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Research paper

Practice of Sustainability in Higher Education

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Abstract

Higher education have a significant role in supporting the realization of sustainable development, thus forming the concept of the sustainable university. The concept of the sustainable university emphasizes the importance of economic, environmental and social activities conducted by the college. The college is expected to formulate the curriculum, perform research and community service activities with the topic of sustainability. The purpose of this study was to assess the extent of higher education considering the environmental, social and economical in their activities. The respondents of this study are the head of a department in Ahmad Dahlan University, Indonesia. This study uses a mixed method approach. Quantitative data obtained using a questionnaire, then processed by using the compared group statistical test. Qualitative data obtained using interview, then processed by using data reduction, data display and conclusion and verification. The results of this survey suggest that the head of the departments had considered the aspect of sustainability in formulating the curriculum, implementation of research and community service activities. From the three points of the Tridharma, which is learning and curricula, research and community service, the departments give more attention to community service activities.

Keywords: *Sustainable University; Learning and Curricula; Rresearch; Community Service*

1. Introduction

Developments implemented around the world have both positive and negative impacts. Environmental issues are one of the effects of development that are of significant concern at the moment. The occurrence of global warming, extreme weather, water pollution, forest burning, water pollution, flooding is the impact of development that does not consider aspects of sustainability [1]–[7]. As a result, the environment and ecosystems become unbalanced. This condition awakened various parties, including academics to play an active role in reducing the negative impact of development that does not consider the sustainability aspect of environmentally, socially and economically.

Indonesia, as a member of the United Nations has an active role to support sustainable development education program. In 2005 the Government of Indonesia, that are the Ministry of Environment and the Ministry of Education made a joint decision which is used as the basis for the guidance for the coaching and elaborating of environmental education. The decree regulates the procedure for the delivery of environmental education, which is to integrate environmental materials with existing subjects. At the level of primary and secondary education, the Ministry of Environment developed the Adiwiyata program. The program aims to realize responsible schoolchildren in the effort to protect and manage the environment through good school governance to support sustainable development [8]. The Government of Indonesia through the Adiwiyata program only covers primary and secondary education, but does not include higher education.

Higher education has a major role in achieving sustainable development goals. The higher education's main role is to conduct learning, research and community services by minimizing the negative impacts of environmental and social aspects. Another role is to educate the public about the importance of preserving the environment and social welfare, thereby becoming a sustainable lifestyle [9]. Higher education in Indonesia should also be involved in supporting sustainable development. Based on this background, the purpose of this study is to explore sustainability practices that have been undertaken by universities.

2. Literature Review

Higher education has a significant role in the sustainable development program. Higher education is an agent of change for social and political circumstances in a country. It is because colleges educate leaders, policymakers, educators, business people, workers, and others. Knowledge, values, and norms can be spread to the community through universities. Because the role of higher education in the community is crucial, then higher education are required to be involved in solving environmental and social problems resulting from development. Higher education are expected to create innovations of sustainable development through various activities undertaken in higher eduation.

The activities of universities in Indonesia are regulated in Law no. 60 the year 1999 about Higher Education. According to the regulation, the purpose of holding higher education is to prepare learner, to become a knowledgeable member of the community and to develop and disseminate their knowledge, to improve the standard

of living of the community. Based on the regulation, higher education can support sustainable development programs by providing knowledge through the learning process, which can be the best solution for facing the challenges of social welfare, economic justice and environmental sustainability through the formation of mentality and behavior of the academic community [9], [10].

The member of higher education also conducts research and community services, besides carrying out the learning function. The duty of learning, research and community service (called as the tri dharma of higher education) needs to be supported by administrative and operational activities. The sustainability aspect should also be considered for research, community service, and operational activities

Due to the critical role of higher education in supporting sustainable development, thus raising the concept of the sustainable university. The concept has evolved since The World Summit on Sustainable Development in Johannesburg in 2002. The forum initiated by the United Nations (UN) considers that education is an essential factor to support sustainable development, as education is the driving factor for change [11], [12]. The results of the discussion formulate the Decade of Education for Sustainable Development which states that from 2005 to 2014 all UN member countries, led by UNESCO (United Nations Educational, Scientific and Cultural Organization), will support sustainable development through education.

