



## **A model for assessing sustainability of universities in Iraq**

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### **Abstract**

Universities started to sign declarations and international agreements to introduce university's sustainability in. Studies for assessing the university's sustainability are common in developed countries; on the other hand, these studies are inadequate and insufficient in developing countries. In Iraq, there is not an inclusive study that demonstrates and measure the Iraqi universities sustainability. Moreover, this country lacks an assessment tool to assess the university's sustainability. Thus, the purpose of this paper is to propose a model that allows Iraqi universities to promote and evaluate sustainability. Furthermore, this paper provides a model that enables the development of university sustainability indicators, and eliminates some of the main weaknesses found in the models currently available. The model resulted in a set of 28 indicators, which form a flexible tool to assess sustainability of Iraqi universities which consist of (9) curriculums indicators, (7) social sustainability indicators, (3) transportation indicators and (5) green building and energy indicator, (2) recycling and waste management and (2) water use and conservation. These 28 indicators are suggested to be the key indicators for measuring the sustainability of the universities in Iraq

**Keyword:** Sustainability, Universities, Assesses, Iraq

### **Introduction**

In universities, evolution toward sustainability is more than unacceptable. It is extremely slow and frustrating [1]. For long time, universities have been at the foreground in creating paradigms [2]. However, universities have remained traditional

[3]. Recently, a number of universities have been engaging with sustainable development [4]. This was apparent in developed countries, as studies for assessing the university's sustainability are common; however, in developing countries, these studies are scarce [5].

Taking into account the lack of relative assessments in Iraq and faced with a fact that there is low interest and divergent levels of sustainable development amongst universities, its thought that essential to develop a model to permit the assessment and comparison of universities in Iraq. This assessment tool would be helpful in self-assessment of different institutions and allows for continuous improvement in order to facilitate the assessment process in countries where the effort to implement sustainability in universities is at an early step of development. Each of the tools evaluated in previous studies which evaluated have diverse advantages and disadvantages in their application in universities. This paper presents a discussion of existing approaches, followed by a proposal for a model of university's sustainability assessment which overcomes all the weaknesses in previous studies and based on a flexible approach. Iraq was the country chosen for conducting the case study because it is one of the biggest emerging economies in the Middle East region. Bagdad University chooses as a case study in this article. The case was analyzed during several months. The aim of this paper is to identify ideal assessment tools to assist sustainability of universities in Iraq.

According to the "Brundtland Report, a development that is sustainable has need of a transformation of the economy in addition to society [6]. Education, specifically higher education (universities), plays an important role to create the social and economical transform required to achieve sustainable development. Education, which includes principles of sustainable development, is called education sustainable development [7]. For the period of the Tbilisi Declaration, which organized by UNESCO in assisting with the UN Environmental Programme (UNEP) in 1977, participants suggested that universities have to carry out research in relation to environmental education and train experts in this field. Moreover, Participants recommended that universities must develop curriculums concerning environmental education, engage in regional and international initiatives of cooperation in the environment, inform and educate the public about environmental issues and engage faculty and staff in environmental issues [8]. In the 1990s, universities began to sign international agreements and declarations related to education, sustainable development in response to their lack in environmental issues, actions, and the several sectors constant criticism of the society for the inability of these universities to be models of environmental education [9]. The impact of signing these declarations by universities is beneficial for sustainable development, because all declarations contribute to the awareness of sustainable development in university decision makers, promote scientific discussion about sustainable development, and signing a declaration is a way to be part of the community [10]. These declarations are only self-commitments to act, though signing a declaration is the first step towards sustainability. In 2002, the UN declared the educational decade for sustainable development (DESD) to incorporate education, sustainable development into all aspects of education and learning as an effort to modify performances for a more sustainable future. UNESCO, in 2004, developed the International Implementation Scheme to describe goals, objectives, and milestones for the educational decade for sustainable development. One of the key milestones of the International Implementation Scheme is to collect indicators of progress. However, there is a lack of studies that investigate sustainable development in universities especially, in Iraq

## **2. Methodology**

In order to establish a sustainability assessment model that is both adaptable to different contexts and able of creating common ground indicators, following important tasks were used:

- Problem identification
- Describe the steps needed to develop an assessment model for universities

