Barriers to implementing environmental management system in Indonesian Higher Education Institutions: A systematic review

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Abstract. Sustainability of the environment is affected by various organizations’ environmental performances, such as Higher Education Institutions (HEI). The HEI’s environmental performances are divided into different categories, such as energy, water, waste, mobile sources, paper, food, and built-up area. Implementation of Environmental Management System (EMS), such as ISO 14001:2015 has been acknowledged to improve HEI’s environmental performances. Despite that fact, only a few HEI that implemented ISO 14001:2015 for their EMS in Indonesia. This article analyzes potential barriers to implementing EMS in Indonesian HEI based on a systematic literature review and in-depth interviews at the case university. There are 25 potential barriers found, analyzed, and then summarized. Five main potential barriers are identified: (1) lack of commitment from the management of the stakeholders; (2) lack of financial resources; (3) lack of expertise on EMS; (4) organizational; (5) lack of engagement from student, staff, and faculty. The study’s results can be used as additional consideration for HEI to overcome barriers in implementing EMS.

1. Introduction

Sustainability in universities has been a frequent topic for a long time ago, as they can inflict significant direct and indirect impacts on the environment [1]. Nowadays, most universities worldwide start to pay more attention to their environmental performance, which is an essential part of attaining sustainability. Environmental aspects of the university that have been identified commonly are related to energy, water, and other resources such as paper and plastic, generation of waste, emission from transportation, and landscaping/biodiversity [2]. Those environmental aspects commonly will be evaluated and reported annually in the Sustainability Report for each university.

There are so many ways to achieve a greener image and improve our environmental performance; one of them is implementing an environmental management system (EMS). ISO 14001 is a widely recognized standard for EMS. Initially, the ISO 14001 series was created to deal with the environmental impacts of the industry. However, over time, the ISO 14001 series can be applied to all organizations engaged in any field, whether small or large. One of the causes of this development is the many potential benefits for organizations implementing an environmental management system. The most important benefits of implementing EMS are reducing costs and savings by reducing raw materials, energy, and waste [3]. Sorooshian & Ting (2018) identified five essential benefits, namely reducing pollution, increasing the level of compliance with laws and regulations, improving the EMS implementation process and providing strategies for improving environmental performance in general, increasing awareness of environmental issues within the organization and among employees, and...
improve environmental performance itself. The Environmental Management System for HEI itself is increasingly developing, not only ISO 14001 but other standards that can be used as a framework for universities in implementing EMS implementation. Some of the EMS frameworks that can be used for HEI are ISO 14001, SML Self-Assessment Checklist, Higher Education 21 Program, Auditing Instrument for Sustainability in Higher Education (AISHE), the Osnabrück University Model, and the Sustainable University Model [4].

The EMS needs to be applied by HEI because it provides various kinds of environmental, economic, and social benefits [5]. Some examples of environmental benefits obtained are the reduction of water and energy usage, also waste reduction. The economic benefits obtained are related to the environmental benefits generated, namely reducing costs from energy and water use, and waste management [5–7]. If they successfully implement EMS well, HEI's social benefits are a right image from various other organizations [5,8]. An example of a successful EMS case in HEI is Chiba University, which received 20 national awards and three international awards in the environmental field and was covered by more than 100 newspaper articles [5]. EMS's successful implementation can also attract prospective international students and facilitate funding for research and development projects [9].

Despite its popularity, only a few to none research related to ISO 14001 has been conducted in Indonesia. Mapping of literature related to ISO 14001 shown that most of the publications come from the USA with 25.5% from the total literature and no such papers coming from Indonesia [10]. ISO 14001 has been proven to improve the organization's economic, environmental, and social performance [5], yet implementation in the education sector such as campus is still minimal. The total number of certified organizations to ISO 14001 in 2019 was 396,242 organizations, and only 0.3% came from the education sector [11]. In Indonesia, there are only two educational sector organizations out of a total of 2,213 organizations that were ISO 14001 certified in 2019 [11]. These facts might be occurred because of the various barriers faced by HEI during the implementation of EMS [5,12–15].

