Accelerating the transformation to a green university: University of Bahrain experience

Riyad Y. Hamzah*, Naser* W. Alnaser*, Waheeb* E. Alnaser

University of Bahrain, P.O. Box 32038, Isa Town, Kingdom of Bahrain

Abstract. Many universities are striving to have an environmental impact on the society as they are considered as small communities aiming to be eco-friendly and having low CO_2 emission. This concept has been emerging after the worldwide concern on the ozone depletion issue and global warming. As a result, many titles have appeared like "Green Universities", "eco- friendly Universities," "Environmental sustainable Universities" and "Environmentally responsible universities," etc. This paper proposes a mechanism that allows universities to go green or become environmentally sustainable higher education bodies in a short span of time. It simply advises the universities to best practice the Environmental Sustainable Development Goals (ESDG's) Components incorporated in the seventeen United Nation Sustainable Developments Goals (SDG's) that were announced on the 25 th September 2015 by all leaders of the countries which were aimed to end poverty, protect the planet and ensure prosperity for all as part of a new sustainable development agenda where each goal has specific targets to be achieved over the next 15 years. These ESDG's listed within the SDG's are the following: 1) Good Health and Well-being. 2) Quality Education. 3) Clean Water and Sanitation. 4) Affordable and Clean Energy. 5) Industry, Innovation and Infrastructure. 6) Sustainable Cities and Communities. 7) Climate Action. 8) Life below Water. 9) Life on Land. Therefore, incorporating such 9 Goals in the strategic planning of each worldwide university that has aligned its goals with the Country National Strategy - which by default includes these SDG's - will accelerate and boost each university to transform to Green and Environmentally Sustainable campus. The paper also sheds light on the experience of University of Bahrain in this respect.

1 Introduction

Countries, including their governments, institutions, industries (private and local), universities and even its schools have become very much concerned with the sustainable developments in general and environmental sustainable developments after they had all come to believe that striving towards sustainability will assure the continuation of living in peace and environmentally hazardous environments. Therefore, pinpointing these "Sustainable Development Global" or "Global Goals" and committing to adopting them by each country will help in protecting the planet and assure enjoying peace and prosperity by its inhabitants. The SDGs came into effect in January 2016 on the successes of the Millennium Development Goals (MDG), which started a global effort in 2000 to mainly reduce income poverty, provide much needed access to water and sanitation, drive down child mortality and drastically improve maternal health. The SDG's were born at the United Nations Conference on Sustainable Development in Rio de Janeiro, Brazil, in 2012. The objective was to produce a set of universal goals that meet the urgent environmental, political and economic challenges facing our world.

According to UN [1] these 17 Goals build the SDGs work in the spirit of partnership and pragmatism to make the right choices to improve life, in a sustainable way, for future the generations of any nation). The broad goals are interrelated though each and has its own targets to achieve with total of 169 targets. SDGs cover a broad range of social, environmental and economic development issues and because they are very vital they were known as "Transforming our World: the 2030 Agenda for Sustainable Development" or 2030 Agenda. SDG's provide clear guidelines and targets for each country to adopt in accordance with their own priorities and the environmental challenges of the world at large, i.e. setting these SDG's in each national strategic plan. UNDP is uniquely placed to help such countries to implement these Goals through its work in some 170 countries and territories. These 17 Goals are the followings:

1) No Poverty. 2) Zero Hunger. 3) Good Health and Well-Being for people. 4) Quality Education. 5) Gender Equality. 6) Clean Water and Sanitation. 7) Affordable and Clean Energy. 8) Decent Work and Economic Growth. 9) Industry, Innovation and Infrastructure. 10) Reduced Inequalities. 11) Sustainable Cities and Communities. 12) Responsible Consumption and Production. 13) Climate Action. 14) Life Below Water, 15) Life on Land. 16) Peace, Justice and Strong Institutions. 17) Partnerships for the Goals.

2 Discussion

Universities and industries are more concerned to the Environmental Sustainable Developments Goals (ESDG) Components incorporated in these 17 Sustainable Developments Goals (SDG's), these are:

1) Good Health and Well-being (Goal 3).
2) Quality Education (Goal 4).
3) Clean Water and Sanitation (Goal 6).
4) Affordable and Clean Energy (Goal 7).
5) Industry, Innovation and Infrastructure (Goal 9).
6) Sustainable Cities and Communities (Goal 11).
7) Climate Action (Goal 13).
8) Life below Water (Goal 14).
9) Life on Land (Goal 15).

