The Green University's Role in Developing Environmentally Friendly Infrastructure: Reference to The University Of Wageningen, Ranked Number One In The World

دور الجامعة الخضراء في تطوير البنية التحتية الصديقة للبيئة:

إشارة إلى جامعة واجينجين المصنفة الأولى عالميا

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ملخص: تهدف هذه الدراسة إلى إبراز الدور الفعال للجامعة الخضراء في تطوير البنية التحتية الصديقة للبيئة، وتوصلت الدراسة إلى أن التنمية المستدامة تعد تنمية مستمرة طويلة الأمد للمجتمع تهدف إلى تلبية حاجة البشرية الآن وفي المستقبل من خلال الإستخدام الرشيد ، وتجديد الموارد الطبيعية ، والحفاظ على الأراضي للأجيال القادمة، وكما تهدف التنمية المستدامة إلى القضاء على الفقر بجميع أشكاله في كل مكان ، وكذلك إلى أن أحد أهداف التصنيف الجامعي العالمي للجامعة هو تعزيز التغيير الاجتماعي الذي تقوده الجامعة من حيث أهداف الإستدامة، وأن من أهم المجالات التي تحظى باهتمام كبير من جامعة Wageningen للإستدامة هي الطاقة والبناء والمشتريات المستدامة والنفايات والغذاء والتنقل، وفي النهاية أوصت الدراسة إلى ضرورة الإستفادة من خبرات الجامعات التي إحتلت المراتب الأولى في التصنيف العالمي للجامعات من أجل تحقيق الإستدامة.

الكلمات المفتاحية: الجامعات، التنمية المستدامة، معايير التصنيف العالمية للجامعات، جامعة واجينجين.

Abstract : This study aims to highlight the effective role of the Green University in developing environmentally friendly infrastructure, and the study concluded that sustainable development is a long-term continuous development of society aimed at meeting the needs of humanity now and in the future through rational use, and renewal Natural resources, preserving lands for future generations, and sustainable development aims to eliminate poverty in all its forms everywhere, as well That one of the goals of the university's global university classification is to promote the social change that the university leads in terms of sustainability goals, and that one of the most important areas that receive great attention from the University of Sustainability is Wageningen for energy and construction, sustainable procurement, waste, food, and mobility, and in the end the study recommends the need to take advantage of the expertise Universities ranked first in the rankings of universities to achieve.

Keywords: Universities, Sustainable Development, World University Ranking Standards, University of Wageningen.

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Introduction

With increasing economic disruptions, environmental risks and social crises at the global level, the old concepts of addressing these disorders are no longer effective and effective, because short-term treatments have a capacity nature that does not create integrated objectives for stability on all aspects of future strategies, while neglecting the environmental dimension. On the other hand, new economic concepts have been formulated in order to correct environmental imbalances and achieve economic stability better through what is known as the green economy, which will contribute significantly on the one hand to the revitalization of the global economy and the preservation and creation of jobs and promote sustainable and inclusive growth and on the other hand reduce environmental risks and thus achieve a sustainable global economy, Because the University is the cornerstone of the development process and the main pillar of its success, the human being was the center of the development process and a direct relationship has emerged between education and sustainable development, as the university is the primary means of establishing positive awareness among the members of society and refining them with various resistances and skills necessary to build an educated society that is full of qualified human resources and able to keep up with the development process and participate in it effectively and efficiently, and is characterized by economic and social stability and saturated with environmental awareness.

- **The problem of the study:** From the above, the problematic features of this study are highlighted as follows: What is the effective role of green university in the development of environmentally friendly infrastructure? And what's the reality of Wageningen experience?
- **Sub-questions:** From the previous problem, several sub-questions can be asked, including the following:
- What does sustainable development mean, and what are its objectives?
- What is the nature of the relationship between the university and sustainable development?
- What are the main points of the Experience of The University of Wageningen in the development of environmentally friendly infrastructure?
- **The Importance of the study:** The importance of the study stems from the special importance of both the university theme and sustainable development and the urgent need to create sustainable economics that take into account the environmental aspects, by focusing on the university, which is a link with society and an essential tool for establishing awareness among its members to maintain environmental stability and achieve the effectiveness of sustainable development dimensions.
- **The objectives of the study:** The core objectives of this study can be summarized as follows:
- Learn about theoretical concepts about sustainable development;
- Learn about the relationship between the University and sustainable development;
- Introducing The Experience of The University of Wageningen and its Role in Sustainability.
- **Methodology of the study:** In order to take note of the aspects of this paper, the descriptive analytical approach was used to explain and clarify the various theoretical terms associated with sustainable development and the role of universities in achieving sustainability, with the interpretation of the criteria of the world ranking of green universities based on the experience of the leading University of Wageningen.
- **Study axes:** The problem in this study can be addressed through the following topics:
- University and Sustainable Development;
- Green Metric Global Green Universities Ranking;

- University of Wageningen Netherlands (ranked first in the world).

