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Research paper

Leveraging Sustainability of HEIs in Malaysia through Lean and Green Strategies: a Literature Review and Research Agenda

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Abstract

The journey towards sustainable development (SD) in Malaysia was started since the 1970s. Afterwards, a Malaysian New Economic Model (NEM) was formulated to pursue SD targeting high income, inclusivity and sustainability, which is in line with the 2030 SD agenda. Based on the goals of NEM, the Eleventh Malaysia Plan 2016-2020 (11MP) was developed. One of the 11MP coverage areas is education. In order to be sustainable, Malaysian higher-education institutions (HEIs) committed to corroborate this agenda by articulating an obligation to embrace the sustainability principles. However, within the Malaysian academic setting, it is still in its infancy, as most of the studies were constrained within the context of single university. In addition, to what extent the planning, strategies, and approaches for HEIs sustainability have been implemented tended to be neglected. Consequently, SD in HEIs is still far from being integrated into a holistic manner by policy makers. This paper extensively reviews the literature regarding the SD in the context of HEIs and provides some ideas for the future research leading towards the development of a comprehensive framework for sustainability development in Malaysian HEIs. Expectedly, this study could benefit policy makers, key players, and universities top management to progress towards sustainable university in an effective and efficient manner. It may strengthen the discourse on the implementation of SD initiatives within the Malaysian HEIs.

Keywords: *Lean University, Green University, Sustainable Development, University Sustainability, Higher Education Institutions, Malaysia*

1 Introduction

Higher education institutions (HEIs) in Malaysia have shown strong commitment to corroborate the Malaysian 2030 agenda for SD. As stated in the Education Blueprint (Higher Education) 2015-2025 [1], one of the national overriding aspirations is to ensure financial sustainability. In this attempt, Malaysian HEIs articulated an obligation to embrace the SD principles [2]. Accordingly, it has been adopted by several universities [3,4]. The HEIs have deliberated sustainability components in the campus planning and management [4]. Nowadays, this agenda continuously draws attention from societies (e.g., environmental protection agencies and activists, NGOs, and university stakeholders). Even though this idea has been uttered into strategic policies, only few were moving toward sustainable campus [2]. It is suspected due to the sustainability concept within the academic setting is still in its infancy and continuously misunderstood [3] as most of the studies were constrained in the context of single university, besides only focusing on the implementation planning, strategies, and approaches [5-8]. In other words, to what extent the sustainability practices have been implemented tends to be neglected.

Furthermore, facts and figures indicated that SD in HEIs is still far from being holistically integrated by policy makers. Some studies [9-11] called for more investigations in order to provide a clearer picture on the ideas and integrate them into the education system. Lean and green are two strategies that potentially leverage organizational sustainability. Lean focuses on doing more with less [12] in terms of waste (i.e., non-value added activities), energy, and resources while targeting flexibility, quality, productivity, customer satisfaction, and sustainability. On the other hand, green strategies target elimination of negative impacts of activities on natural environment [13], which demand a new paradigm that allows businesses to cultivate environmental performance [14]. Several studies, especially in manufacturing industries, have attempted to integrate the two principles and proved to be powerful to enhance organizational performance [15,16]. Even though its impact is indisputable, studies endeavored to integrate the two strategies to enhance HEIs sustainability are still lacking. A recent study by Caldera, et al. [11] highlighted that the lean and green concept is still relatively new, and it remains unclear for many as to how exactly lean thinking can contribute to the sustainability transformation of organizations. This study attempts to bridge this gap.

To sum up, this study attempts to investigate the extent of the implementation of SD practices in Malaysian HEIs, while endeavoring to develop a holistic framework by integrating lean and green practices. It is expected that the findings may shade some light around the body of knowledge theoretically and practically through providing a better understanding on sustainability projects, practices and strategies. Since the issue of sustainable university is still relatively new in Malaysia [17], this research may benefit the policy makers, key players, and universities top management to progress towards sustainable universities in an effective and efficient manner. Subsequently, the

study is also expected to strengthen the discourse on the implementation of SD initiatives within HEIs in Malaysia.