Ranking bodies for Environmental Sustainable Universities or Green Universities should include in their criterion these listed 9 goals, as much as possible in a measurable scale or indicators. These will make them faster to be achieved since the mother of these universities are committed to adopt the SDG's and accordingly the ESDG's- which already set in their Strategic Plan (or Government Working Action Plan) which is already budgeted and will receive favorable support.

According to our modest analysis, the UI Greenmetrics for Green Universities ranking which is established by University of Indonesia in 2010 [2] looks like that it has benefited a lot from such ESDG, which includes the followings main criterion:

1. Setting and Infrastructure (SI), which is related to Goal 5 and 6 in our ESDS (or Goal 9 and 11 in SDG's).
2. Energy and Climate Change (EC), which is related Goal 4 and Goal 7 in our ESDS (or Goal 7 and Goal 13 in SDG's).
3. Waste (WS), which is related Goal 1 and 8 in our ESDS (or Goal 3 and Goal 14 in GSD's).
4. Water (WR), which is related Goal 3 in our ESDS (or Goal 6 in SDG's).
5. Transportation (TR), which is related Goal 7 and 9 in our ESDS (or Goal 13 and 15 in GSD's).
6. Education (ED), which is related Goal 2 in our ESDS (or Goal 4 in SDG's).

To clarify and support such conclusion on the matching of UI Greenmetric and ESDG one can refer to components of such Environmental Sustainable Development Goals [3]. This is explained as follows:

I. **Criteria number 1** in UI Greenmetric (Setting and Infrastructure), which is classified to match with Goal 5 and 6 in ESDG (or Goals 9 and 11 in SDG's), is explained as follows:
  A. Goal 5 in ESDG (or Goal 9 in SDG's) is concerned with building resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. Industry plays a critical role in innovation and research, which are crucial for job creation, poverty eradication, gender equality, labour standards, and greater access to education and health care. Together, it will lead to promote inclusive and sustainable industrialization (higher education campus) and technology development.
  B. Goal 6 in ESDG (or Goal 11 in SDG's) is concerned with making cities (University Campus) and human settlements inclusive (students and staff), safe, resilient and sustainable. This is because rapid urbanization puts pressure on supplies of fresh water, sewage systems, the living environment and public health. Embracing in the technological and social benefits of cities (universities) by making sure they are safe for everyone (students and staff) will lead to a sustainable campus valid for decades to come.

II. **Criteria number 2** in UI Greenmetric (Energy and Climate Change), which is classified to match with Goal 4 and Goal 7 in ESDG (or Goal 7 and Goal 13 in SDG's), is explained as follows:
  A. Goal 4 in ESDG (or Goal 7 in SDG's) is concerned with ensuring access to affordable, reliable, sustainable and modern energy for all. As is explained [3] clean, sustainable energy is not just about the environment. In fact, there are lots of death cases resulting from gas emissions during energy production and operation.
  B. Goal 7 in ESDG (or Goal 13 in SDG's) is concerned with taking urgent action to combat climate change and its impacts. Climate change has the potential to derail other efforts toward sustainable development by altering weather patterns that threaten the food production and increasing sea levels which will displace coastal communities (universities). This compels universities to increase their awareness and convey urgency to the public that they are combating climate change.

III. **Criteria number 3** in UI Greenmetric (Waste), which is classified to match with Goal 1 and Goal 8 in ESDG (or Goal 3 and Goal 14 in SDG's), is explained as follows:
  A. Goal 1 in our ESDG (or Goal 3 in SDG's) is concerned with ensuring healthy lives and promoting well-being for all at all ages (particularly young students as they are the power of the future), preventable disease (from pollution or bad interior air quality in lecture room and laboratories or from building materials and furniture), untreated drug & alcohol abuse, preventable birth defects, avoidable traffic and industrial accidents which will lead to long and healthy life.
  B. Goal 8 in ESDG (or Goal 14 in SDG's) is concerned with conservation and sustainable use of the oceans, seas, and marine resources for sustainable development. In fact, a lot of waste (liquid or sometimes solid waste) has ended up in the seas or oceans. Oceans and seas are being threatened and destroyed by human (students and staff) activities like marine pollution, overfishing, and destruction of marine habitats.