These tasks would be used to construct the sustainability assessment model for universities

Each task will discuss separately

### 2.1 Problem identification

Sustainable development in universities is not only unacceptable, but it is also slow and frustrating." An increasing number of universities are engaged in institutionalizing sustainability into their systems in the last two decades [11]. This is arguably due to the increased level of awareness of sustainability issues in society and the significant impacts of university activities on communities [2]. Additionally, the increasing significance of declarations and partnerships for fostering transformative sustainable development is confirmed by the more than 1000 universities by signing the Copernicus University Charter, the Talloires Declaration, and the Kyoto Declaration [5]. However, sustainable development in universities is still far from being integrated into a holistic manner by university leaders [12]. Further inclusive addition of sustainable development has been called by a number of authors into their systems [13]. Citizens always support sustainability [14].

A high-quality sustainability assessment tools can assist progress to the sustainability and improve this problem through detection of most excellent practices. In addition, these tools support communication of progress within institutions, which is a key to success in moving toward the amorphous target of sustainability in universities. To attain these benefits, universities assessment tools must be developed, constructed and implemented.

### 2.2 Describe the steps needed to develop an assessment model for universities

Numerous of existing sustainability assessment methodologies and model of government, education and organizations were critically examined and reviewed. The sustainability assessment model developed in this study by using these other tools as launching points. Figure 1 shows the university assessment model processes which developed by the author.

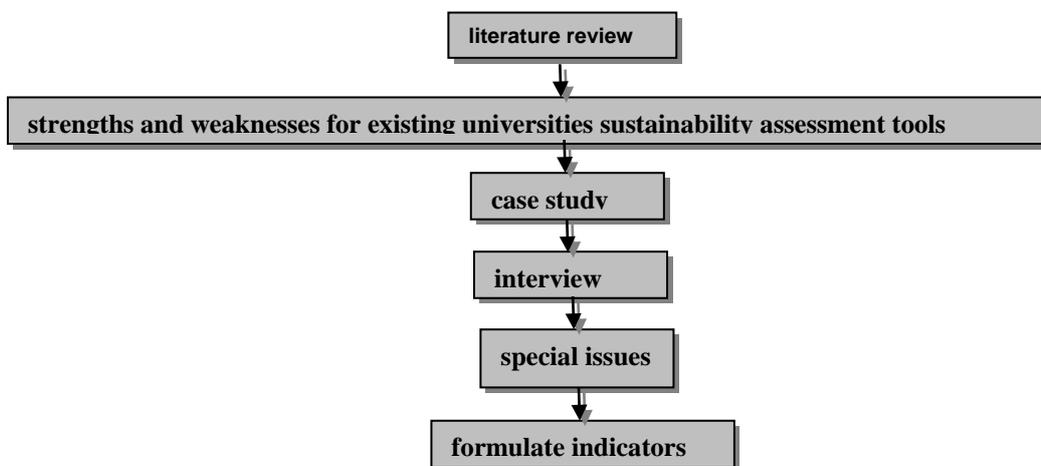


Fig 1. University's assessment model

### **2.2.1 Review the literature / document analysis by means of developing universities sustainability assessment tools**

The first step in developing a universities sustainability assessment tool was an extensive literature review related to analyzing sustainability assessment in universities [15]. The work of [16] is a good reference point for recognizing items to assess universities sustainability. This study was conducted mainly through a literature review of documents analysis to recognize the main aspects of a sustainable university and approaches in assessing sustainability of the university. The developed model involves six processes that begin with a review of literature on university sustainability and university sustainability assessment approaches. An archival research method was conducted over different university sustainability dissertations; university sustainability approaches and university sustainability articles. The purpose of this process was to identify international university sustainability assessment approaches. Journal of Cleaner Environment, Journal of Educational Policy, and Journal of Education for Sustainable Development are the major documents, which their articles were analyzed. This study examined the key aspects outlined in the previous comprehensive approaches and selected of related elements for possible adoption and integration in the Iraqi university's sustainability assessment model. Moreover, various documents were analysed as it is shown in Table 1. These documents are used as reference to create a model to assess sustainability in the Iraqi universities. [17] analyzed 11 of the mainly adopted assessment tools to measure sustainability initiatives in universities."

