



## Institutional Sustainability Development of Higher Education in Indonesia

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### Abstract

This study examines the seven primary dimensions of higher education sustainability: Curriculum, Research and Scholarship, Operation, Faculty Staff Development and Rewards, Outreach and Service, Student Engagement, and Administration-Mission & Planning. Based on Cluster 1, 2, and 3. This study looked at 146 higher education institutions (HEIs). A survey of 146 university lecturers was used to gather data and calculate the contribution of each dimension, and we used Confirmatory Factor Analysis (CFA). We discovered that HEIs' sustainability is significantly determined by faculty staff development and rewards, administration, mission, and planning. However, the Curriculum and Research & Scholarship sections were the weakest. Cluster 1 HEIs had the highest rate of institutional sustainability development, followed by Cluster 2 and 3, as expected. Cluster variability and patterns are also explored to reveal differences between variables. This paper presents a study of commonalities among several sets of learning outcomes for sustainable development in higher education and examples that might help HEIs choose acceptable learning outcomes for sustainable development. This paper is intended to stimulate conversation and forward-thinking, enriching a much-needed part of sustainability education.

### How to Cite

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## INTRODUCTION

Higher education plays a vital role in changing and resolving fundamental issues, including social inequality, globalisation, development, environmental preservation, and sustainability (Tormey et al., 2008). Several universities have recently implemented operational and research plans and pedagogical structure adjustments to make sustainability a part of the university's everyday routine (Krupczak et al., 2007). Efforts to establish sustainable practises in colleges have hit a roadblock. Traditional methods of creating and disseminating academic information, university organisational structure, and high human and financial resource requirements are still used by universities. Despite these limitations, a few universities have implemented remarkable improvements to assist students in better understanding sustainability (Lozano et al., 2015). Universities that emphasise sustainability education can provide students with the values, knowledge, skills, and motivation they need to contribute to their communities economic, social, and environmental well-being (Sterling, 2010).

People can get the knowledge, skills, and attitudes they need to address global social and environmental concerns through education for sustainable development. They constructed an educational system that encourages learners to acquire a critical interest in the activities by promoting these competencies and skills (Tormey et al., 2008). As a result, any investigation of how these techniques affect future professionals' formation must consider learners' perspectives on the quantity of information about sustainability strategies used in universities (Owens & Halfacre-Hitchcock, 2006). A growing number of scientific studies, particularly those based on quantitative data analysis, have recently been published that assess these views.

Higher education institutions have critical duties concerning sustainable development in education because they serve as

facilitators in raising community knowledge about the issue (Berchin et al., 2018). Higher education institutions should provide students with the knowledge and skills to conduct sustainable development initiatives (Sterling & Thomas, 2006). Sustainable development is a development model that balances environmental, social, and economic factors. As a result, Higher Education Institutions must address education's long-term sustainability from a comprehensive and systemic perspective (Svanström et al., 2008). The Sustainable Development Goals (SDGs) of the United Nations, particularly SDG 4, integrate sustainability into higher education institutions.

In higher education institutions, sustainability can be implemented in six ways: (1) facilities or operations; (2) teaching and curriculum; (3) organisational management; (4) external community; (5) research; and (6) assessment and communication (Lozano et al., 2015; Shriberg, 2002; UNESCO, 2012) Higher education institutions can act as change agents and transformative forces in implementing sustainability at all levels, from institutional to national (Kapitulcinová et al., 2018). Understanding the principles explored in earlier literature (Aleixo et al., 2018; Kagawa, 2007; Müller-Christ et al., 2014) is necessary for understanding sustainability in higher education. The research reviewed in this study focuses on how higher education institutions can become more sustainable through institutional restructuring, core competency development, and curriculum reform.