The research was carried out at a reasonably well-known university in Indonesia for its environmental management efforts. Indonesia was chosen because only very few studies have been conducted regarding implementing environmental management systems in HEI [10]. A preliminary interview has been conducted at the case university, and there are indications that the implementation of the environmental management system was partially implemented and faced various barriers. Previous research results indicate that the implementation of EMS in one of the leading universities in Brazil also faced various barriers [12]. The case university is also unique. It consists of two main campuses that are far apart, one is in the capital city, and the other is in the suburban, with apparent differences in environmental performance. Therefore the study aims to analyze the potential barriers in the case university and the potential strategy to overcome the barriers.

2. Method

The method for this article is divided into two main parts. The first part is a systematic literature review, and the second part is to conduct in-depth interviews with stakeholders in the case university in Indonesia. Literature reviews are useful as they can explore a particular research area [16]. A systematic review is conducted to identify all empirical evidence with inclusion criteria to answer research questions [16]. There are three phases in conducting a literature review: designing, conducting, analysis, and writing [16]. There are several criteria for the systematic review in this article: article published between 2015 – 2020, addressing the barriers to implementing EMS in HEI, and registered at Scopus. The year 2015 is chosen as the bottom line since the most recent version of ISO 14001 was published in 2015. It is also to ensure that the barriers identified still become valid issues that must be solved. Articles are then be extracted with relevant keywords such as “Environmental Management System,” “Barrier”, and “Higher Education Institution” at Scopus. Screening of relevant articles is conducted through the analysis of titles and abstracts. Further screening is conducted through the analysis of the result. Final data of barriers are analyzed and presented as the potential barriers to implementing EMS in HEI.
The second part of the method consists of several interviews. The collecting data was carried out during the COVID-19 pandemic; therefore, the interviews were conducted using an online video conference application and social media. The case university was chosen because it is one of the leading universities in Indonesia. It has two main campuses located far apart, one is in the capital city, and the other is in the suburban. The campus located in the capital city consists of the majority of postgraduate students. There are three main stakeholders to implement EMS at case university. The first stakeholder, stakeholder A, is responsible for managing and maintaining facilities at the case university. The second stakeholder, stakeholder B, is responsible for managing environmental, safety, and health risks with a management system approach at the case university. The third stakeholder, stakeholder C, is responsible for giving feedback regarding the sustainability rank result. In-depth interviews are conducted with stakeholders A and B at a case university in Indonesia. In contrast, a structured interview is conducted with stakeholders C. Questions asked regarding the barriers that arise when implementing EMS in the case university and recommend improving the EMS itself. The result of the interviews is then analyzed with the previous systematic literature review results.

3. Results and discussion

Based on the method described, four recent articles match the criteria and relevant to this study's purposes. Most of the articles are screened out because the focus of discussion is not HEI; instead, they focus on industrial EMS. Many case-study articles explain the implementation of EMS in specific HEI but disregard the barriers. Therefore those four recent articles become the primary sources for this particular study. Barriers identified from the articles are presented in Table 1.

| No. | Potential Barriers                                                                 | Source               |
|-----|-------------------------------------------------------------------------------------|----------------------|
| 1.  | Lack of commitment from Government                                                  | [15]                 |
| 2.  | Lack of commitment (support and monitoring) from University Management              | [5,12,14,15]         |
| 3.  | Lack of funds/financial resources                                                   | [5,12,14,15]         |
| 4.  | Lack of expertise                                                                   | [14,15]              |
| 5.  | Academic curriculum of the University                                              | [15]                 |
| 6.  | The disconnect between the University and society                                  | [15]                 |
| 7.  | Top-down policy implementation in the University                                   | [5,15]               |
| 8.  | Lack of academic freedom in University                                             | [15]                 |
| 9.  | Inadequate power supply and internet facilities                                    | [15]                 |
| 10. | The salary structures for academic and non-academic staff in the University         | [5,15]               |
| 11. | Student apathy for environmental studies in the University                          | [5,15]               |
| 12. | Emphasis on traditional professional programs in the University                    | [15]                 |
| 13. | Lack of clarity as to the environmental damage caused by the HEI                   | [12]                 |
| 14. | HEI hierarchy differing from that of a company                                     | [12]                 |
| 15. | Lack of interest or motivation from faculty members and technical-administrative staff | [12,14]                   |
| 16. | Turnover of staff and students in the HEI                                          | [12]                 |
| 17. | Difficulty of carrying out environmental audits                                     | [5,12]               |
| 18. | Challenging and time-consuming data collection                                     | [5,12]               |
| 19. | EMS not being a priority                                                            | [12]                 |
| 20. | Lack of communication between the institution and top management                   | [5,12]               |
| 21. | Understaffing                                                                       | [5,12,14]            |
| 22. | Lack of confidence in the potential benefit of EMS                                 | [5,12]               |
| 23. | Lack of time                                                                        | [12]                 |
| 24. | Lack of knowledge and information on EMS                                            | [5,12,14]            |
25. Bureaucratic processes