1-   University and Sustainable Development

Various concepts related to university and sustainable development will be presented and the relationship between them clarified.

1-1-   Definition of sustainable development

- In 1992, the Rio de Janeiro declaration on Environment and Development described sustainable development as long-term continuous development of the society aimed at satisfaction of humanity's need at present and in the future via rational usage and replenishment of natural resources, preserving the Earth for future generations .

In a definition presented by Pearce in 1993, sustainable development is related to the society's development whose costs are not placed on future generations, or at least efforts are made to compensate for such costs (Environmental Challenges in Farm Management). This ethical necessity not to make the development a burden for future generations and to guarantee these generations' possibilities analogous to those available to previous generations should be seen as a normative basis of sustainable development (Remigijus & and others, 2009, p. 29), see Figure (01).

1-2-   The importance of sustainable development

The role of sustainable development of society has been noted since 1992 the Earth Summit in Rio de Janeiro and reiterated at the World Summit Sustainable Development in Johannesburg in 2002. Without environmental protection cannot ensure sustainable development. Sustainable development includes environmental protection, while environmental conditions sustainable development. The European Union requires a new approach to global environmental problems linked to environmental effects and pressure of all socio-economic consequences. Realizing the need for continued economic and social development, it is imperative to protect and improve the state of the environment represents the only possibility to create and maintain the welfare of both the present generation and those to come; this balance was the factor that can and should ensure the development of society as a whole. This is the key issue of sustainable development. In the last century, economic and technical progress has led to the neglect and deterioration of natural resources systems. The global economy, however, is now structured and non-renewable resources with a strong impact on the environment, exceeding the capacity of different ecosystems. Examples are: the decimation of forest areas, reducing the area of farmland per person, reduction of drinking water, global warming, melting glaciers and extinction of animal and plant species. Environmental issues and how man / human communities affect ecosystem concerns have been part of human society from the beginning. It is believed today that many prehistoric societies have developed rules and taboos regarding the use of certain common resources so as to protect or ensure their rational exploitation. The natural resources and ecosystems supporting everyday life were represented in many traditions and rituals of communities living in close contact with nature.

In this context, sustainable development is of fundamental importance because: (Dan Cristian & and others, 2015, pp. 808, 809)
- The use of renewable resources does not exceed their rate of regeneration with emphasis on preservation of natural resources. In this eco-centric approach, natural resources are assigned an

intrinsic value, independently of their usefulness to human beings. It is a romantic vision that sees nature as an antidote to industrialized society.

- The use of renewable resources cannot exceed the replacement rate. In this case the emphasis is on conservation of natural resources. This approach is deeply anthropocentric - nature has value to the extent that sustains life and human activity is prevalent even today.

- The release of harmful substances shall not exceed the capacity of natural systems to absorb and compensate. In this case the general welfare of the ecosystem should be the first priority, and human aspirations and needs to be resized and re-evaluated by the fact that they are not a priority, but a small element among many other items.

1-3-   The 17 Sustainable Development Goals

These objectives can be summarized below: (United Nations, 2019, pp. 04-20)

- End poverty in all its forms everywhere;
- End hunger, achieve food security and improved nutrition and promote sustainable agriculture;
- Ensure healthy lives and promote well-being for all at all ages;
- Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all; Achieve gender equality and empower all women and girls;
- Ensure availability and sustainable management of water and sanitation for all;
- Ensure access to affordable, reliable, sustainable and modern energy for all;
- Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation; Reduce inequality within and among countries;
- Make cities and human settlements inclusive, safe, resilient and sustainable;
- Ensure sustainable consumption and production patterns; Take urgent action to combat climate change and its impacts; Conserve and sustainably use the oceans, sea and marine resources for sustainable development;
- Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;
- Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;
Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