The sustainable university is a program aimed at universities so that their learning, research, and community service consider economic, environmental and social aspects as well as minimize the negative impacts of resource use, and support the realization of a sustainable community lifestyle. The concept of sustainable university emphasizes the importance of economic, environmental and social aspects of every activity undertaken by universities, from the preparation of vision, mission, and strategy of universities up to the reports compiled by universities [13]. Even sustainable universities also prepare students, to play an active role in environmental sustainability and social welfare [9], [14]. When becoming students, they are required to take an active role in supporting the college program, and when have graduated, they are required to disseminate knowledge about the sustainability of the environment and social welfare to the broader community.

Every activity undertaken by universities is directed to preserve the environment and social welfare, while maintaining the university's survival from the economic side, hence the continuation of universities can be continued. The university's sustainability activities can minimize the adverse impacts of operating activities on the environment, using of natural resources as efficiently as possible and educate the public on sustainability; then an excellent natural environment can continue to be enjoyed by future generations.

The concept of sustainable university has long been discoursing and applied by various universities in various countries [13], [15]–[17]. Unfortunately, the application of the concept has not achieved expected results. This condition is due to the absence of guidelines on the actions that colleges must take to support sustainable development [18]. Universities need a guide to help the achievement of sustainable development goals, to ensure that the actions taken by the higher education are appropriate.
Constraints faced in applying sustainable university are the leaders of universities and teachers have not understood appropriately about the concept, goals, policies, and programs of sustainable education. As a result, this sustainable education cannot be integrated into the applied curriculum [19]. Also, college education tends to misunderstand students, that is humans are dominant beings, and nature can be exploited for the benefit of humans [15]. Also, sustainability-oriented learning has not been a priority. Few educational institutions are concerned about sustainability by integrating it into teaching and practice [15]. As a result, students have not yet had the awareness to preserve the environment and social justice.

Practices that do not reflect sustainable life in college, apart from the aspects of learning, are the operational activities of higher education. Operational activities conducted by universities cause pollution. Pollution arises from teaching activities, that are the use of projectors and air conditioning, and from laboratory activities are laboratory waste. Potential contamination also occurs from operational events, which are using electricity, paper, and other resources. The use of motor vehicles by the academicians, including students also resulted in air pollution. As a result, the community around the campus became affected by the existence of college activity, because of the pollution of air, water, soil, and the sounds caused by activity in universities. Although the presence of universities brings a positive impact on the community, that is triggering economic growth for the surrounding community, the adverse effects of college activity should still be minimized.

Initiation efforts to promote sustainability practice in universities have been conducted by Universitas Indonesia since 2010 with the implementation of UI Green Metric program. The objective of the program is to assess and rank the sustainability efforts that universities have undertaken around the world. More and more universities join the program which is conducted every year. In 2010, participants who attended the program amounted to 95 colleges from 35 countries, and by 2016, the participants increased to 516 universities from 62 countries. Indicators measured and the weight of each indicator were settings and infrastructure (15%), energy and climate change (21%), sewage treatment (18%), water treatment (10%), transportation (18%) and education (18%) [20].

Indonesian universities that participate on the of UI Green Metric ranking amounted to 49 universities, consisting of state-owned and private universities. Indonesian universities in the top 100 are Universitas Indonesia at 31, Institut Teknologi Sepuluh Nopember at 43, Bogor Agricultural University at 57, Diponegoro University at 69, Universitas Sebelas Maret at 76, and Universitas Negeri Semarang at 95 [21]. This condition indicates a lack of awareness of higher education in Indonesia on environmental aspects.

3. Methodology

The object of this study is all department in the Ahmad Dahlan University, which amounted to 37 units. Data were obtained by using a mixed method. The data of this research are quantitative which collected through questionnaire, and qualitative, which got through an interview. Both types of data are used to obtain more in-depth results of this study [22]. Questionnaires distributed to the head of the department. Number of questionnaire return and can be processed 20 copies. It is shown that the questionnaire return rate is about 54%. The questionnaire return rate indicates the low level of participation of the respondents of this study. Researchers have made various efforts to increase the number of return questionnaires, but the results have not been satisfactory. The researcher asked some respondents who did not return the questionnaire, and most of them argued that they did not understand the topic of sustainability.