On the other hand, [17] suggested that best university sustainability assessment tool should:

- Recognize significant issues: suitable issues of major importance to university must be addressed by sustainability assessment tools contextually.
- Be comparable and calculable: a limiting factor in the assessment is the capability to compute the development toward sustainability.
- Overcome the ecological efficiency
- Motivations and measure processes: the instruments to compute sustainability ought to request about rewards, incentives and other process
- Be comprehensible: tools for assessment of sustainability should be comprehensible to a wide range of stakeholders

**Table 1** list of universities sustainability assessment tools analyzed by [18]

No.	Tool of Sustainability Assessment
1	Campus Ecology (1993)
2	Higher Education Funding Council for England's environmental report and workbook (Environmental Workbook) (1998)
3	University Leaders for a Sustainable Future's Sustainability Assessment Questionnaire for Colleges and Universities (SAQ) (1999)
4	Environmental Management System Self-Assessment Checklist (2000)
5	Penn State Indicator Report(1993)
6	Auditing Instrument for Sustainability in Higher Education (AISHE) (2000)
7	National Wildlife Federation's State of the Campus Environment (2001)
8	Campus Sustainability Selected Indicators Snapshot (2001)
9	Campus Sustainability Assessment Review Project (CSARP) (2001)
10	Campus Sustainability Assessment Framework (CSAF) (2002)
11	Higher Education Partnership for Sustainability (HEPS) (2002)
12	Good Company's Sustainable Pathways Toolkit (2003)
13	Global Reporting Initiative Modified for Universities(2004)
14	Sustainability Tracking, Assessment and Rating System (STARS) for Colleges and Universities Version 0.4 (2006)
15	Campus Sustainability Assessment Framework Core (CSAF Core) (2009)
16	College Sustainability Report Card(2010)

### 2.2.2 Strengths and weaknesses of university sustainability assessment models

The universities sustainability assessment tools reviewed in the previous section differ seriously in purpose, function scope, and state of development. On the other hand, these tools share significant strengths and weaknesses, as it was clear in Table 2.

**Table 2** the major strengths and weaknesses of existence universities sustainability assessment tools [17]

Tool	Major Strength points	Major weakness points
National Wildlife Federation's State of the Campus Environment	Identifies processes and current status	Small sample within each college/university
Sustainability Assessment Questionnaire	Emphasises sustainability as a process	No mechanism for comparison or benchmarking
Auditing instrument for sustainability in higher education (AISHE)	Flexible framework for institutional comparisons	Motivations are potentially excluded
Environmental Workbook and Report	Useful in strategic planning and prioritising	Operational eco-efficiency and compliance focus
Greening Campuses	Comprehensive, action orientation incorporating processes	Calculations and comparisons difficult
Environmental performance survey	Compatible with environmental management systems	Neglects sustainability and cross functional initiatives
Indicators Snapshot/Guide	Quick, prioritised environmental snapshot	Operational with little reference to processes, motivations, and sustainability
Grey Finstripes with Green Ties	Model for data collection and reporting Links programs and reputations	Not sustainability specific
EMS Self-assessment	Rapid self-assessment focused of processes	Operational eco-efficiency focus
Higher Education 21's Sustainability Indicators	Recognises sustainability explicitly and strategically	Indicators may not represent most important issues

None of these tools contains parts that are explicitly designed for universities. Additionally, they do not cover the two important parts of the universities system (education, research). Therefore, their efficiency for assessing university's sustainability is decreased. Twelve sustainability tools were comprised by [19]. The tools that [19] assessed were not build up to be employed within universities, although a number of them may possibly be modified for this purpose and a number of their strengths may possibly be useful to universities. However, many tools have been developed to deal with the specific requires of universities and to include the five university systems such as the State of the Campus Environment, Auditing Instrument for Sustainable Higher Education, and Sustainability Assessment Questionnaire [20]. These tools recognize important issues in addition to methods to set and achieve prioritized sustainability goals to offer a base for strategic planning. On the other hand, most assessment tools dose not effectively communicate methods and results.

