2018). Online integrity disclosure: benchmark for good governance? *Asia-Pacific Management Accounting Journal (APMAJ)*, *13*(1), 207-230.

Joseph, C., Rahmat, M., Syed Yusuf, S. N., Janang, J. T., & Madi, N. (2022). The ethical value disclosure index from the lens of SDG 16 and institutional theory. *International Journal of Ethics and Systems*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/IJOES-05-2021-0109

Joseph, C., Sawani, Y., Janggu, T., Hossen, R., & Atan, P. (2021a). Development of a sustainable development goals disclosure index (SDGDi) for Malaysian local authorities. *IPN Journal of Research and Practice in Public Sector Accounting and Management*, *11*(1), 61-79.

Joseph., C., Utami, I., Madi, N., Rahmat, M., Janang, J. T., & Omar, N. H. (2021b). A comparison of online fraud prevention disclosure in Malaysian and Indonesian public universities. *Management and Accounting Review*, *20*(2), 59-83. https://doi.org/10.24191/MAR.V20i02-03

Kestin, T., Van den Belt, M., Denby, L. R., K.E, Thwaites, J., & Hawkes, M. (2017). Getting Started with the SDGs in universities: A Guide for universities, higher education institutions, and the academic sector. Retrieved 22 October 2021 from https://ap-unsdsn.org/wp-content/uploads/University-SDG-Guide_web.pdf

Kroll, C., Warchold, A., & Pradhan, P. (2019). Sustainable development goals (sdgs): Are we successful in turning trade-offs into synergies? *Palgrave Communications*, *1*(15). https://doi.org/10.1057/s41599-019-0335-5

Legaspi, J. L. R. (2023). The current state of sustainability reporting: Evidence from publicly listed financial institutions. *Corporate Governance and Sustainability Review*, *2*(7), 18-28. https://doi.org/10.22495/cgsrv7i2p2

Liu, J., Kitamura, Y., & Savelyeva, T. (2022). Building an 'Ecosystem' for transforming higher education teaching and learning for sustainability. *Asia Pacific Education Review*, *23*(4), 539-542. https://doi.org/10.1007/s12564-022-09794-1

Lozano, R., Ceulemans, K., Alonso-Almeida, M., Huisingh, D., Lozano, F. J., Waas, T., Lambrechts, W., Lukman, R., & Hugé, J. (2015). A review of commitment and implementation of sustainable development in higher education: Results from a worldwide survey. *Journal of Cleaner Production*, *108*(Part A), 1-18. https://doi.org/10.1016/j.jclepro.2014.09.048

Lu-Gonzales, A., Tsusaka, T. W., Szabo, S., Kadigi, R. M. J., Foglietti, C. B., Park, S., & Matthews, Z. (2023). Evaluating the contribution of complex international research-for-development programmes to the sustainable development goals. *The European Journal of Development Research*, *35*(2), 380-401. https://doi.org/10.1057/s41287-022-00573-7

Luhmann, M., Hofmann, W., Eid, M., & Lucas, R. E. (2012). Subjective well-being and adaptation to life events: A meta-analysis. *Journal of Personality and Social Psychology*, *102*(3), 592-615. https://doi.org/10.1037/a0025948

Midin, M., Joseph, C., & Mohamed, N. (2017). Promoting societal governance: Stakeholders' engagement disclosure on Malaysian local authorities' websites. *Journal of Cleaner Production*, *142*(Part 4), 1672-1683.

Monteiro, S., Ribeiro, V., & Molho, C. (2023). A 5 pillars approach to the sustainable development goals performance and reporting in Portuguese higher education institutions. Proposal for an applied framework. *International Journal of Sustainability in Higher Education*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/IJSHE-02-2023-0047

Nhemachena, C., Matchaya, G., Nhemachena, C. R., Karuaihe, S., Muchara, B., & Nhlengethwa, S. (2018). Measuring baseline agriculture-related sustainable development goals index for Southern Africa. *Sustainability*, *10*(3), 849.

Nicolò, G., Aversano, N., Sannino, G., & Tartaglia Polcini, P. (2021). Investigating web-based sustainability reporting in Italian public universities in the era of Covid-19. *Sustainability*, *13*(6), 3468.

Nikolaou, I. E., & Tsagarakis, K. P. (2021). An introduction to circular economy and sustainability: Some existing lessons and future

directions. *Sustainable Production and Consumption*, *28*, 600-609. https://doi.org/10.1016/j.spc.2021.06.017

Puertas, J., & Bermúdez, M. (2020). Development of a global SDG progress index aimed at "leaving no one behind". *Sustainability*, *12*(10), 4085. https://doi.org/10.3390/SU12104085

Rosati, F., & Faria, L. (2019). Business contribution to the sustainable development agenda: Organizational factors related to early adoption of SDG reporting. *Corporate Social Responsibility and Environmental Management*, *3*(26), 588-597. https://doi.org/10.1002/csr.1705

Rosati, F., & Lourenço, F. (2019). Addressing the SDGs in sustainability reports: The relationship with institutional factors. *Journal of Cleaner Production*, *215*, 1312-1326. https://doi.org/https://doi.org/10.1016/j.jclepro.2018.12.107

Rosen, M. A. (2020). Do universities contribute to sustainable development? *European Journal of Sustainable Development Research*, *4*(2), 1-3. https://doi.org/https://doi.org/10.29333/ejosdr/6429

Son-Turan, S., & Lambrechts, W. (2019). Sustainability disclosure in higher education. *International Journal of Sustainability in Higher Education*, *20*(7), 1143-1170. https://doi.org/10.1108/IJSHE-02-2019-0070

Susilowati, E., Joseph, C., Vendy, V., & Yuhertiana, I. (2022). Advancing SDG No 16 via corporate governance disclosure: Evidence from Indonesian and Malaysian Fintech companies' websites. *Sustainability*, *14*(21), 13869. https://www.mdpi.com/2071-1050/14/21/13869

Unerman, J. (2000). Methodological issues: Reflections on quantification in corporate social reporting content analysis. *Accounting Auditing & Aaccountability Journal*, *13*(5), 667-680.

UNSDN. (2021). How to communicate sustainability on university websites. *United Nation Sustainable Development Network.* http://www.unsdsn-ne.org/wpcontent/uploads/2021/10/Sustainability-communication-on-university-websites-GUIDE_211007.pdf

Useh, U. (2021). Sustainable Development Goals as a Framework for Postgraduate Future Research Following COVID-19 Pandemic: A New Norm for Developing Countries. *Higher Education for the Future*, *8*(1), 123-132. https://doi.org/10.1177/2347631120972064

Vilalta, J. M., Betts, A., & Gómez, V. (2018). *The Why and How of GUNi's Commitment to the SDGs. Sustainable Development Goals: Actors and Implementation*. http://www.acup.cat/sites/default/files/2018-06/Higher%20Education%27s%20Role.pdf