2 Literature Review

2.1 Sustainability in HEIs

Sustainability has been becoming a worldwide concern for the university policy makers during the last decades. Multiple initiatives to promote SD have been carried out throughout the world since its first declaration during the Stockholm Conference in 1972 [9]. Even though the early stage of its development, many universities did not consider the sustainability to be relevant to their activities; recently, most of the universities all over the globe have supported the notion that sustainability is the central of their undertakings [10,18-21]. Nowadays, this agenda continuously draws attention from wider societies, such as environmental protection agencies and activists, NGOs, and university stakeholders.

Several definitions of sustainable university have emerged. One of the most popular definitions came from the work of Velazquez, et al. [22], who defined it as "a higher educational institution, as a whole or as a part, that addresses, involves and promotes, on a regional or a global level, the minimization of negative environmental, economic, societal, and health effects generated in the use of their resources in order to fulfill its functions of teaching, research, outreach and partnership, and stewardship in ways to help society make the transition to sustainable lifestyles". Abdullah, et al. [17] defined sustainability campus as "the changes in campus operations, financial, administrative planning and policy, academic curricula, and research that facilitates positive environmental changes". Borrowing the idea from Alshuwaikhat and Abubakar [23]; Larrán Jorge, et al. [24] argued that a sustainable campus should be environmentally healthy, with a prosperous economy through energy and resource conservation, waste reduction and efficient environmental management; it should promote equity and social justice and export these values to community. These definitions clue that sustainability in HEIs covers all the activities while considering their impacts on economy, social, and environment.

A university consists of municipal of individuals, which involves a variety of facilities and accomplishments. It manages a wide range of facilities; buildings, dormitories, offices, restaurants and other facilities required for its routine operations. At the same time, to perform its daily activities, university consumes a lot of resources, such as energy, technology, machine and equipment, human being, capital, and many more. In this case, all the university stakeholders must engage to understand and solve the problem to ensure and advance its sustainability. This idea is in line with Awuzie and Emuze [25], Too and Bajracharya [26] and Weisser [18], who advocated the need for a holistic approach to engage any community in SD.

Few researches have been carried out to develop a framework of university SD. The most notably is the work of Velazquez, et al. [22], who provided a framework consisting of four structured layers towards sustainable university, starting with developing sustainability vision; formulating sustainability mission; establishing sustainability committee to create policies, targets, and objectives; and lastly developing sustainable strategies. This framework was then adapted by Mat, et al. [27] and suggested to be implemented in the Malaysian HEIs. However, there are different interpretations among the scholars regarding the concept of SD in HEIs. Through their study contextualized in Malaysian Research Universities, Saadatian, et al. [28] suggested five basic parts of SD; (1) sustainability in policy, planning and administrations (2) sustainable courses and curricula (3) research and scholarship (4) university's operations, and (5) outreach and services. Another different perspective came from Universiti Malaysia Sabah (UMS) through the works by Hussin and Kunjuraman [3], which highlighted six main cores of EcoCampus action plan; (1) mind-set change, (2) infrastructure development, (3) teaching and learning, (4) research themes, (5) management, and (6) operational practices. This hints that consensus regarding the framework as well as strategies on SD is still lacking, that may create confusion on its implementation. Accordingly, this study attempts to develop a more comprehensive point of view on the SD in order to be implemented holistically.

2.2 Sustainability in Malaysian Higher Education

Recently, in order to empower public HEIs, the Ministry of Higher Education (MOHE) of Malaysia has developed a policy that encourages universities to be independent and generates their own income by giving autonomy status to the universities. As is known, MOHE allocated 90 percent to finance the university's operating expenses per year. While the remaining 10 percent is financed from the students' education fees. However, as the autonomy status is given, especially for those who are in the Research University category, they are required to manage their own financial effectively and efficiently as well as generating their own income to finance their operating expenses. With the autonomy status, the universities need to ensure the implementation of financial governance such as the adoption and implementation of policies, rules and procedures for financial sustainability and management, planning, control, financial reporting and monitoring as well as generating financial and wealth resources more systematically. In addition, the universities should earn its own financial resources without relying on the government's financial supports.