IV. **Criteria number 4** in UI Greenmetric (Water), which is classified to match Goal 3 in our ESDS (or Goal 6 in SDG's) is explained as follows:

  A. Goal 3 in our ESDS (or Goal 6 in SDG's) is concerned with ensuring availability and sustainable management of water and sanitation for all. It is vital to have an access to clean water at home (or universities) therefore it must be conserved and treated or reuse safely for irrigation. Diseases caused by contaminated water kill more people every year than all forms of violence, including war. By prioritizing clean water, universities can improve the health and livelihoods of its students.

V. **Criteria number 5** in UI Greenmetric (Transportation), which is classified to match Goal 7 and Goal 9 in our ESDS (or Goal 13 and Goal 15 in SDG's), is explained as follows:

  A. Goal 7 in ESDG (or Goal 13 in SDG's) is concerned with taking urgent action to combat climate change and its impacts. One of the most damaging issues to the environment is gas emissions from transportation, especially if students use their own car in frequent going and coming trips more than two or three times a day! The world's industrialised nations have changed the balance of the earth's carbon cycle over the last 150 years by burning large amounts of fossil fuels. Climate change has been proving and has been witnessed to affect the climate by altering weather patterns that threaten our food production and increasing sea levels which will displace coastal communities.

  B. Goal 9 in our ESDS (or Goal 15 in SDG's) is concerned with protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. In fact, nearly all these elements are vulnerable due emissions from emission of transport gases [3].

VI. **Criteria number 6** in UI Greenmetric (Education), which is classified to match Goal 2 in our ESDS (or Goal 4 in SDG's) is explained as follows:

  A. Goal 2 in our ESDS (or Goal 4 in SDG's) is concerned with ensuring inclusive and equitable quality education, especially in teaching courses concerned with the environment and sustainability based on critical thinking, experimentation, research and contractual studies. Strong and quality education must be always being promoted and be provided lifelong to allow efficient learning opportunities for all. As the world's population grows, more resources and policies are needed to make sure that students at the universities (and everywhere) get a good education. According to UN [4], the world needs two million teachers and four million new classrooms to make sure every student can get an education. Full access to quality education (especially in environmental issues) is the first step to achieving sustainable development, poverty eradication, gender equality and women's empowerment. Let's make the sound investment in quality education by ensuring that primary and secondary schools are free for every child by 2030.

The University of Bahrain, for example, has aligned its "Green Initiatives" in its own strategic plan (2015 - 2018) - which has 7 Goals, 30 Initiatives, and 29 Key Performance Indicators. This strategy is aligned (directly and indirectly) with the nine Environmental Sustainable Development Goals (ESD's) which are embedded in the seventeen Sustainable Development Goals (SDG's) where the National Strategy or the Government Working Plan, approved by the National Council (Parliament and Consultative Council) has made the University receive good rank and points , from the first entry in 2016 i.e. ranked 242 out of 516 worldwide universities with a score of 4,475 while in 2017 its rank was 307 out of 619 worldwide universities with a total score of 4,457. The backward move with a lower score in 2017 was attributed by UI Greenmetric management as due to inaccuracy in their scoring in 2016 in the education although in 2017 we had introduced an Internationally unique PhD program in Environmental Sustainable Developments (with partnership with regional UN offices in Bahrain) and had upgraded our 15-year-old MSc in Environmental Sustainable Development (and partnership with UNESCO chairs) had also won about USD 1 million as contractual research in renewable energy for water production and PV panels testing and accordingly improving. Comparison of the performance of these two years in UI Greenmetric ranking is as follow:

1. In 2016, ranking in Education was 180 globally (813 points) and in 2017 the score is 638!
2. In 2016 ranking in Transportation was 281 globally (773 points) and in 2017 the score was 813!
3. In 2016 ranking in water is 287 globally (340 points) and in 2017 the score was 340.
4. In 2016 ranking in Waste is 279 globally (999 points) and in 2017 the score was 1023.
5. In 2016 ranking in Energy and climate is 362 globally (581points) and in 2017 the score was 638!
6. In 2016 ranking in Setting and Infrastructure was 362 globally (969 points) and in 2017 the score was 978.

