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Developing Sustainability Measurement Tool for University of Babylon

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Abstract
In the last few decades, there have been increasing in assessing sustainability for industrial originations worldwide. The educational institution stared to adopt these principles as it is considering a large platform to start with. Narrowing down to the Iraqi educational institutions, there are still frustrating with applying the sustainability concept at the universities. Therefore, a developed tool to assess the current sustainability situation was conducted. Based on the analyzing by using Prism software after a year of gathering data, there was a significant issue with all the 15 indicators. The indicators broke down into Transportation, Educations and Research, Recycling Systems, Green Buildings as well as Water and Wastewater. The developed sustainability assessment tool is beneficial for any other university that willing to take a part in this principle with continuous measuring should be monitored.

Keywords: Sustainability Tool, Babylon University**,** Iraq.

1. Introduction

The sustainability assessment in the higher education in all the Iraqi universities is still unidentified and frustrating[1], although some educational institutions have been engaging with the sustainability concept [2]. This was successfully being managed in developed nations rather than developing once [3]. With less interest in the sustainability development among the Iraq universities and lack in Iraqi studies literature, it is crucial to develop such a model for the universities, particularly the University of Babylon to address the status of sustainability for this university. This work is mainly focused on the available approaches as well as providing a model for Babylon university sustainability assessment which is taking into consideration all the drawbacks in previous sustainability studies. Chosen the Babylon university this for study as it is considered among the largest educational institutions in Iraq with approximately 25 thousand students and 5 thousand staff [4]. This study was performed for several months (from September 2017 to September 2018) to find out the best model to assist Babylon university.

In 1987, World Commission on Environment and Development has stated that any development in sustainability need to be transform both economy and society [5]. Thus, the higher education system in Iraq has vital effects in this transformations. A suggestion made by the Tbilisi Declaration in 1977 participants which were that any educational institutions have to conduct a research regarding environmental

education with training the pioneers in this field. In addition, the participants stated that educational institutions should collaborate locally and internationally to cooperate in environmental initiatives and educate people[6]. Therefore, many universities signed an agreement regarding sustainable development in order to take step in this concept which faced criticisms of the inability of those educational institutions [7]. The benefits from these agreements are increased sustainability awareness and encourage scientific collaborations [8]. An international scheme was published by UNESCO in 2004 [9], focused mainly on describing the goal, objectives as well as milestones for the proposed 10 years of sustainable development educations with aiming to monitor the progress. On the other hand, educational institutions in Iraq have not evaluated this concept.

2. Method

To build a robust model that is able to suit various context with its indicators, issue allocations as well as an illustration the stages for developing a sustainable assessment model will be employed in this study.

3. Issue allocation

The sustainability assessment in higher education in all Iraqi universities is still unidentified and frustrating. In the last twenty years, there have been rising in a number of educational institutions that applied a sustainability development in their systems [10]. This is because of a noticeably increased awareness in terms of the sustainability concepts between society. Moreover, more than 1000 educational institution worldwide have been signed many agreements regarding sustainability development. An example of those agreements is the Kyoto Declaration, Talloires Declarations well as Copernicus University Charter [3]. Despite of the gained support for the sustainable development by the citizen [11], it still away from the leader of the educational institution [12]. The sustainability assessment tools can be able to keep tracing the university progress in this manner which is helping to solve issues identified in the institutions.

4. Illustration the stages for developing sustainable assessment model

After a careful examination of the literature in terms of sustainable development models, Figure 1 describes the whole systematic approached that been applied.
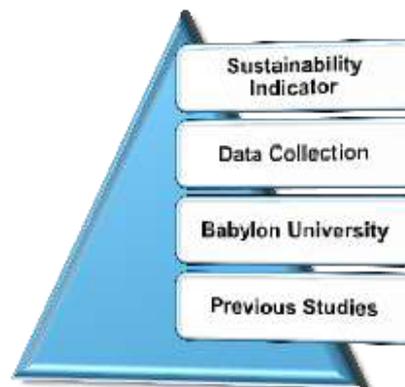