Be aware of that, a number of SD initiatives have been carried out in Malaysian HEIs as summarized in Table 1. Universiti Kebangsaan Malaysia (UKM) has become the most popular in the topic of sustainable campus. The studies by Choy and Catherine Lau [29], Darus, et al. [30], Fadzil, et al. [31], Kwami, et al. [6], and Saadatian, et al. [28] have reported the UKM's sustainable planning and strategies. In Universiti Teknologi Malaysia (UTM), Zen, et al. [8] have also discussed the strategy and approach of institutionalizing university sustainability and sustainable energy management program. Likewise, Low, et al. [7] reported the energy sustainability strategies in UTM. In a similar trend, sustainable strategy in UMS was reported by Hussin and Kunjuraman [3]. In addition, Abd-Razak, et al. [2] and Abd-Razak, et al. [5] discussed the planning and challenges towards sustainable campus among four research universities (RUs) in Malaysia; UKM, Universiti Sains Malaysia (USM), Universiti Malaya (UM), and Universiti Putra Malaysia (UPM). Based on this fact and figure, prior studies in Malaysian HEIs have been contextualized on the limited number of universities. In addition, the studies have been focusing on the planning and strategies of SD implementation. Hence, there is a broad gap to be bridged by this proposed study to investigate the current stage of SD initiatives and to develop its common framework for Malaysian HEIs.

Table 1: Recent studies on campus sustainability in Malaysia

Context	Author	Focus areas
UKM	Choy and Catherine Lau [29]	Policy and strategy for SD.
UKM	Darus, et al. [30]	SD planning & strategies.
UKM	Fadzil, et al. [31]	Sustainability assessment framework.
UKM	Kwami, et al. [6]	SD strategies.
UKM	Saadatian, et al. [28]	Campus SD practices.
UKM	Mat, et al. [27]	Managing sustainable campus.
UTM	Zen, et al. [8]	Strategies of campus SD and energy management.
UTM	Low, et al. [7]	Energy sustainability strategies.
UMS	Hussin and Kunjuraman [3]	SD strategies.
RUs	Abd-Razak, et al. [2], Abd-Razak, et al. [5]	Planning & challenges towards sustainable campus among four RUs in Malaysia (UKM, USM, UM, UPM).

2.3 Lean University

Lean can mean "less" and at the same time "more". Less in terms of waste, design time, costs, fewer organizational layers and fewer suppliers per customer [32]. On the other hand, lean can also mean "more" in terms of more employee empowerment, more flexibility and capability, more productivity, more quality, more customer satisfaction, more long-term competitive success, and more profitability [33]. Eleven indicators of lean university developed through an extensive review on literature will be used. They are value maximization, stakeholders' involvement, waste identification, flow (workplace design for flow), work standardization, level and balance workloads, built-in quality, pull system, visualization, multifunctional employees, and continuous improvement.

A few studies have reported the significant positive effects of the lean implementation on the university performance [12,34-37]. Balzer, et al. [12] reported the benefits of lean university implementation in a number of universities in the US. The study noted its positive significant effects towards waste elimination, which subsequently reduces operational costs of the universities. It is expected that its implementation in Malaysian HEIs contributes significantly to the sustainability of HEIs in Malaysia through its proven ability to eliminate waste.

2.4 Green University

Environmental concerns have contributed to organizations taking a proactive role to reduce the negative impacts of their activities as well as to improve environmental efficiency of their operations, while leveraging their financial objectives. This concern is supported by methods of environmental operations management, green operations, green supply chain, eco-design, green building, sustainable value stream mapping, and life cycle assessment [38]. Few empirical studies have provided evidence regarding the significant effect of green initiatives towards sustainability of the organizations [13,14,23,39,40] through reducing waste, energy consumption, and improve well-being of the university community. In this study, the five indicators used to assess the university greenness proposed by UI GreenMetric [39] are used. The five indicators are setting and infrastructure, energy and climate change, waste, water, and transportation.