This comparison clearly supports the suggestion of taking advantage of the existing UN ESDG's and SDG's in accelerating the Green practice in the universities.

Much research has been conducted seeking mechanisms that enhance the dissemination and the practice of Green or Environmental Sustainable Campus [5-14]. The reason is universities can be considered as "small cities" which may have heavy impacts on the environment due to their activities, and movement of goods and persons inside campuses [16]. Universities can be seen as complex buildings, in terms of waste generation, transportation, water and materials consumption, energy

and electricity consumption, given the scientific, social and educational activities that take place within their boundaries [15]. Therefore, it is strongly believed that taking the ESD's embedded in SDG's set by United Nations will assist universities to be "Greener" and "Environmentally Sustainable" universities.

3 Conclusion

Aligning the Green Initiatives in certain universities in their own strategic plans which are aligned with the nine Environmental Sustainable Development Goals (ESD's) embedded in the seventeen Sustainable Development Goals (SDG's) will boost and accelerate such universities to be Green or Environmentally Sustainable because such SDG's are already mandated, approved and budgeted in the Government Strategic Work Plan which all legislation parties like the National Council (Parliament and Consultative Council) or Senate have already approved and embraced.

References

1. United Nations, available online at http://www.undp.org/content/undp/en/home/sustainable-development-goals.html

2. UI GreenMetric World University Rankings, available online at http://greenmetric.ui.ac.id/wp-content/uploads/2015/07/UI-Greenmetric-Guideline-2016.pdf

3. Trombulak, S.C. and Christopher, A. F (2000) Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities, *Conservation Biology*, **14**, issue 1, pp18-30.

4. https://www.globalgiving.org/sdg/?rf=ggad_15&gclid=CjwKCAiA24PVBRBvEiwAyBxf-T-GAFIhsznA2nCOAEbqAcNztXxd2-bKxstZLMsP1yr6jxETOXtjVhoCjXwQAvD_BwE

5. Hajrasouliha, A. (2017) Campus score: Measuring university campus qualities, *Landscape and Unrban Planning*, **158**, pp166-176.

6. Geng, Y, Liu, K., Xue, B., Fujiita, T. (2013) Creating a "green university" in China: a case of Shenyang University, Journal of Cleaner Production, **61**, pp13-19.

7. Ragazzi, M and Ghidini, F. (2017) Environmental sustainability of universities: critical analysis of a green ranking, *Energy Procedia*, **119**, pp 111–120.

8. Azar, E and Al Ansari, H. (2017) Framework to investigate energy conservation motivation and actions of building occupants: The case of a green campus in Abu Dhabi, UAE, *Applied Energy*, **16**, pp 563-573.

9. Tiyarattanachai, R. and Hollmann, N. M. (2016) Green Campus initiative and its impacts on quality of life of stakeholders in Green and Non-Green Campus universities, *SpringerPlus*, **5**:84, DOI 10.1186/s40064-016-1697-4.

10. Kingston, K., Cassil, B. and Wilson, B. (2017) Inspiring a sustainable culture at a school or university, *American School & University*, Asumag.com, pp 24-26.

11. Chalfoun, N. (2014) Greening University Campus Buildings to Reduce Consumption and Emission While Fostering Hands-on Inquiry-Based Education, *Procedia Environmental Sciences,* Vol 2, pp 288-297.

12. Subramaniam, D., Sulaiman, H., Saleh, Al Omar, W., Salim, M (2016) Institutionalize waste minimization governance towards campus sustainability: A case study of Green Office initiatives in Universiti Teknologi Malaysia, *Journal of Cleaner Production*, **135**, pp 1407-1422.

13. Patel, B. and Patel, P. (2012) Sustainable campus of Claris life sciences through green initiatives, *Renewable and Sustainable Energy Reviews*, **16**, pp 4901-4907.

14. Massimo, D.E., Fragomeni, C., Malerba, A. and Musolino, M. (2016) Valuation Supports Green University: case Action at Mediterranea Campus in Reggio Calabria, *Procedia- Social and Behavioral Sciences*, **223**, pp 17-24.

15. Alshuwaikhat, H.M. and Abubakar, I. (2008). An integrated approach to achieving campus sustainability: assessment of the current campus environmental management practices. *J Clean Prod*, **16**, pp 1777-1785.