There are many potential barriers that HEI might encounter when implementing EMS. Some of the main potential barriers are lack of commitment, lack of funds, lack of expertise, and the university’s academic curriculum [15]. Another HEI also mentioned that the main barrier is that EMS is not seen as a priority in their place [12]. Lack of resources, lack of awareness, and lack of interest are also the main barriers to implementing EMS in HEI [14]. Okayama (2019) divided barriers into five categories: human/organizational, administrative burden, cost burden, issues concerning effects, and issues concerning students and student organizations [5]. There is a similarity between each barrier that has been found in each HEI. Main barriers found from the literature can be simplified into (1) lack of commitment from the management of the stakeholders; (2) lack of financial resources, (3) lack of expertise on EMS, (4) organizational, (5) lack of engagement from student, staff, and faculty.

Commitment from various stakeholders' management is often mentioned as one of the main issues in each article. The success in implementing EMS depends on commitment from the management [7,17,18]. Chiba University started implementing EMS by ISO 14001 certification kickoff declaration by the president [5]. At the same time, the University of Glamorgan enhanced the organization's environmental sustainability by adhering to the corporate commitment of continual improvement [7]. Lack of financial and human resources is also mentioned as one of the main barriers in each article since without resources, then the program that has been planned cannot be implemented effectively. Organizational barriers occurred because of the different HEI hierarchy compared to the industry [12]. Engagement of student, staff, and faculty also becomes one of the key points to the successful implementation of EMS in HEI [5] since there are many things to do to not rely entirely on the available staff they already have their responsibilities.

The case university consists of two main campuses, one in the capital city and the other in the suburban. As the one responsible for managing and maintaining facilities at the case university, Stakeholder A mentioned the commitment of government as the main barrier, especially for the campus located in the capital city. The readiness level of facilities and infrastructure in the suburban area is higher than that in the capital city. University has made an effort to improve its environmental performance, such as segregation of waste. However, all those waste will be remixed to be delivered to the final disposal or landfill at the collection phase. There is also the problem of the availability of land. Limited land leads to limited improvement options in terms of environmental performance, such as additional green open space area.

Awareness is also mentioned as one of the main complicated barriers to solve, especially in Indonesia. Most people have quite a low awareness of environmental management, such as segregation of waste, and it has already become a kind of a culture and is difficult to change. Understaffing is not a problem in the university's case, since they have stationed personnel on each campus with their own office. Stakeholder A also has a representative in each faculty, making their job easier to maintain the environmental management system. Finally, the last barrier mentioned is the lack of funds, which is no less important than the other barriers mentioned previously.