After that, informants were selected to obtain more in-depth data through interviews. The chosen informant is the head of the study program which is considered by the researcher to provide comprehensive information about the aspects of sustainability on the learning, research and community service.

3.1. Validity Test

Validity test is done for each group of questions, which measures a particular variable. The validity of the measured level is done by correlating the value of each item with the total score estimated. Testing was conducted using Pearson correlation method. There is considered a high correlation if the correlation coefficient is higher than 0.8 and a weak correlation if the correlation coefficient is less than 0.5. The item in question is valid if the value of Pearson correlation coefficient is statistically significant, at a significance level of 5% [23].

Based on the results of testing the validity of the learning and curricula question items, it appears that for the entire learning and curricula question items have correlation values higher than 0.3 and significance value below 0.05. It shows that the learning and curricula question items are valid and can be used to measure aspects of learning and curricula.

Based on the results of testing the validity of the research question items, it appears that one item question has a correlation value below 0.3 and a significance value higher than 0.05. It indicates that the item is invalid, so it must be removed from the list of questions. Other question items showed a correlation value higher than 0.3 and significance value under than 0.05. It shows that the seven items of the research question considered valid and can be used to measure aspects of the research.

Based on the results of testing the validity of the item in question community service, it indicates that for all the question items of community service has a correlation higher than 0.3 and significance value smaller than 0.05. It shows that the entire item in question the community service are valid and can be used to measure the aspect of community service.

3.2. Reliability Test

Reliability tests performed to assess the level of reliability of the instruments used in the study. This testing is done with Cronbach method, ie by comparing *Crobach's Coefficient Alpha* with a value of 0.06. An instrument is said to be reliable if *Crobach's Coefficient Alpha* has a value above 0.06 [23].

Based on the results of reliability test using Cronbach method, showed that all aspects of the instruments used in this study had a score higher than 0.06. It Indicates that the instruments are reliable.

4. Result and Analysis

4.1. Learning and Curricula

Respondents' answers to questions related to learning and curricula areas briefly presented in Table 1. In general, the head of the department has initiated to consider aspects of sustainability in their curriculum. It showed the item question no. 2 until 4. More than 60% head of department has been integrating sustainability issues into learning program. However, the integration of sustainability issues into the learning program is not supported by the policy that underlies the implementation of integration programs.

4.2. Research

The answers of respondents from questions about research briefly presented in table 2. In general, head of the department has considered aspects of sustainability in the field of research. It appears from the high score of the response value of items question about research.

More than 83% the head of the department stated that the availability of funds to carry out research, although there is head of the department says that he/she does not know that there is funding to research the sustainability topic. Also, research on the sustainability topic has been conducted by lecturer, which supported by the department.

The much quantity of research related to the topic of sustainability is triggered by the involvement of lecturers and students, and the support of institutions or between department to conduct research. It showed from the heads of department response to the question number 6 and 7. More than 73% the heads of department stated that research on the topic of sustainability had been carried out with the involvement of lecturers and students and the support of institutions or between units in the university.

Tabel 1: Summary of Respondents' Answers about Learning and Curricula

No.	Question	Respondents answer (in percentage)					
		Do not know	**Nothing**	**a little**	**Enough**	**Good**	**Very good**
1	There are rules that department offers subject related to the topic of sustainability	0	31.6	10.5	26.3	15.8	15.8
2	The integration of sustainability topics with the curricula	0	10.5	15.8	31.6	26.3	15.8
3	Issues of local sustainability and the challenges are included in the learning program	0	5.3	10.5	47.4	21.1	15.8
4	Global sustainability issues and challenges are included in the learning program	0	5.3	21.1	21.1	31.6	21.1
5	Student involvement in learning programs related to sustainability	0	15.8	15.8	21.1	42.1	5.3
6	Involvement among resources in universities in the learning program related sustainability	0	5.3	21.1	42.1	21.1	10.5
7	The willingness of lecturer to teach a subject that related with the topic of sustainability	0	0	10.5	42.1	42.1	5.3
8	There is awareness of lecturers to conduct the teaching process by considering aspects of sustainability	0	0	10.5	42.1	42.1	5.3
9	The consideration of sustainability aspects in the process of learning assessment	0	10.5	21.1	31.6	31.6	5.3