2.5 Integration of Lean and Green in HEIs

The trend of today's organizations is not only to improve its operations, but also to enhance environmental efficiency. This requires more researches to discover the possible mixture of the lean and green principles, which were traditionally implemented individually with different objectives. Previous studies (such as Cherrafi, et al. [16]; Garza-Reyes [38]; Chaplin, et al. [41]; and Thanki and Thakkar [42]) highlighted the compatibility of the two paradigms in several areas, such as manufacturing, product development, supply chain. In general, prior studies suggested that lean and green are concurrent and thus are expected to effectively work together. However, literature shows the limited investigation on this integration in the HEIs context. It is expected that the integration of these principles may shade a light for the future HEIs sustainability, not only in Malaysia, but also the entire world.

2.6 Lean and Green Impact on Sustainability

A number of researches have been dedicated to examine the impact of individual and concurrent lean and green practices on multiple measures of performance, such as sustainability, operations, and business performance. Several studies have also addressed the potential benefits of simultaneously adopting lean and green within organizations [16,38,41-44]. Most of the studies agreed that organizations that implement lean and green simultaneously as a total system potentially achieves higher performance, particularly, environmental and operational.

3 Research Agenda

3.1 Research Framework

Based on the literature review, a research model is proposed, including lean university practices and green university practices as independent variables and university sustainability performance as a dependent variable. Generally, the research framework is presented in Fig. 1. This framework is novel, as it accommodates two strategies (i.e., lean and green) that have been already proven effective in leveraging sustainability of various organizations. In the future study, the each of the elements in the framework will be detailed-up into individual practices and activities, and their individual effects on sustainability performance will be revealed. This may be different from previous studies, which did not look at the integration between two great strategies.

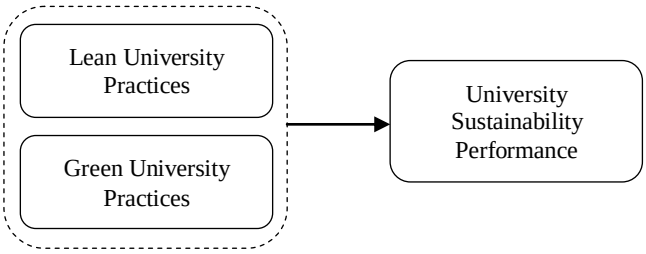

Fig 1: Research Framework

3.2 Theoretical Background

The research framework developed in this study is underpinned by Resource Based View (RBV), Activity Based View (ABV), and Theory of Complementarity. Literature presented had shown that the RBV can complement organizational strategies strongly in helping organizations to enhance performance and competitive advantage [45-48]. The principles of RBV-organizational practices serve as guidelines to help in understanding and determining the practices that can maximize performance through its implementation. Hence, it is crucial to focus on the development and selection of the important lean and green practices, which in turn, can improve sustainability performance significantly. In determining the practices, the present study follows the criteria provided by Ketokivi and Schroeder [49] as follows, (1) the practices are likely to satisfy the criteria for strategic resources; (2) the practices have been theoretically or empirically associated with one or more specific measures of organizational performance; and (3) the practices and performance measures have been linked in recent literature.

Although the RBV has been recognized as an excellent and powerful approach to determine the strategic resources that can significantly affect the performance, the theory is not without limitations[50-52]. Several studies have critically reviewed regarding the limitation of the RBV. Based on the rigorous literature review, the RBV suffers from at least three factors. One is that the RBV lacks of the link relating the resources (and capabilities) and value creation [51]. In other words, it was not clear how strategic/potential resources and capabilities contribute to value creation, since value is a fundamental component to determine the competitive advantages. Sheehan and Foss [53] argued that the RBV lacks of the concept of activities because it is primarily a concern to recognize strategic resources that can yield competitive advantage, meanwhile it has not reached its full potential in the field of strategy and tends to be less transparent on how resources and capabilities lead to value creation.