1-4-   Dimensions of sustainable development

The dimensions of sustainable development can be explained in figure (02). Through the previous Figure (02) the dimensions of development can be illustrated in the following: (Christopher, 2018)

- **Environmental Sustainability:** In a truly sustainable environment, an ecosystem would maintain populations, biodiversity, and overall functionality over an extended period of time. Ideally, decisions that are made should promote equilibrium within our natural systems and seek to encourage positive growth. Unnecessary disturbances to the environment should be avoided whenever possible. If there is a disturbance, it should be mitigated to the maximum practicable extent. When decisions are made,

one part of the discussion should always be the environmental impacts of the proposed outcome or result.

There are several items that are directly related to environmental sustainability. One of the concepts that is of the utmost importance is the proper management of our natural resources. Using the Z-squared approach to sustainability, we can minimize our impacts to the environment. In some cases we can even promote habitat restoration and preservation as means to negotiate a successful solution to a problem.

- **Economic Sustainability:** Similar to environmental sustainability, economic sustainability involves creating economic value out of whatever project or decision you are undertaking. Economic sustainability means that decisions are made in the most equitable and fiscally sound way possible while considering the other aspects of sustainability. In most cases, projects and decisions must be made with the long term benefits in mind (rather than just the short term benefits). Keep in mind that when only the economic aspects of something are considered, it may not necessarily promote true sustainability.

For many people in the business world, economic sustainability or growth their main focal point. On the large scale (globally or even locally), this narrow-minded approach to management of a business can ultimately lead to unsatisfactory results. However, when good business practices are combined with the social and environmental aspects of sustainability, you can still have a positive result that is for the greater good of humanity.

There are several key ideas that make up economic sustainability. For example, governments should look to promoting "smart growth" through no-nonsense land use planning and subsidies or tax breaks for green development. Strong financial support for universities, education programs, and research & development is an important part of economic sustainability as well. In addition to this, an emphasis should also be placed on other areas such as reducing unnecessary spending and cutting red tape.

- **Social Sustainability:** Social sustainability is based on the concept that a decision or project promotes the betterment of society. In general, future generations should have the same or greater quality of life benefits as the current generations do. This concept also encompasses many things such as human rights, environmental law, and public involvement & participation. Failing to put emphasis on the social part of decision or action can result in the slow collapse of the spheres of sustainability (and society as well).

One great example of social sustainability is the passing of the Clean Water Act in 1972 (and amendments in 1977) and the Safe Drinking Water Act in 1974. Overall, these sets of laws were great pieces of legislation that set minimum water quality standards for both surface and drinking water. This had the effect of positively promoting the health and well-being of everyone in America. The clean water act also served to protect our nation's water supply by making it essentially illegal to discharge pollutants in adjacent rivers, lakes, and streams. This period of time in our nation also saw many other improvements in our environmental laws. All of these laws (and other factors as well) lead to the overall betterment of society for Americans. The graph below illustrates the correlation between the passing of this kind of legislation and the average life expectancy for citizens of the United States.

1-5- Why the sustainable development goals need universities?

The tertiary education and scientific research sector are explicitly recognized in a number of the SDGs: however. University contribution is needed much more broadly to achieve all of the SDGs.

A quick look at the SDGs shows that they cover a very wide range of specific areas such as agriculture. health. gender equality. Water and sanitation energy industry and innovation infrastructure etc and under almoste all of them .higher education institution can make a positive contribution whether in teaching research community engagement or advisory services the unique function and expertise of universities are critical for overcoming the wide range interconnected social economic and environmental challenges which is covered by the SDG agenda. Arguably the SDGs will not be achieved without this sector. The key roles for universities are:

- University can provide the knowledge, innovations and solution to underpin the implementation of the SDGs through addressing the challenges of the SDGs that require new knowledge and new ways of doing things;
- University can develop and assess policy options and also monitor the progress;
- To achieve the SDGs we need everyone to contribute universities provide professional and personal skills and capabilities to create future leaders, decision- makers, innovators, entrepreneurs and citizens with the knowledge and motivation who can contribute to achieve the SDGs;
- Universities hold a position of neutral and trusted stakeholders within society. They also have a key role in educating the public and other sectors on the SDGs and in advocating for the importance of the SDGs (Joy , Samiya, & Saleemul, 2018, p. 02). See figure (03).