Because education is a critical tool in attaining sustainability, the phrase "education for sustainable development" or ESD has become widely accepted worldwide (Mckeown et al., 2002). Universities, at least at the institutional level, acknowledge the necessity of encouraging sustainable development. ESD can be applied in all educational sectors using a cross-disciplinary approach (Barth & Rieckmann, 2012), educating students, university officials, and lecturers about the need to adopt sustainable practises on campus. Students can

find answers to real-world challenges associated with unsustainable activities through sustainable development education.

The necessity for institutional transformation is demonstrated by developing a document highlighting the importance and needs of colleges and universities to pursue sustainable practises. There are numerous approaches for higher education institutions, including sustainability, and scholars are still divided into the most effective implementation strategies. Several academics think that integrating sustainability into higher education demands a significant shift in institutional practise (Clugston & Calder, 2000; Shriberg, 2002). The "fundamental characteristics and conditions" for achieving sustainable practise on campus include restructuring the mission, curriculum, and research and enhancing institutional support and outreach to local and global populations (Clugston & Calder, 2000). We can successfully establish a sustainable campus by redesigning many components of higher education.

Sustainability planning in the development of higher education is essential in enabling higher education institutions to set their goals and commit to taking concrete actions and actions at all levels to implement sustainability (Leal Filho et al., 2018). In addition, the importance of higher education institutions (IHE) as leaders and role models of sustainability practices in society has gained increasing recognition in recent years (Alkaher & Avissar, 2018). However, more research needs to examine how planning can support higher education institutions to assess their performance and determine whether the goals have been achieved.

Previous research conducted by Veideman (2022) focused on Education for Sustainable Development (ESD) and summarized the opportunities and challenges for developing internationally comparable ESD indicators in the higher education sector, discussing the relevance, validity and feasibility of indicators. The results show that ESD indicators are considered highly relevant by various sta-

keholders, the majority of PTs surveyed plan to collect ESD data within 3 years. Meanwhile, other researchers Wright et al. (2022) only focused on elaborating the conceptual framework used to direct the development of the Collaborative for the Common Good (CCG) at Wingate University. Cottafava et al. (2022) only focuses on examining the importance of encouraging scientific production of Higher Education towards the SDGs as a concrete institutional contribution to sustainable development.

Therefore the novelty and aim of this study is to explore the sustainable development of higher education and fill research gaps or present new ideas using Curriculum, Research and Scholarship, Operations, Faculty Staff Development and Rewards, Outreach and Service, Student Engagement, and Administration-Mission & Planning as measurement with CFA (Confirmatory Factor Analysis) approach university lecturers. According to Barth's (Barth, 2013) research on institutional change's key challenges and drivers, minor systematic improvements can successfully encourage persistent growth in higher education. He considers a "bottom-up" method in which university sustainability concepts are successfully integrated through ongoing communication, support networks, and student leadership. According to Barth, student-led change will generate future leaders committed to sustainability and drive university organisational transformation, resulting in environmentally friendly schools and universities.

Levy and Marans (Levy & Marans, 2012) focused their study on creating a long-term campus culture. At the University of Michigan, they looked into sustainability programmes. They decided to put together a list of recommendations based on how other universities may foster a "culture of sustainability" on campus. Wurzel's (Wurzel et al., 2013) research on the impact of sustainability-focused campus culture on student professionals is comparable to Levy and Marans research on the same topic (Levy & Marans, 2012). According to Wurzel (Wurzel et al., 2013),

sustainability is gaining popularity in higher education, and campuses must embrace green programmes that "encourage transdisciplinary, cooperative thinking, planning, and execution". Collaboration between lecturers, staff, and students is crucial to building a sustainable culture on campus.

Institutional transformation is an essential part of establishing a long-term campus. To make campus improvements, all college community members must work together. The research discussed in this section outlines how agencies can use a "top-down" or "bottom-up" approach to effect systemic change. All studies agree that community collaboration is crucial in establishing an environmentally healthy institution. The role of students in promoting sustainability on campus should not be primarily their responsibility. To successfully develop an ecologically friendly university, faculty and administration must also promote sustainability.