Secondly, according to Chan, et al. [52], the RBV focuses on taking away any strategic resources and capabilities rather than on

complementarity among them, since a resource and activity hardly acts as a standalone in achieving a superior position. This reveals that there are inadequacy and limitation of the RBV in addressing the relationships or interactions between company's resources in enhancing the desired outcomes. Whereas, when resources have complementarities, it enhances their potential to increase company's performance and sustain competitive advantages [54]. In order to overcome the deficiencies of RBV, this study attempts to adopt the ABV and complementarity theories.

To ensure compatibility between the three theories, Sheehan and Foss [53] provided guidance by relying on the objectives and underlying assumption of the theories. Sheehan and Foss [50] strongly agreed that activities take the role in relating resources, capabilities and strategic position in the competitive world. They further revealed that a comprehensive view on value creation of organizations can only be gained when the RBV and ABV point of views are integrated. At one side, RBV ensures the strategic and potential resources and capabilities, at another side ABV emphasizes valuable activities leading to sustainable competitive advantage. However, facts and figures indicated that several activities are complemented among them; adopting one practice can increase marginal returns of another, or *vice-versa*. Therefore, when the RBV, ABV, and complementarity theories are integrated, a comprehensive strategic framework of value creation and sustainable competitive advantage could be provided.

In summary, compatibility between RBV, ABV, and complementarity theories to support the framework is exhibited in Fig.2. Based on the figure, lean and green practices are treated as resources that fulfill all criteria of strategic resources suggested by Barney [55]. Due to the lack of concept of activities in RBV [50,53], and lack of link relating the resources and value creation [51], the ABV plays a role of translating the resources into activities. It is very important because activities are a key link between resources and strategic position as strategic resources were only valuable when placed into activities [56,57]. Through a reciprocal relationship between resources and capabilities, lean and green practices and activities are continually improved and shaped. In other words, creation of capabilities through lean and green practices and activities helps in deployment of organizations' unique competencies. At the same time, improvement in practices and activities would improve company's capabilities.

3.3 Research Agenda

A sequential exploratory mixed method is planned, in which the research will be commenced qualitatively and will be followed by a quantitative approach to generalize the initial findings.

3.3.1 Qualitative Research Design

This stage is addressed to determine key indicators of lean, green, and sustainability of HEIs as the indicators for the three concepts are still lacking in the literature. A case study would be appropriate in the initial stage of the study. Using the purposeful sampling technique, a series of in-depth data collection (i.e., interviews, focus group discussions, and document/website reviews) will be conducted. Tentatively, the five research universities in Malaysia (i.e., USM, UTM, UM, UPM, and UKM), will involve. A series of the semi-structured interviews will also be carried out to the departments, which have high involvement in the SD initiatives, such as the department of development and maintenance, bursary, registrar, etc. This qualitative data collection will generate two types of qualitative data (i.e., interviewer field notes, transcripts of interviews and document reviews). Subsequently, the data will be analyzed with content analysis procedure

following the analysis spiral suggested by Creswell [58]. The process of data analysis will be assisted by the qualitative data analysis software Atlas.ti.

3.3.2 Quantitative Research Design

After the qualitative data analysis, the quantitative phase with a survey methodology will be conducted as an attempt to generalize the qualitative findings. Specifically, this cross-sectional survey is addressed to: (1) determine the extent to which the HEIs in Malaysia have implemented sustainability development, lean and green practices, (2) examine the effects of lean and green practices on the sustainability of HEIs, and (3) propose a holistic framework for sustainability of Malaysian HEIs.