### 2.2.3 Case study

The selected case study university is among the oldest, most important, most popular and highest-ranking universities of Iraq. Baghdad University is characterized by being one of the oldest and the largest universities in the Middle East. Its foundation history extends with the establishment of its colleges such as Islamic Sciences College (1067 AD) to develop the university later and go ahead as the earliest university in Iraq in 1957. Baghdad University is superior to more than 18 thousand universities within the international qualifying by superiority on an enormous number of American, Canadian, European and Arab universities to be the prominent university among the international universities. Moreover, the number of the students is rising every year to reach 68 thousand male and female students.

#### **2.2.4 Interview**

Semi-structured interviews were designed to use in the case study to explore the issues in-depth. To ensure the survey is clear and easy to answer, the interview survey was piloted prior to the study proper. This allows identifying points of confusion and problems leading to alterations the final version of the interview. Interviewees were selected for participation in the interview by recommendations using the technique of snowballing. Snowball sampling is an approach for selecting interviewees who can provide additional information. The process started by asking an already known interviewee, with whom else one might carry out an interview. The process might be used to secure a wider range of interviewees by means of a person already known by the researcher to recommend other interviewees who might have knowledge or expertise in areas of sustainable development. The results issues were reassessed and the results from each research technique were listed on the same page.

#### **2.2.5 Special issues**

The next step in the development of the model is to explore the major issues within the case study. In this step the determining and diagnosis of university sustainability aspects can be achieved, which is a critical step in the overall model. The results of this step are recognition of issues that have an adverse effect on the sustainability of the University of Bagdad. The data, which derived from the interviews, were simplified and organized.

#### **2.2.6 Indicators development process**

The indicators had been developed in consultation with experts and through a careful review of the literature on sustainability. The formulation of indicator has followed the approach developed by [21] to develop a list of indicators. This approach consists of five steps as follows: 1. Reviewing all issues identified through previous step, 2. Thinking about possible indicators for each issue, 3. Carrying out deep thinking, 4. Consulting experts, 5. Drawing on findings from other studies and initiatives. Furthermore, indicators have to reflect the following important sustainability indicator characteristics, namely: simple, credible and understood [22]. Moreover, it is necessary at this stage (formulation stage) to think about how to measure progress towards sustainability during implementation and select the most appropriate indicator. The indicators should cover the whole "university system (Education, Research, Campus operations, and Community outreach [23]. This should help university to assess the sustainable development of each of the subsystems.

### **3. Results and Discussion**

Due to the important role that universities play to achieve sustainability. This research will enable to assess the extent to which universities in Iraq are including sustainability in programs and curriculum, research and scholarship, faculty and staff development and rewards, outreach and community service, student opportunities, and institutional mission and planning. The results of this research might provide information to organizations interested in sustainability education, about the extent in which universities in Iraq are addressing sustainability in their curriculums and activities create awareness about sustainability in universities in Iraq in which sustainability is currently not being addressed, or promote actions or plans consistent with UNESCO goal of integrating principles, values, and practices of sustainability in all aspects of education and learning . The methodology applied for this research was qualitative – quantitative exploratory cross-sectional. The selection of this methodology was the most appropriate in order to meet the aim of the research. The

instrument selected was based on interview and questionnaire. This instrument, as it was expected, provided a quick snapshot of the issues and needs in universities, it was economically viable and it provided a rapid turnaround in data collection. The participants were contacted face to face, when possible, and via email in some cases. Participants from Bagdad University completed the survey, with a return rate of 100%.

The Quantitative data were collected mainly using a Likert-type ordinal scale. A questionnaire for ranking indicators had been distributed. A group of forty participants from the University of Bagdad were used to contribute to the process for ranking of indicators. Each participant had been asked to choose the level of importance attributed to each indicator listed in the questionnaire. This questionnaire applied the Likert scale which has a number and a concise description connected with each reply category. The participant who participated at questionnaire were asked to show the significant of each of the listed category of indicators on a scale of 1 to 4 where 1 associated with not significant; 2 associated with less significant; 3 associated with significant and 4 associated with very significant. The participants selected the categories which best explain their responses to the category of indicators that will be rated. The average score for each indicator was calculated. The data analysis results include the average; standard deviation and rank of each indicator by using Excel program to calculate the mean which is the average and the standard deviation which is a measure of variation or spread in the data set from the questionnaire. The average score for each indicator was calculated to rank the indicators on the basis of priority. The results of the indicators development process for the case study are presented at Table 3

To insure the reliability and the validity in addition to recognize and reduce potential problems of questionnaire results, a pilot test occurred by preparing the questionnaire and submitting it to ten professional colleagues from the University of Bagdad for review. Then, asking them to complete the questionnaire and seeking feedback from each participant to check the appropriateness of the response choices, the level of understanding of the questionnaire, the time required to complete the questionnaire and who will participate.