The willingness of lectures and students to research the topic of sustainability is also appreciable. Almost 90% of the heads of department stated that the desire of lecturers and students to conduct research related to sustainability is gratified. The research topics that have been implemented include observing alternative power sources from environmentally friendly natural materials, scrutiny garbage, and waste processing methods, analyzing the quality of life, level of achievement of sustainable development goals

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Table 2: Summary Respondents Answers to Questions of Research

No.	Question	Respondents answer (in percentage)					
		Do not know	**There is no**	**a little**	**Enough**	**Good**	**Very good**
1	The availability of funding to conduct research on the topic of sustainability	5.3	0	10.5	36.8	26.3	21.1
2	Research that addresses the issue of local sustainability and challenges	0	0	21.1	36.8	31.6	10.5
3	Department's commitment to conduct research on the topic of sustainability	0	0	10.5	21.1	57.9	10.5
4	Research that addresses the issue of global sustainability and challenges	0	0	5.3	36.8	42.1	15.8
6	The involvement of lecturers or students in research on the topic of sustainability	0	5.3	21.1	21.1	42.1	10.5
7	The support of institutions or units to conduct research on the topic of sustainability	0	15.8	5.3	26.3	42.1	10.5
8	The desire of faculty or students to do research on the topic of sustainability	0	0	10.5	36.8	42.1	10.5

4.3. Community Service

Respondents' answers to questions about community service briefly presented in table 3. In general, the heads of department have considered aspects of sustainability in community service programs.

All of the heads of department expressed their commitment to conduct a program of community service with the topic of sustainability. Programs of community service have been implemented by addresses the issues and challenges of sustainability, both locally and globally. The achievement of this condition because of the involvement of lecturers and students in the implementation of the program of community service, as well as the high motivation of lecturers and students in the implementation of this program. Program grants and the commitment of the institution in the implementation of the program of community service on sustainability topic is quite good. These conditions trigger awareness of the lecturers in universities to conduct community service on sustainability topic. Nevertheless, for the community service program to run well, communication between the department and stakeholders needs to be well established. It Should be done so that the purpose of the program of community service, primarily the meaning of sustainability can be accepted by the community and the benefits are also felt by the community. In addition, the topic of sustainability has not been taken into consideration to assess the program of community service.

Table 3: Summary Respondents Answers to Questions of Community Service

No.	Question	Respondents answer (in percentage)					
		Do not know	**There is no**	**a little**	**Enough**	**Good**	**Very good**
1	Involvement of lecturers and students in community service programs on sustainability topic	0	0	10.5	42.1	36.8	10.5
2	Department commitment on community service programs on sustainability topic	0	0	0	26.3	68.4	5.3
3	Programs of community service which relating local sustainability issues and challenges	0	0	5.3	36.8	52.6	5.3
4	Programs of community service which relating global sustainability issues and challenges	0	5.3	15.8	36.8	31.6	10.5
5	Communication between the department and the stakeholders in determining the community service on sustainability topic	0	5.3	21.1	21.1	47.4	5.3
6	The consideration of aspects of sustainability as one of the assessment criteria of community service	0	31.6	5.3	21.1	42.1	0
7	Funding grant to run community service programs on sustainability topic	0	0	10.5	21.1	57.9	10.5
8	Institution commitment on community service programs on sustainability topic	0	0	5.3	31.6	52.6	10.5
9	The willingness of Lecturers and students to do the community service programs on sustainability topic	0	0	5.3	26.3	57.9	10.5

4.4. Consideration of Sustainability Among Tridharma Activity

Analysis the sustainability considerations among Tridharma activities (learning, research, and service community) is conducted by one-way ANOVA compare test. This statistical tool is used after ensuring that the research data were normally distributed and homogeneous.