Stakeholder B is responsible for managing environmental, safety, and health risks with a management system approach at the case university, based on the job description provided. There is vagueness in terms of the responsibility of stakeholder B. Based on the interview, the informant said that stakeholder B’s scope of work is to monitor and evaluate the air and water quality, while stakeholder A will be in charge of the management of waste and energy. It is not according to the statement from stakeholder A and C. Stakeholder A mention that stakeholder B's responsibility is more towards the policymaker related to environmental, safety, and health. Stakeholder C stated that their responsibility is to give the case university feedback through stakeholder B as an evaluation material to the improvement policy and EMS implementation. Later, the informant from stakeholder B said that the policy made is more towards safety than the environment one. There is an indication of a lack of clarity in responsibility.
At the end of the interviews, the informant mentioned the barrier related to coordination between stakeholders. The informant further explained that barriers related to coordination might occur because of the lack of clarity of each stakeholder’s responsibility to implement EMS. The informant suggests establishing a Sustainability Office, which focuses on environmental sustainability. It is also a response to the barrier mentioned previously.

Student involvement in implementing EMS at the case university is still relatively low. Stakeholder A mentioned that there is sufficient personnel to implement EMS at the case university related to their responsibility so far. The statement is strengthened by stakeholder B's opinion, which mentioned that there is a low engagement of the student in implementing EMS. The student involvement is only in the form of participation in program implementation, not in the entire EMS process, consisting of the plan, do, check, and action.

Stakeholder C is a committee formed with a tenure of one year. There is no significant barrier in doing their responsibility, but they recommend further improve EMS implementation in the case of a university. According to them, the Sustainability Office is indispensable to coordinate various stakeholders related to the environmental management system to achieve further the environmental objectives set by the case university. It is consistent with the stakeholder B's recommendation and the model proposed by Adomßent et al. (2019), which mentioned the urgency of a platform to create bridges across departmental boundaries in HEI [19].

Adomßent et al. (2019) proposed the Green Office model, divided into three models, Student-led Sustainability Office, Student Engagement Unit, and Student and Staff-led Green Office. The key difference between those three models is the team’s composition as can be seen in Figure 1. Student-led Sustainability Office’s team consists of student employees, student volunteers, and staff contact in university, Student Engagement Unit’s team consists of student employees, volunteers, and staff as the coordinator between them, Student and Staff-led Green Offices’ team consists of at least one full-time staff member, students, and volunteers [19]. The three models proposed area based on students' engagement, while at the case university, only staff are in charge of EMS implementation.

Figure 1. Organigram of Green Office Models [19].

Engagement of students has been proven to maintain EMS implementation in HEI, such as the case of Chiba University [5]. Student engagement can solve the barriers identified in the previous part. In terms of barrier related to challenging and time-consuming data collection and also the difficulty of carrying out environmental audit has been resolved since student takes part to prepare the documentation required in EMS, the student also becomes the internal auditor, therefore reducing the burden of staff and reducing the cost required [5]. This contradicts the results obtained from the interview, in which student involvement is deemed not necessary. It may be related to the theory proposed by Clarke & Kouri (2009) that divides drivers to implement EMS into three generations. The first generation focuses more on the operations and compliance of regulations. The second generation aims to improve internal communication and cooperation, and the third generation aims to improve external communication and develop stakeholder partnerships [4]. Both models proposed [5,19] are likely to be in the second or even generation, while the university is still in the first generation.
Therefore it is recommended to increase student engagement at implementing EMS in the case of a university.

4. Conclusion
The purpose of this article is to analyze potential barriers that might occur while implementing EMS in Indonesian HEI. Based on the systematic literature review, many potential barriers have occurred in other HEI while implementing their EMS. It can be simplified into five categories: (1) lack of commitment from the management of the stakeholders; (2) lack of financial resources; (3) lack of expertise on EMS; (4) organizational; (5) lack of engagement from student, staff, and faculty. Interview results show that potential barriers mentioned in the last part also occurred in Indonesian HEI, such as lack of funds and lack of commitment from the Government. It is also found that the lack of clarity in responsibilities might hinder the implementation of EMS. The establishment of the Sustainability Office is recommended by stakeholder B and stakeholder C to become the center of coordination between the various stakeholders who work around the environmental management system. It is recommended to increase student engagement at implementing EMS in HEI to solve various barriers mentioned. This study has certain limitations due to pandemic conditions, namely the lack of informants and interviews conducted online. Further research is suggested to increase the number of informants such as students and conduct Focus Group Discussion to obtain feasible solutions for the barriers.

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