Curriculums are the most important issues in the University of Bagdad which are included in the highest priorities by participant followed by social issues while water use and conservation issues take the least score. As well as recycling and waste management which did not get any advanced rank as it shown at Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, and Figure 7

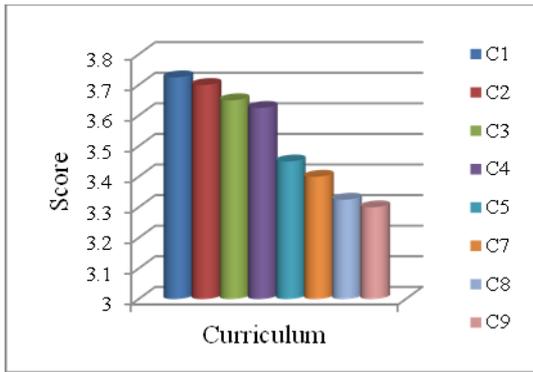


Fig. 2 Comparison of scores for curriculum sustainability indicator

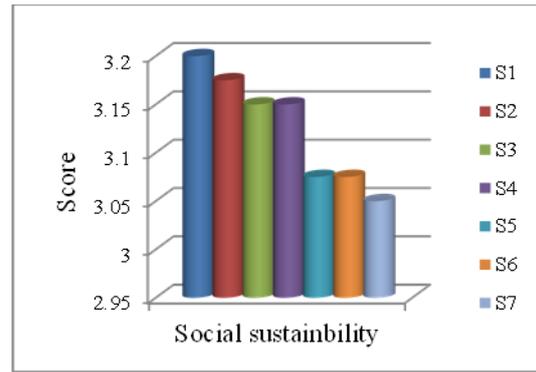


Fig. 3. Comparison of scores for social sustainability indicator

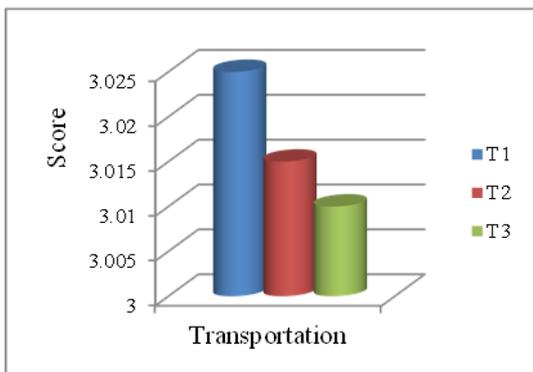


Fig. 4. Comparison of scores for Transportation sustainability indicator

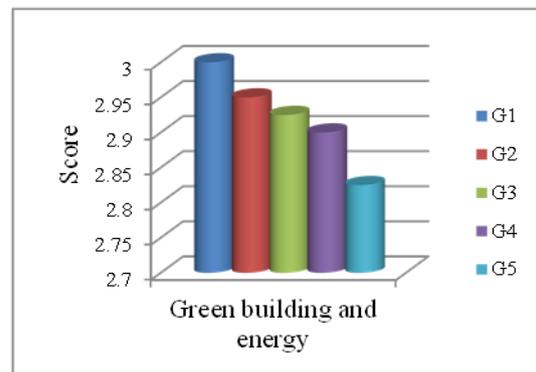


Fig. 5. Comparison of scores for Green Building and Energy sustainability indicator