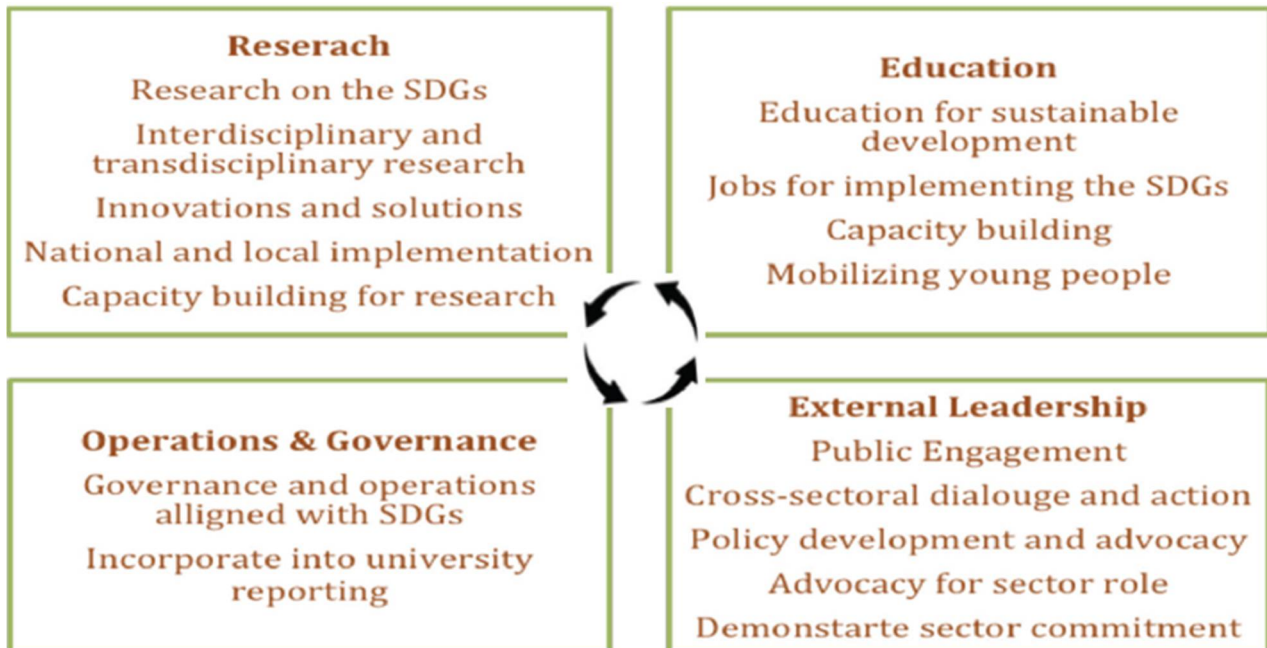### 1-6- Why universites need the sustainable development goals?

The SDGs provide a unique opportunity to higher education institution to demonstrate their willingness and capability of playing an active and meaningful role in the development of their respective countries and in contributing towards global sustainable development. They also provide an opportunity for collaboration and partnerships- south-south and north-south. Moreover, the Importance of sustainable development is recognized I a number of the goals, particularly SDG4, which calls for "inclusive and equitable quality education and lifelong learning opportunities for all". Many targets within this goal are directly relevant to universities, such as for all learners to" acquire the knowledge and skills needed to promote sustainable development". The SDGs are a global framework, business, civil society, funders, other universities and the community. Universities can draw a range of benefits from this broad support by engaging with the SDGs. Key benefits include:
- The SDGs provide a new and integrated way to communicate and demonstrate to external stakeholders- including government, funders and the community about the contribution of universities to global and local wellbeing and therefor demonstrate their impact and relevance.
- The SDGs speak to both young and people, as global citizens want to make meaningful contributions to society and the environment. Nowadays different organizations are increasingly embedding the SDGs as a strategic focus and also creating demand for graduates who understand and can implement the SDG.
- One of the strengths of the SDG agenda is working together on shared interests. This will give universities opportunities to form new collaborations with government, industry, and the community in both research and education.
Universities are increasingly re- thinking their role in the twenty-first century and looking forwards societal needs. Universities can also became role models in case of solving global challenges. To fulfill this agenda the SDGs provide a universally agreed organizing structure for a university to make the university globally aware (Joy , Samiya, & Saleemul, 2018, p. 02).