A set measurement will be developed based on the results of the qualitative study with the support from the relevant literature. In order to enhance the content validity, readability and brevity, the instrument will be reviewed by a number of specialists (i.e., academicians and practitioners) in the area of SD. The feedbacks from the respondents will be used to develop the better instrument. Organization (i.e., faculty and department) will be the unit of analysis, with dean/deputy dean and head of departments who are dealing with SD in HEIs as the element of unit of analysis. A total of 94 universities (i.e., 20 public and 74 private universities) [59] are expected to involve. 500 faculties and departments will be randomly selected and sent the survey.

Three phases of quantitative data analysis are proposed. Firstly, profiling of SD practices will be carried out, along with the calculation of sustainability indices. Secondly, the relationships among the variables will be examined by using the Structural Equation Modeling with SmartPLS 3.2.7. Finally, an integrated framework of Malaysian university sustainability will be developed and validated through expert reviews.

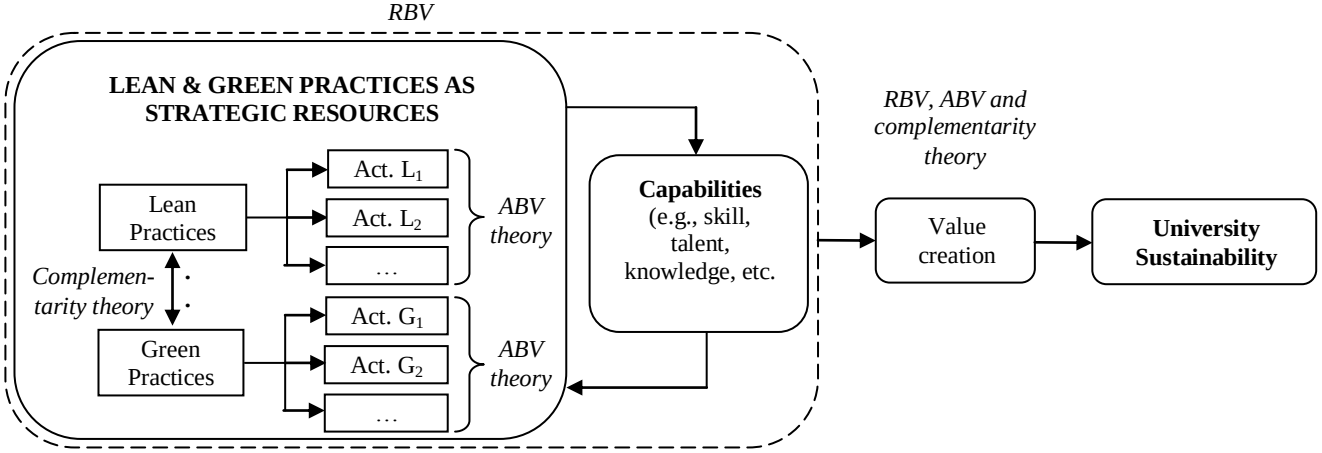

Fig 2: Related Theories and Variables of the Study

4 Implications of Study

This study carries some benefits on society, economy, and nation. The society will benefit in terms of the reduction of negative impacts of HEIs' activities to the environment through the integration of environmental concerns into organizational strategies, such as waste management, construction of sustainable building campus, and the use of equipment to generate sustainable energy. Economically, the study could give some impacts in terms of promoting the reduction of operational costs through waste elimination (i.e., non-value added activities), besides encouraging energy-efficiency initiatives in the HEIs. It could secure financial sustainability, which is targeted by the Ministry of Education. Thus, this may entail reducing the reliance of HEIs on government resources [1]. Additionally, this study could become a catalyst to how HEIs shape their behavior and values towards sustainability.

5. Conclusion

Prior studies in Malaysian HEIs were contextualized on the limited number of universities and tended to focus on the planning and approaches of SD implementation. Thus, there is a need to investigate the current status of the initiatives as well as to develop its common framework for the Malaysian HEIs. Future studies should involve more institutions and consider multiple strategies that have been proven effective to leverage the sustainability in other contexts. Thus, a comprehensive perspective on how to sustain the HEIs can be acquired.

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