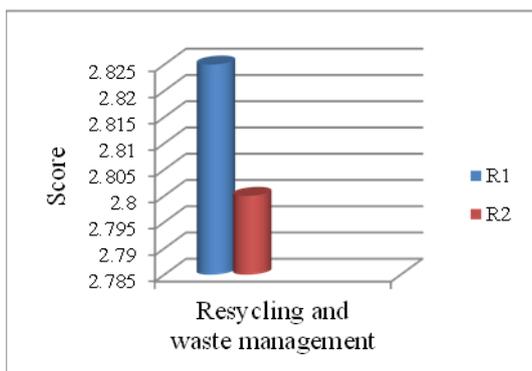


Fig. 6. Comparison of scores for Recycling and Waste Management sustainability indicator

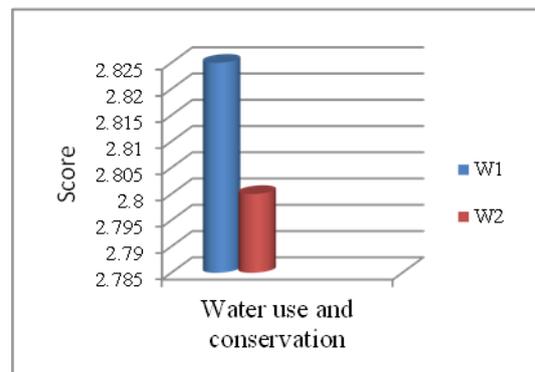


Fig. 7. Comparison of scores for Water Use and Conservation sustainability indicator

The participants give the lowest priority to a (The amount of water consumption), with an average score of 2.6 which is somewhere less important. This judgment has had a degree of consistency between the participants. Furthermore there is something which is difficult to answer when some issues are very significant, but are marked as less or not important by participants, like (Number of initiatives to safely dispose of hazardous waste) and (Number of initiatives to reduce water consumption). Although, some green building and energy issues may be essentially important, they are not considered as significant issues by participants such as (Total electric, gas, diesel energy consumption) which have a rank of 22. However, as shown in Table 3 the final set of indicators consist of (9) curriculums indicators, (7) social sustainability indicators, (3) transportation indicators and (5) green building and energy indicator, (2) recycling and waste management and (2) water use and conservation. These 28 indicators are suggested to be the indicators for measuring the sustainability of the universities in Iraq.

**Table 3** list of university sustainability assessment indicators

Categories	Indicators
Curriculum	C1) Number of graduate students with sustainability research
	C2) Number of centres providing sustainability research and services
	C3) Number of published research concentrates on sustainability issues
	C4) Number of grants and contracts giving to sustainability research
	C5) Number of departments ensure on the existence of sustainability in their curricula
	C6) Percent of courses contenting sustainability in relation to the total of courses
	C7) Number of programs that encourage sustainability
	C8) Number of programs that encourage national unity
	C9) Amount of funds allocated to the university's media
Social Sustainability	S1) Availability of university's accommodation for students, staff and academicians
	S2) Number of jobs, providing at or through the university
	S3) Proportion of non-students using the library
	S4) Percent of low socioeconomic background students
	S5) Number of women in high-level governance positions
	S6) Number of employing staff and academicians of minority ethnic groups
	S7) Number of voluntarism initiatives of students, staff and academicians
Transportation	T1) Percent of students, staff and academicians using of public transportation
	T2) Congestion delay
	T3) Transport diversity
Green Building and Energy	G1) Existence of sustainability website
	G2) Number of initiatives to reduce energy consumption
	G3) Total electric, gas, diesel energy consumption
	G4) Existence of sustainability in the strategic plan of instituting
	G5) Using renewable energy sources
Recycling and Waste Management	R1) Number of initiatives to waste recycling
	R2) Number of initiatives to safely dispose of hazardous waste
Water Use and Conservation	W1) Number of initiatives to reduce water consumption
	W2) The amount of water consumption

For quantitative information, it is necessary to gather general information to build a base line for universities, such as: number of programs and courses, and total number of research papers, etc. In order to do this, as shown in Table 4. indicators obtained for implementation of the model in Iraqi university are separated into qualitative and quantitative groups.