Testing of data normality is done by one-sample Kolmogorov-Smirnov. Meanwhile, testing the homogeneity is use Test of Homogeneity of Variances value. Based on the testing, the research data are normally distributed and homogeneous.

Based on the results of the compare test using ANOVA statistical tools, showed F-value is 3.271 and the significance is 0.046 (below than 0.05). It indicate that there is difference between high Tridharma aspect. To further analyze the aspects which are different, then followed by post hoc test, using the Bonferroni method. Bonferroni method is used, because of this research data is homogeneous.

Table 4: *Post Hoc* Bonferroni Test

Activity Tridharma	Sign.	Result
Learning-Research	0.512	No difference
Learning-Community Service	0,747	No difference
Research-Community Service	0,040	There is a difference

Table 5: Compare mean among Tridharma Activity

Tridharma activity	Average
Curriculum	37.68
Research	34.73
Community service	40.15

Based on Bonferroni post hoc test result, it is seen that there is no difference of sustainability consideration between curriculum and research. It Shows that sustainability topics have the same weight in the formulation of curriculum and research activities conducted in higher education.

As for the formulation of curriculum and community service activities with sustainability topics, universities also have the same weight of attention. This is evident from the Bonferroni post hoc test, which shows no difference between the curriculum aspect and community service

Another aspect, the research and community service, based on the test post hoc Bonferroni, showed there is a difference. In another word, the higher education has a higher attention in one aspect. When viewed from the average value between the two, it appears that the average value of community service is higher than the research (Table 5). This shows that sustainability considerations are more emphasized on community service activities, compared with the research aspect.

Community service activity is an activity undertaken by the academic community to apply the knowledge acquired in higher education. The hope is that the science can be used to promote the general welfare and the intellectual life of the nation (article 47 of Law No. 12 Indonesia, 2012). Through activities to the community, universities can be closer to the community and the environment, so that social and environmental aspects become more attention in community service activities

5. Conclusion

The results of this study indicate that in general, higher education has considered the aspect of sustainability. The university, in this case the heads of department had already been aware for considering aspects of sustainability in the formulation and implementation of learning, research and community service.

The curriculum of the study program has considered the sustainability aspect, by integrating sustainability topics in the course. The involvement of academicians and lecturers to teach courses with sustainability topics as one of the supporting factors of the program integrates sustainability issues in the curriculum. However, the application of curriculum in the program needs to be supported by the policy, so there is certainty and clarity in the application of the curriculum

The implementation of research in the department has considered the sustainability aspect. Research activities related to the topic of sustainability can be done because of the involvement of lecturers and students, as well as support from institutions or between units to conduct research, including the availability of financial assistance. The willingmess of lecturers and students to do research with sustainability topic is good.

Community service activities have also considered aspects of sustainability. Community service are implemented by addressing sustainability issues and challenges, both local and global. This condition is achieved due to the involvement of the academic community in the implementation of community service programs, and the high interest of lecturers and students in the implementation of this program. However, to formulate community service activities it is necessary to build communication between the department and the stakeholders, so that the purpose of the program, especially the purpose of sustainability can be accepted by the community and the benefits are also felt by the community. In addition, the topic of sustainability has not been taken into consideration to assess the program of community service.

The departments pay more attention to the issue of sustainability in community service activities, compared to research activities and learning. This is because the community service is an activity undertaken by the academic community to apply their knowledge to the community, so that social and environmental aspects become the main concern of the departments.

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References

[1] M. I. Qureshi, A. Md. Rasli, A. Jusoh, and T. O. Kowang, "Sustainability: A new manufacturing paradigm," *J. Teknol.*, 2015.

[2] M. I. Qureshi *et al.*, "Environment and air pollution: health services bequeath to grotesque menace," *Environ. Sci. Pollut. Res.*, 2015.

[3] M. I. Qureshi, N. U. Khan, A. M. Rasli, and K. Zaman, "The battle of health with environmental evils of Asian countries: promises to keep," *Environ. Sci. Pollut. Res.*, 2015.