Core competencies centered on sustainability must be established for higher education institutions to be successfully reorganised. According to the research of Barth et al. (Barth et al., 2007) students believe that cross-disciplinary collaboration is an essential component of sustainable development. They also stress the necessity of socio-communicative competence and the willingness to interact. Students can learn from others through dialogue and activities involving various people (Barth et al., 2007).

By establishing critical sustainability competencies, higher education institutions may educate students to apply their skills and knowledge in a professional situation. After reviewing the work of Barth, Godemann, Rieckmann, and Stoltenberg (Barth et al., 2007) in their search for necessary sustainability competencies in higher education, Hidalgo et al. (Hidalgo & Fuentes, 2013) concluded that three types of competencies could successfully help universities incorporate sustainability practises on campus.

Students will obtain a critical perspective on solving socio-environmental challenges

by refining their cognitive skills. Students can then address these questions using their methodical skills. Globally, social change is aided by alterations in moral and ethical action attitudes. "Achieving a sustainable future requires individuals to adopt alternative values, attitudes, skills, habits, and behaviours that are often learned and developed at an early age," higher education institutions must comprehend (Hidalgo & Fuentes, 2013).

The basis for the successful implementation of sustainable practises can be laid by including core competencies in higher education institutions. A commitment to sustainability cannot be made without a thorough grasp of how sustainable development on campus may benefit students and universities.

By designing a curriculum that emphasises the importance of sustainability, students and lecturers may be motivated to support sustainable practises. This research section examines the effects of including sustainability in the curriculum. Colleges must incorporate sustainability into teaching and learning activities to foster sustainable development across campus.

Collaboration is crucial when it comes to developing a curriculum that emphasises sustainability. Individuals are way too important in today's higher education. Colleges and universities haven't done enough to encourage cooperation and collaborative activities that can help establish a more sustainable future. Cortese (Anthony D. Cortese, 2003) investigates the role of higher education in securing a long-term future. "Learning is segregated," he argues, "and academics frequently drop out of school as a result of established professional incentives and traditions from spreading their work beyond fields or inviting interdisciplinary collaboration."

Barth, Michelsen, and Sanusi (Barth et al., 2011) highlight the main concepts that higher education institutions need to use to successfully integrate sustainability into the curriculum in evaluating higher education for sustainable development. These themes were proposed in 2009 at the Third International

Conference on Higher Education for Sustainability. The articles stress the importance of "mainstreaming higher education for sustainability," which entails employing innovative pedagogical techniques to increase student interest in sustainable practises, as well as examining "the impact of higher education for sustainability" in society and developing "innovation in higher education for sustainability" (Barth et al., 2011).

Developing critical thinking skills connected to environmental concerns will arise from restructuring the curriculum to include sustainability. Assume that notions of sustainability are discussed in class and then applied to real-life settings. In this case, students and teachers will likely lessen our global impact. Matthias Barth and Marco Rieckmann (Barth & Rieckmann, 2012) extend the research on the implementation of curricular reform in universities. Their research looked at a one-year curriculum at an Ecuadorian university that offered lecturers a basic concept of ESD and demonstrated how to apply it to teaching approaches. The curriculum focuses on collaborative learning through course creation. Lecturers from a variety of fields are asked to participate in the programme. Twenty-five persons volunteered, with eighteen signing up and finishing the programme. Lecturers are then told to design seminars that enable students to solve real-world problems with unsustainable behaviours.

Through collaboration and multidisciplinary approaches, academics can reflect on each other's efforts to indoctrinate sustainability. Lecturers in the programme "recognise the relevance of transdisciplinary research and its value in addressing environmental issues" (Barth & Rieckmann, 2012). Lecturers can apply their expertise to real-world challenges through development seminars. These lectures urge students to get involved in their communities in certain circumstances. Participants' confidence is boosted, and they are motivated to continue implementing ESD into their practise after a successful programme integration (Barth & Rieckmann, 2012).