**Table 4** list of university sustainability assessment indicators

Indicators	Type of Indicators
C1) Number of graduate students with sustainability research	Quantitative
C2) Number of centres providing sustainability research and services	Quantitative
C3) Number of published research concentrates on sustainability issues	Quantitative
C4) Number of grants and contracts giving to sustainability research	Quantitative
C5) Number of departments ensure on the existence of sustainability in their curricula	Quantitative
C6) Percent of courses contenting sustainability in relation to the total of courses	Qualitative
C7) Number of programs that encourage sustainability	Qualitative
C8) Number of programs that encourage national unity	Qualitative
C9) Amount of funds allocated to the university's media	Quantitative
S1) Availability of university's accommodation for students, staff and academicians	Qualitative
S2) Number of jobs, providing at or through the university	Quantitative
S3) Proportion of non-students using the library	Quantitative
S4) Percent of low socioeconomic background students	Qualitative
S5) Number of women in high-level governance positions	Quantitative
S6) Number of employing staff and academicians of minority ethnic groups	Quantitative
S7) Number of voluntarism initiatives of students, staff and academicians	Quantitative
T1) Percent of students, staff and academicians using of public transportation	Quantitative
T2) Congestion delay	Qualitative
T3) Transport diversity	Qualitative
G1) Existence of sustainability website	Qualitative
G2) Number of initiatives to reduce energy consumption	Quantitative
G3) Total electric, gas, diesel energy consumption	Quantitative
G4) Existence of sustainability in the strategic plan of instituting	Qualitative
G5) Using renewable energy sources	Qualitative
R1) Number of initiatives to waste recycling	Qualitative
R2) Number of initiatives to safely dispose of hazardous waste	Qualitative
W1) Number of initiatives to reduce water consumption	Qualitative
W2) The amount of water consumption	Quantitative

#### 4. Conclusions

Universities increasing interest, to achieve sustainability can be added together with the use of assessment tools that permit comparison between universities. Currently available tools are difficult to apply in contexts where sustainability is at an early stage of development. The most important strong point of this research is that it successfully and efficiently reconsiders largely of the existing university sustainability assessments prepared in the world and gathers the excellent ideas from all of them to form an assessment model. The model formed at this article constructs depend on a great history of sustainability assessment of universities and make great efforts to take it to the next step in its development." It is very helpful, extensive, a broad, and highly analytical work.e Most sustainability categories were covered, and both public and system considerations were addressed effectively. Moreover, a transparent model was delivered which consists of five steps and can be applied by any person or organization that have an interest in promote university's sustainability. Moreover, this model is a powerful communication tool that possibly will highlight sustainability and attract the attention of institutions and leaders. "The research resulted in a set of 26 indicators which form a flexible assessment tool that has potential to be used for Iraqi university's sustainability assessment or developed further in a variety of ways. This paper contributes to academic knowledge of the techniques of formulation of indicators of university's sustainability assessment and it's proved

to be useful and simple to implement, in order to establish indicators." Universities in Iraq should be implementing this research to provide an assessment of their progress to sustainability." It's recommended that the results of this research may be helpful as a foundation to compare to similar researches in other countries, especially in the Middle East region, which might be very beneficial to achieve sustainability in universities and produce of a better and sustainable future for all. Moreover, private universities should take advantage of the results of this research to improve their university's sustainability practices. Finally, the author believes that the applied of the proposed model in this article will be extremely helpful since it offers an easy, understandable, extensive, a broad and highly analytical methodology and mechanism."