Figure 1 Babylon University sustainability assessment model

4.1. Previous Studies

First of all, previous literature in terms of sustainability assessment tools at the universities was done extensively [13]. Many studies have been conducted worldwide. A study was done by Jorge and his colleague in 2014, which based on analyzing the literature to find out the major concept of the sustainable university and how to assess the sustainability of educational institution [14]. The study conducted a model that contained six stages by handling all the review regarding university sustainability. The main aim of the study was to identify the best systematic approach of sustainability in educational institutions

worldwide and the possibility of adoption this tools for Babylon university. In addition, several studies were analyzed for the purpose of the adoption to come up with the best tool that fits the university of Babylon. However, a study was conducted in 2002, that pointed out, in any assessment sustainability tool, the following should be addressed: identified important university problem, the comparison tool, motivated and measurable tool, as well as included various stakeholders from the literature, it was clear that every tool used to assess the sustainability has both benefits and drawbacks [15]. For example, Greening Campuses, Higher Education 21st sustainability indicator, Sustainability Assessment Questionnaire, Environmental Performance Survey, Indicators snapshot/ Guide as well as Environmental workbook and report. In addition, some of these tools have both advantage and disadvantage. For instance, the Environmental workbook and report has useful strategic planning and prioritizing but at the same time, it is operational eco-efficiency and compliance focus.

Although these tools were designated for assessing the sustainability in the universities, there was no further discussion for the major pillars of the education which are research and education. A study also compares sustainability studies at the universities which were included 12 tools but the designed tool did not fully able to be applied within the university system [16]. Additionally, most tools have discussed various aspect for university sustainability assessment such as Educational Institution Environment, Auditing instrument as well as sustainability questionnaires [17].

4.2. Babylon University
This Iraqi University is located a 100 KM south Baghdad, the Iraqi capital city. It consists of 25 thousand students and 5 thousand employees with 22 faculties. The University teaches various subjects with night classes as well.

4.3. Data Collection
The study began upon accumulated issues observed at Babylon University. The first step was gathering the data and doing it in two ways. The first one was approaching the problems in person and writing down the cause of the issues in the university. The second stage interviews the expert at the Babylon university and the employees responsible for decision making. The Questions were prepared before the interviewees.

4.4. Sustainability Indicator
The resulted indicators based on the data collections were analyzed carefully with an assist from the convention of UNESCO in 2003. Thus, the following steps were taken in order to allocate possible Indicators

- Identifying the issues
- Allocating the indicator
- Analyzing
- Results

The indicators should be credible as well as include the major pillars in the education system such as education, research as well as the university operation and the community [18].

Table 1 Babylon University assessment indicators

Indicator	Sample	Question	Year
Transportation	TS1	Percentage of employees and student using public transport	2018
	TS2	Jam delay	2018
Educations and Research	ER1	Number of faculties run sustainability workshops	2018
	ER2	Number of faculties run sustainability courses	2018
	ER3	Number of faculties run sustainability research	2018
Recycling Systems	RS1	Pollution prevention	2018
	RS2	Percentage of waste reduction	2018
	RS3	Percentage of waste recycling	2018

Green Buildings	GB1	Total electric, gas, diesel energy usage	2018
	GB2	Numbers of trees in the campus	2018
	GB4	Number of faculties using LED technology	2018
	GB4	Numbers of sustainability platforms such as social media	2018
Water and	WW1	Numbers of imitative to water and wastewater reductions	2018
Wastewater	WW2	Amount of wastewater consumption	2018
	WW3	Amount of water consumption	2018

5. Result and discussion

Many studies have been focused on sustainability in universities [19-23]. In order to apply the concept of sustainability in a given university, many operations related to environmental effects as well as other indicators should be monitored. These are the materials and energy usage, fuels and water consumption, waste reduction, laboratory usage as well as the existing buildings.
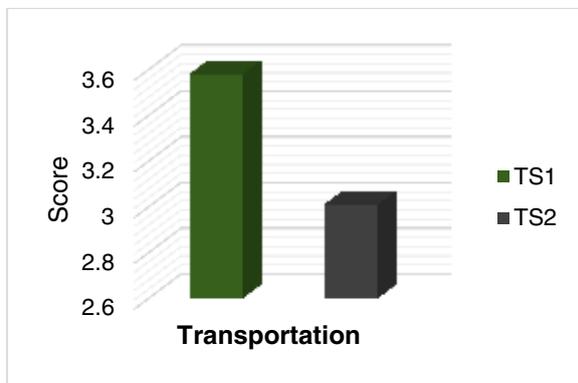