"Organisational change towards sustainability entails evaluating at least three alternative outcomes," based on the program's favourable outcomes from students and lecturers. 1. Academic teaching staff individual ability, 2. Professional performance, and 3. Long-term organisational influence (Barth & Rieckmann, 2012).

Barth and Timm (Barth & Timm, 2011) conducted another case study examining student opinions on university sustainable development programmes. The research was carried out at the University of Leuphana in Luneburg, Germany, where fully integrated sustainable development techniques were integrated into the curriculum. All students were requested to participate in two questionnaires examining the effects of a sustainability-focused curriculum. The response rate for the first survey was 93.3 percent. The students were equally enthusiastic about the curriculum, and after finishing the programme, the majority had gained knowledge about the idea of sustainability. "From a long-term viewpoint," the researchers concluded, "it appears vital to find and communicate extra value to students that they can recognise and acknowledge" (Barth & Timm, 2011).

According to the literature, a reorientation of education is required at the university level to include sustainable practises. "As they (1) educate the future decision-makers of society (2) generate, transfer, and convey new knowledge that reflects and simultaneously innovates society," universities play an essential role in sustainable development (Anthony D. Cortese, 2003; Fien, 2002; Gough & Scott, 2003). Curriculum transformation at the university level has an organisational impact, as seen by programmes like the ones mentioned in this paper. Lecturers adjust their curriculum, collaborate, and find effective techniques. Interdisciplinary approaches are essential for developing and maintaining long-term growth in higher education. The systematic transformation toward sustainability can be achieved through joint efforts. Due to the curriculum redesign, lec-

turers and students will be challenged to solve real-world challenges. A sustainability-focused curriculum will broaden students' global perspectives and impact our society and the planet.

## METHODS

This study used a descriptive approach to determine the average accomplishment of each dimension and variable. The variables (1) Curriculum, (2) Research and Scholarship, (3) Operations, (4) Faculty and Staff Development and Rewards, (5) Outreach and Service, (6) Student Engagement, and (7) Administration, Mission, and Planning were also subjected to Confirmatory Factor Analysis (CFA). This study is carried out as its whole initially, then broken down into clusters and shown using a "radar chart."

The clustering findings for 2021 were created using information from 2,136 higher education institutions that actively populate the higher education database, all of which are split into five clusters. 15 institutions contribute to Cluster 1, 34 universities contribute to Cluster 2, 97 universities contribute to Cluster 3, 400 universities contribute to Cluster 4, and 1,590 universities contribute to Cluster 5. Nonetheless, this study only examined clusters 1, 2, and 3, each of which had 146 universities.

**Table 1.** Clusters of Higher Education

Cluster	Number
Cluster 1	15
Cluster 2	34
Cluster 3	97
Total	146

Source: Processed Data (2023)

## RESULT AND DISCUSSION

To understand the quality of higher education, we present "Table 2: Higher Education Clusters". Table 2 provides an overview of the

dimensions measured and each dimension's average and standard deviation in the cluster.

The higher education clusters identified in Table 2 include several relevant variables. The first dimension, "Curriculum", measure the adequacy and level of excellence of the curriculum in higher education institutions. Second, "Research and Scientific Work" measures the adequacy and excellence of research and scientific work produced by institutions. The third, "Operational", includes variables related to the operation of higher education institutions, such as resources, adequacy of facilities, and service availability.

Furthermore, the dimension "Faculty and Staff Development and Rewards" evaluates the adequacy of efforts to develop and reward institutions' lecturers and staff. They were followed by the "Outreach and Service" dimension, which measures institutional involvement in community service activities. Then, the "Student Engagement" dimension evaluates student involvement in activities and experiences outside the classroom. Finally, the "Administration, Mission, and Planning" dimension includes institutional administration and planning variables.

Through Table 2, we can see each dimension's average and standard deviation, which gives an idea of the level of quality and adequacy in each aspect. Some dimensions score high, indicating a good level of excellence and adequacy, while others receive an "adequate" rating, indicating room for improvement. The data in Table 2 can provide a better understanding of the condition of higher education in the various aspects being assessed. Thus, stakeholders, such as education decision-makers, accreditation bodies, and the general public, can use this information to improve and develop better quality higher education system.