## 5. References

- [1] **Molderez, I., & Gaeremynck, V. Lambrechts, W., Mula, I., Ceulemans, K.** The integration of competences for sustainable development in higher education: An analysis of bachelor programs in management. *Journal of Cleaner Production*, <http://dx.doi.org/10.1016/j.jclepro.2011.12.034>. 2012.
- [2] **Lozano, R.** Incorporation and institutionalization of SD into universities: breaking through barriers to change. *Journal of Cleaner Production* 14, 787-796.2006
- [3] **Elton, L.** Dissemination of innovations in higher education: a change theory approach. *Tertiary Education and Management* 9, 199-214.2003.
- [4] **Lozano, R.** Diffusion of sustainable development in universities' curricula: an empirical example from Cardiff University. *Journal of Cleaner Production* 18 (7), 637-644. 2010.
- [5] **Calder, W., & Clugston, R. M.** U.S. progress toward sustainability in higher education. *The Environmental Law Reporter News & Analysis*, 33 (1), 10003-10023.2003.
- [6] **WCED.** *Our Common Future*, first ed. Oxford University Press, Oxford.1987.
- [7] **Dale, A., & Newman, L.** Sustainable development education and literacy. *International Journal of Sustainability in Higher Education*, 6 (4), 351-362. 2005.
- [8] **UNESCO & UNEP.** *Tbilisi Declaration*. Tbilisi: UNESCO.1977.
- [9] **Wright, T.** The evolution of sustainability declarations in higher education .In: Corcoran, P.B., Wals, A.E.J. (Eds.), *Higher Education and the Challenge of Sustainability: Problematics, Promise, and Practice*. Kluwer Academic Publishers, Dordrecht, The Netherlands.2004.
- [10] **Mader, C.** *Integration of sustainability into universities-good practices and benchmarking for integration*. Norderstedt, Germany: Grin Verlag.2004.
- [11] **Lozano, R., Lukman, R., Lozano, F. J., Huisingh, D. & Lambrechts, W.** Declarations for sustainability in higher education: becoming better leaders, through addressing the university system. *Journal of Cleaner Production*, vol. 48 (June 2013), 10-19. 2013.
- [12] **Milutinovi\_c, S., Nikoli\_c, V.** Rethinking higher education for sustainable development in Serbia: an assessment of Copernicus charter principles in current higher education practices. *J. Clean. Prod.* 62 (1), 107-113. 2014.
- [13] **Fadeeva, Z., Mochizuki, Y.** Higher education for today and tomorrow: university appraisal for diversity, innovation and change towards sustainable development. *Sustain. Sci.* 5 (2), 249-256. 2010.
- [14] **Monteith, J. and Sabbatini, R.** "The evolving role of sustainability on the new campus of California State University", *Greening of the Campus II: The Next Step*, Ball State University, Muncie, IN, 18-20 September, pp. 56-60. 1997.

- [15] **Venetoulis, J.** Assessing the ecological impact of a university: The ecological footprint for the University of Redlands. *International Journal of Sustainability in Higher Education* Vol. 2, Issue 2, pp. 180 – 196. 2001.
- [16] **Larrán Manuel Jorge, Francisco Javier Andrades Peña.** Determinants of corporate social responsibility and business ethics education in Spanish universities. *Business Ethics: A European Review* 23:10.1111/ beer. 2014.23. Issue-2, 139-153. 2014.
- [17] **Shriberg, M.P.** Sustainability in US Higher Education: Organizational Factors Influencing Campus Environmental Performance and Leadership. PhD dissertation, University of Michigan. 2002.
- [18] **Masaru Y. and Yuko T.** *Journal of Education for Sustainable Development* 6:1 63–77. 2012.
- [19] **Cole L.** Assessing sustainability on Canadian University campuses: development of a campus sustainability assessment framework. Canada: Royal Roads University; 2003.
- [20] **Roorda, N.** "Auditing sustainability in engineering education with AISHE", *ENTREE 2000 Proceedings, EEE Network, Brussels*, pp. 13-30.2000.
- [21] **UNESCO.** Convention for the Safeguarding of the Intangible Cultural Heritage, Paris, 17 October 2003.
- [22] **Smith, George.** The Methodology of the Principia. In Cohen and Smith (Eds.) (2002), 138-173. 2002.
- [23] **Cortese AD.** The critical role of higher education in creating a sustainable future. *Planning for Higher Education* 2003;31 (3): 15e22. 2003.
- [24] **Abdul Hameed, M.;Noor, H. ; Eman, S. Athmar, A.** Assessment of some atmospheric heavy metals in selected sites within Baghdad city. *Mesop. environ. j.* Vol.2, No.3: 42-46. 2016
- [25] **Khudhair, K. M.** Assessment of Water Quality in Main Branches of Shatt Al Arab River. *Mesop. Environ. j.*, Vol. 2, No. 1, pp.71-86, 2015
- [26] **Al-Rekabi, H. Y. and Al-Ghanimy, D. B. G.** Determine the validity of the Euphrates River (Middle Euphrates) for drinking purposes using a water quality index (CCME WQI). *Mesop. Environ. j.*, Vol. 2, No. 1, pp. 1-11, 2015.