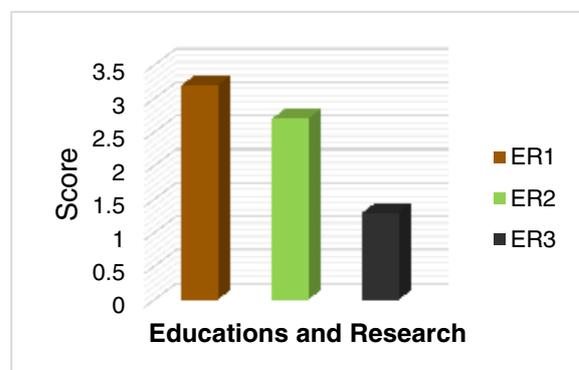Figure 2 Scores differentiation for Transportation Indicator

Figure 3 Scores differentiation for Educations and Research Indicator
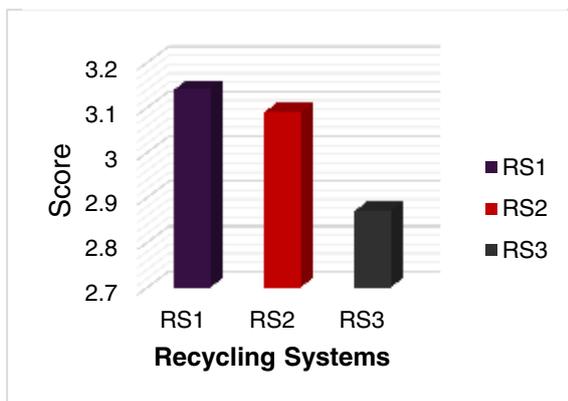

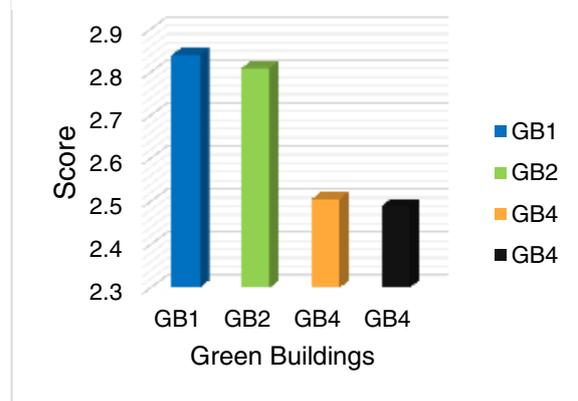Figure 4 Scores differentiation for Recycling Systems Indicator

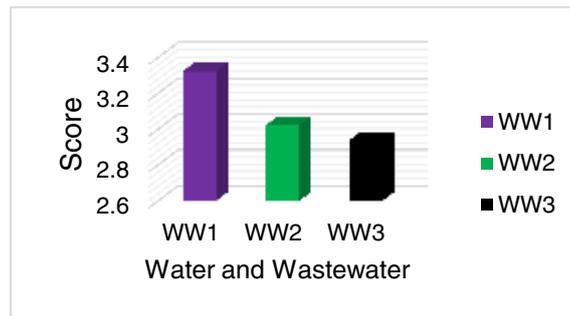Figure 5 Scores differentiation for Green Buildings Indicator

Figure 6 Scores differentiation for Water and Wastewater Indicator

The results data analyzing was qualitative in this paper as the obtained data was by interviews as well as in-person data gathering. This step consumed time as it took a whole year to get the required data. In addition, there were formal written letters to the managers to get best-answered results. The study was conducted based on a Likert-type ordinal scale after using different scales. Some data were obtained as a percentage and others as a number as well as statements. Thus, it was organized and analyzed by using Prism software to calculate the average of the standard deviation of each indicator.

As it can be noticed from the figure (2-6) above with 15 sustainability indicators, it is clear that the transportation came out at the first issue (figure 2) facing the university of Babylon with many users of the vehicle caused congestion in the early morning near the university as well as after-work time. This mainly due to the increased user as well as the unpaved roads near the campus. Followed by education and research in figure 3. Then comes figure 4, figure 5 as well as figure 6.

However, there were less considerations among the manager and the manager who were interviewed in the field of water usage as well as green buildings. In addition, it is clearly evidenced that those do not have a background about sustainability. However, it was seen an enthusiasm among some interviewees who were willing to assist us to get better data.