[4] M. I. Qureshi, U. Awan, Z. Arshad, A. M. Rasli, K. Zaman, and F. Khan, "Dynamic linkages among energy consumption, air pollution, greenhouse gas emissions and agricultural production in Pakistan: sustainable agriculture key to policy success," *Nat. Hazards*, vol. 84, no. 1, 2016.

[5] M. I. Qureshi, R. M. Yusoff, A. R. Ahmed, K. Isa, and A. Imran, "Linking quality of work life with sustainable manufacturing performance," *Adv. Sci. Lett.*, vol. 23, no. 9, 2017.

[6] N. U. Khan, A. M. Rasli, and M. I. Qureshi, "Greening human resource management: A review policies and practices," *Advanced Science Letters*. 2017.

[7] R. B. M. Yusoff, A. Imran, M. I. Qureshi, and A. G. Kazi, "Investigating the relationship of employee empowerment and sustainable manufacturing performance," *Int. Rev. Manag. Mark.*, vol. 6, no. 4, 2016.

[8] I. Ministry of Environment, *Buku Panduan Adiwiyata 2012 (Guidebook of Adiwiyata)*. Jakarta: Ministry of Environment, Indoensia, 2012.

[9] K. D. Arbuthnott, "Education for Sustainable Development Beyond

Attitude Change," *Int. J. Sustain. High. Educ.*, vol. 10, no. 2, pp. 152–163, 2009.
[10] M. A. Al-khateeb, N. Al-ansari, and S. Knutsson, "Sustainable University Model for Higher Education Iraq," *Creat. Educ.*, vol. 5, pp. 318–328, 2014.
[11] R. Idris, "Pendidikan Sebagai Agen Perubahan Menuju Masyarakat Indonesia Seutuhnya (Education as an Agent of Change Towards a Complete Indonesian Society)," *Lentera Pendidik.*, vol. 16, no. 1, pp. 62–72, 2013.
[12] Unesco, "UN Decade of Education for The DESD at a glance," 2005. .
[13] L. Velazquez, N. Munguia, A. Platt, and J. Taddei, "Sustainable University: What Can Be the Matter?," *J. Clean. Prod.*, pp. 1–10, 2006.
[14] J. Mcmillin and R. Dyball, "Developing a Whole-of-University Approach to Educating for Sustainability: Linking Curriculum, Research and Sustainable Campus Operations," *J. Educ. Sustain. Dev.*, vol. 3, no. 1, pp. 55–64, 2009.
[15] A. D. Cortese, "The Critical Role of Higher Education in Creating a Sustainable Future," *Plan. High. Educ.*, vol. 31, no. 3, pp. 15–22, 2003.
[16] L. Too, B. Bajracharya, and I. Khanjanasthiti, "Developing a Sustainable Campus through Community Engagement : An Empirical Study," *Archit. Res.*, vol. 3, no. 3, pp. 42–50, 2013.
[17] P. Viebahn, "An Environmental Management Model for Universities: From Environmental Guidelines to Staff Involvement," *J. Clean. Prod.*, vol. 10, no. 1, pp. 3–12, 2002.
[18] M. Shriberg, "Institutional Assessment Tools For Sustainability In Higher Education: Strengths, Weakness, and Implications for Practice and Theory," *Int. J. Sustain. High. Educ.*, vol. 3, no. 3, pp. 243–270, 2002.
[19] M. Y. Choi and R. J. Didham, *Country Reports On Education For Sustainable Development: Centred on the Five Cluster Countries of UNESCO Office, Jakarta*. Jakarta: UNESCO, 2011.
[20] UI GreenMetric, "UI Greenmetric World University Ranking: Guideline," 2015. .
[21] UI GreenMetric, "List of Universities in Each Country," 2017. .
[22] J. W. Creswell, *Research Design : Qualitative, Quantitative, and Mixed Methods Approaches*, Ed Ketiga. Thousand Oaks, CA: Sage, 2009.
[23] U. Sekaran, *Research Methods for Business: A Skill Building Approach*, Fourth. New York: John Wiley & Sons, Inc., 2003.
[24] G. of Indonesia, *Acts no. 12 of 2012 on Higher Education*. Indonesia, 2012.