Table 3 presents the results of a cluster analysis conducted at higher education institutions. There are four clusters identified, namely Cluster 1, Cluster 2, Cluster 3, and All (all institutions). The first column shows the variables measured in the analysis, such as

**Table 2.** Clusters of Higher Education

Variables	Dimension	Average	SD	Desc.
Curriculum	X11	3.408	0.992	High
	X12	3.483	1.021	High
	X13	3.267	0.959	Adequate
	X14	3.350	0.913	Adequate
Research and Scholarship	X21	3.267	1.027	Adequate
	X22	3.283	0.852	Adequate
	X23	3.492	0.944	High
	X24	3.592	0.855	High
	X25	3.300	0.931	Adequate
Operation	X31	3.400	0.920	High
	X32	3.358	0.960	Adequate
	X33	3.167	0.947	Adequate
	X34	3.058	0.813	Adequate
	X35	3.108	0.858	Adequate
	X36	3.058	0.910	Adequate
	X37	3.383	0.936	Adequate
	X38	3.292	0.920	Adequate
	X39	3.225	0.921	Adequate
	X310	3.300	0.931	Adequate
	X311	3.133	0.934	Adequate
Faculty and Staff Development and Rewards	X41	3.200	0.931	Adequate
	X42	3.050	1.011	Adequate
	X43	3.525	0.970	High
Outreach and Service	X51	3.417	0.856	High
	X52	3.583	0.826	High
Student Engagement	X61	3.458	0.829	High
	X62	3.317	0.879	Adequate
	X63	3.225	0.912	Adequate
Administration, Mission, and Planning	X71	3.342	0.939	Adequate
	X72	3.167	0.792	Adequate
	X73	3.358	0.838	Adequate

Source: Processed Data (2023)

**Table 3.** Clusters of Higher Education

				All	Cluster 1	Cluster 2	Cluster 3
Curriculum	X1	←	SUS	0.858	0.877	0.834	0.700
Research and Scholarship	X2	←	SUS	0.864	0.782	0.778	0.890
Operation	X3	←	SUS	0.893	0.895	0.896	0.699
Faculty and Staff Development and Rewards	X4	←	SUS	0.926	0.931	0.930	0.798
Outreach and Service	X5	←	SUS	0.853	0.955	0.731	0.920
Student Engagement	X6	←	SUS	0.907	0.986	0.987	0.788
Administration, Mission, and Planning	X7	←	SUS	0.938	0.838	0.980	0.976
	X11	←	X1	0.679	0.585	0.727	0.643
	X12	←	X1	0.737	0.825	0.784	0.701
	X13	←	X1	0.736	0.844	0.444	0.790
	X14	←	X1	0.728	0.820	0.611	0.699
	X21	←	X2	0.744	0.708	0.629	0.708
	X22	←	X2	0.737	0.907	0.434	0.715
	X23	←	X2	0.725	0.778	0.544	0.708
	X24	←	X2	0.641	0.728	0.515	0.584
	X25	←	X2	0.645	0.871	0.364	0.626
	X31	←	X3	0.693	0.622	0.704	0.650
	X32	←	X3	0.639	0.839	0.657	0.543
	X33	←	X3	0.659	0.761	0.670	0.593
	X34	←	X3	0.582	0.868	0.460	0.536
	X35	←	X3	0.678	0.791	0.587	0.671
	X36	←	X3	0.697	0.870	0.662	0.707
	X37	←	X3	0.691	0.709	0.711	0.672
	X38	←	X3	0.639	0.654	0.687	0.554
	X39	←	X3	0.753	0.662	0.742	0.727
	X310	←	X3	0.716	0.757	0.661	0.710
	X311	←	X3	0.707	0.687	0.605	0.694
	X41	←	X4	0.782	0.755	0.849	0.712
	X42	←	X4	0.771	0.906	0.791	0.712
	X43	←	X4	0.738	0.772	0.560	0.719