6. Conclusion

The unsatisfied sustainability assessment tools available in Iraq has been the courage to conducted a modified tool based on previous literature to assess the sustainability at Babylon university, Iraq. The data have been collected in different methods such as interview, in persons as well as official letters. With analyzing 15 sustainability indicators, there was a major issue in transportations, education and research, recycling and reuse, green building as well as water and wastewater. This is clearly proof that there was less interest in the sustainability assessment tools at Babylon university as should be taken into consideration for future purposes in case the university is seeking for rank. This developed tool is also beneficial for another university.

References

1.Lambrechts, W., Mulà, I., Ceulemans, K., Molderez, I. and Gaeremynck, V. The integration of competences for sustainable development in higher education: an analysis of bachelor programs in management. Journal of Cleaner Production, **48**,65-73, **(2013).**

2.Lozano, R., Diffusion of sustainable development in universities' curricula: an empirical example from Cardiff University. Journal of Cleaner Production, **18(7),** 637-644, **(2010).**

3.Calder, W., & Clugston, R. M. U.S. progress toward sustainability in higher education. The Environmental Law **(2003)**

4.Babylon University, http://en.uobabylon.edu.iq/ accessed august **(2019).**

5.World Commission on Environment and Development. WCED. Our Common Future, first ed. Oxford University Press, Oxford **(1987).**

6.Tbilisi Declaration,UNESCO & UNEP.. Tbilisi: UNESCO**. (1977).**

7.Wright, T. The evolution of sustainability declarations in higher education. In Higher education and the challenge of sustainability, Springer, Dordrecht, 7-19, **(2004).**

8.Al-Alwani, M.K. , A model for assessing sustainability of universities in Iraq, **(2018).**

9.UNESCO. Convention for the Safeguarding of the Intangible Cultural Heritage, Paris, 17 October **(2003).**

10. Lozano, R., Lukman, R., Lozano, F.J., Huisingh, D. and Lambrechts, W. Declarations for sustainability in higher education: becoming better leaders, through addressing the university system. Journal of Cleaner **(2013).**

11. Monteith, J., and R. Sabbatini. "The evolving role of sustainability on the new campus of California State University." Greening of the Campus II: The next step 56-60, **(1997).**

12. Milutinović, S. and Nikolić, V. Rethinking higher education for sustainable development in Serbia: an assessment of Copernicus charter principles in current higher education practices. Journal of cleaner production, **62**,107-113, **(2014)**

13. Venetoulis, J. Assessing the ecological impact of a university: the ecological footprint for the University of Redlands. International Journal of Sustainability in Higher Education, **2(2),** 180-197, **(2001).**

14. Jorge, M.L. and Peña, F.J.A. Determinants of corporate social responsibility and business ethics education in S panish universities. *Business Ethics: A European Review* 23 (2),139-153, **(2014).**

15. Shriberg, M.P. Sustainability in US higher education: organizational factors influencing campus environmental performance and leadership (Doctoral dissertation, University of Michigan) **(2002)**

16. Cole, L., and Tarah W. Assessing sustainability on Canadian University campuses: development of a campus sustainability assessment framework. Unpublished master's thesis, Royal Roads University, Victoria, BC **(2003).**

17. Roorda, N. "Auditing sustainability in engineering education with AISHE." ENTREE 2000 proceedings, EEE network 13-30, **(2000).**

18. Cortese AD. Cortese, Anthony D. "The critical role of higher education in creating a sustainable future." Planning for higher education **31(3),** 15-22, **(2003).**

19. Barnes, P., and P. Jerman. "Developing an environmental management system for a multiple-university consortium." Journal of Cleaner Production **10.1**, 33-391 **(2002).**

20. Bernheim A. How Green Is Green? Developing a Process for Determining Sustainability When Planning Campuses and Academic Buildings." Planning for Higher Education **31(3)**, 99-110, **(2003)**

21. Viebahn P. An environmental management model for universities: from environmental guidelines to staff involvement. Journal of Cleaner Production **10(1),**3-12, **(2002).**

22. Shriberg, M. Institutional assessment tools for sustainability in higher education: strengths, weaknesses, and implications for practice and theory. Higher education policy, **15(2)**, 153-167, **(2002).**

23. Corcoran PB, Calder W, Clugston RM. Introduction: higher education for sustainable development. Higher Education Policy;**103**,15:99, **(2002).**