			All	Cluster 1	Cluster 2	Cluster 3
X51	←	X5	0.781	0.840	0.868	0.650
X52	←	X5	0.730	0.869	0.933	0.568
X61	←	X6	0.711	0.956	0.604	0.729
X62	←	X6	0.748	0.943	0.747	0.580
X63	←	X6	0.747	0.873	0.555	0.826
X71	←	X7	0.745	0.954	0.891	0.593
X72	←	X7	0.748	0.871	0.691	0.650
X73	←	X7	0.615	0.776	0.719	0.543

Source: Processed Data (2023)

"Curriculum", "Research and Scholarship", "Operation", "Faculty and Staff Development and Rewards", "Outreach and Service", "Student Engagement", and "Administration, Mission, and Planning".

The following columns represent the results of the cluster analysis for each variable. The numbers listed are the average values for each cluster, with scores ranging from 0 to 1. Cluster 1, Cluster 2, and Cluster 3 are different clusters, while "All" includes all institutions involved in the analysis. For example, in the "Curriculum" variable, the average score for Cluster 1 is 0.858, for Cluster 2 is 0.877, for Cluster 3 is 0.834, and for the entire institution is 0.700. The same applies to other variables, where each cluster has a different average value.

By using Table 3, we can see the differences in quality or characteristics possessed by each cluster. For example, in the variable "Research and Scholarship", Cluster 1 has an average value of 0.864, indicating good research and scientific work. Meanwhile, Cluster 3 has an average value of 0.778, indicating lower quality in this respect. This information can be helpful for decision-makers in identifying areas where higher education institutions need to improve quality and focus on improvement. In addition, the results of this clustering can be used as a basis for compa-

ring the performance of institutions with other clusters to improve overall higher education standards.

The Curriculum variable is the highest aspect in the X12 dimension, with sustainability aspects being the focus in science, mathematics, literature, history, and art. Meanwhile, for the lowest aspect on the X13 dimension, the undergraduate program aspects were asked to take courses on environmental or sustainability issues. The Research and Scholarship X24 variable become the highest aspect with components of teaching problems and continuous research carried out by lecturers. Meanwhile, the lowest aspect is X21, with a research component or scholarships for various disciplines. In the operation variable, dimension X31 is the highest with building construction and renovation details based on green design principles.

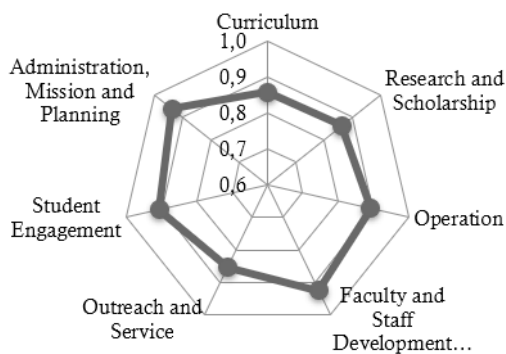
Meanwhile, the lowest dimension aspect is X34, with details regarding solid waste recycling, which is less considered by higher education. The variable Faculty and Staff Development and Rewards dimension X43 with details of higher education provide opportunities for the development of lecturers and education staff to improve understanding, teaching, and research in sustainability. In the Outreach and Service variable, dimension X52 is the highest, with details of institutions

involved in community services related to local sustainability, service learning, and internship programs.

While X51 is the lowest dimension with details of institutions involved in sustainable development work through partnerships or formal relationships at regional, national, or international levels. On the Student Engagement variable, dimension X61 being the highest with details, your institution is committed to providing students with sustainable opportunities and special arrangements. Meanwhile, X63 is the lowest dimension, with details of students being less actively involved in sustainability initiatives. In the Administration, Mission, and Planning variables, all dimensions have adequate categories, with X73 as the highest covering aspects of attention and commitment to sustainability in various activities.

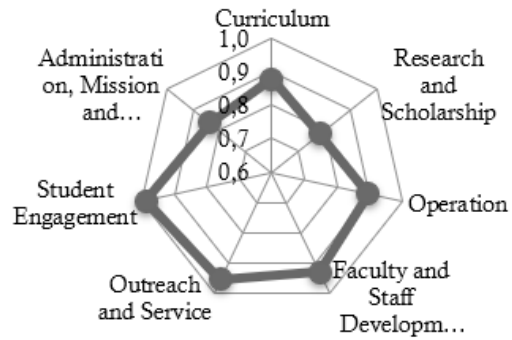
To understand the differences between the clusters in the context of higher education, we present an image highlighting the characteristics of each cluster. This figure helps us to visualize the differences in the measured variables and analyze the comparison between one cluster and another.

The figure consists of (1) All clusters which represent the overall cluster picture.



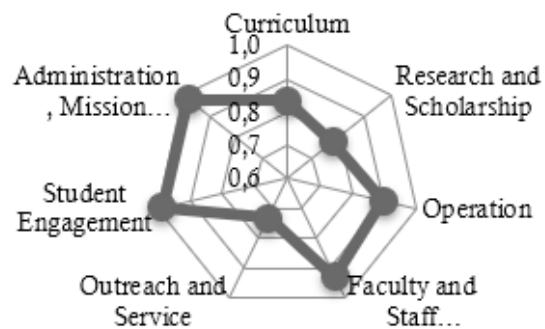
**Figure 1.** All Clusters

(2) The first cluster, and this cluster shows high scores in terms of curriculum and human resource development in higher education institutions.



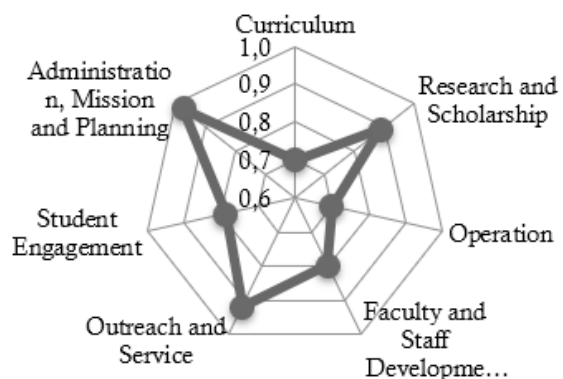
**Figure 2.** Cluster 1

(3) The second cluster, this cluster has a strong focus on research and scientific work, as well as community service



**Figure 3.** Cluster 2

(4) The third cluster, this cluster has advantages in institutional operations and provides a positive engagement experience for students



**Figure 4.** Cluster 3

Through this image, we hope to provide a clear visual understanding of the differences between these clusters in the context of higher education. This information can be helpful for

decision-makers and stakeholders in planning appropriate strategies and actions to improve the quality of higher education.

## CONCLUSION

Education will be critical in this transition to a more sustainable future. Our responsibility for future professional education is to engage in essential growth. We educate those who will shape society's future in higher education. They will create societal and technological systems, most likely the most powerful decision-makers and educators at all levels. It is critical to identify new acceptable higher education goals in terms of learning outcomes (LOs) for students and develop appropriate evaluation criteria to determine whether the desired learning has occurred and promoted continual progress.

After that, we must ensure that our organisational structures, programme curricula, course syllabi, and teaching and learning methods adequately address the learning outcomes and other purposes in higher education institutions. Efforts have been undertaken to address these concerns and specify learning outcomes for students in higher education at universities, organisations, governmental, educational agencies, international conferences, and other venues. This paper presents a study of commonalities among several sets of learning outcomes for sustainable development in higher education and examples that might help HEIs choose acceptable learning outcomes for sustainable development. This paper is not intended to be a comprehensive debate or impose the authors' point of view; it is intended to stimulate conversation and forward-thinking, enriching a much-needed part of sustainability education.

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