1-7- How universities can contribute to the SDGs? See figure (04).

Figure -04-: How universities can contribute to the SDGs?

Reserach
Research on the SDGs
Interdisciplinary and transdisciplinary research
Innovations and solutions
National and local implementation
Capacity building for research

Education
Education for sustainable development
Jobs for implementing the SDGs
Capacity building
Mobilizing young people

Operations & Governance
Governance and operations alligned with SDGs
Incorporate into university reporting

External Leadership
Public Engagement
Cross-sectoral dialogue and action
Policy development and advocacy
Advocacy for sector role
Demonstarte sector commitment

Source: (Joy , Samiya, & Saleemul, 2018, p. 03)

Through figure 04, it is clear that universities can contribute to sustainable development through four key elements represented in education and external leadership, as well as governance and research into interdisciplinary research innovations.

2-   Green Metric Global Green Universities Ranking:

Various elements related to the global classification of green universities will be clarified.

2-1- The concept of the Green Metric classification (sustainable scale) of universities:

Indonesia (UI) initiated world university rankings in 2010, later known as UI GreenMetric World University Rankings, to measure campus sustainability efforts. It was intended to create an online survey to portray sustainability policies programs and in universities around the world.

We based the rankings broadly on the conceptual framework of Environment, Economy, and Equity. The ranking indicators and categories are intended to be relevant to all. We have designed the indicators and weightings to be as free of bias as possible. The work of collecting and submitting data is relatively straightforward and requires reasonable staff time. Ninety-five universities from 35 countries took part in the 2010 version of UI GreenMetric: 18 from America, 35 from Europe, 40 from Asia and 2 from Australia. In 2018, 719 universities from 81 countries around the world participated. This shows that UI GreenMetric has been recognized as the first and only world university rankings on sustainability.

Our theme this year is "Sustainable University in a Changing World: Lessons, Challenges and Opportunities". We would like to focus on universities' effort to work together with their partners in sustainable issues. We look into details of universities' effort and impacts to improve campus sustainability and Sustainability Development Goals (Integrated Laboratory and Research Center, 2019, p. 03).

2-2- Green Metric's Global University Ranking goals:

The classification aims to:

- Contribute to academic discourses on sustainability in education and the greening of campus;
- Promote university-led social change with regard to sustainability goals;
- Be a tool for self-assessment on campus sustainability for higher education institutions (HEIs) around the globe;
- Inform governments, international and local environmental agencies, and the society about sustainability programs on campus (Integrated Laboratory and Research Center, 2019, p. 03).

2-3- Benefits of participating in green metric global rankings of universities:

Universities participating in the sustainability scale have a number of benefits outlined in the following: (Integrated Laboratory and Research Center, 2019, p. 03)

- **Internationalization and recognition:** Participation in UI Green Metric can help the university's efforts in internationalization and recognition by getting its sustainability efforts on the global map. Participation in UI Green Metric can result in an increase of hits to the university website, more mentions of the institution relative with the issues of sustainability on web pages, and more correspondence with institutions interested in the university.
- **Increasing awareness of sustainability issues:** Participation can help to increase awareness in the university and beyond about the importance of sustainability issues. The world faces unprecedented global challenges such as population trends, global warming, and overexploitation of natural resources, oil-dependent energy, water and food shortages and sustainability. We realize that higher education has a crucial role to play in addressing these challenges. UI Green Metric leverages the crucial role that HEIs can play in raising awareness by doing an assessment and comparing efforts in education for sustainable development, sustainability research, campus greening, and social outreach.
- **Social change and action:** UI Green Metric is primarily about awareness raising, but in the future, it will be adapted to encourage concrete change. It is crucial that understanding move forward to action to address emerging global challenges.
- **Networking:** All participants of UI Green Metric are automatically members of UI Green Metric World University Rankings Network (UIGWURN). In this network, participants can share their best practices in sustainability programs as well as networking with other participants worldwide by attending the annual UI Green Metric International Workshop and regional/national workshops hosted by approved host universities. Participants can also arrange technical workshops on UI Green Metric at their respective universities.

As a platform to turn sustainability issues into action, the network is managed by UI Green Metric as the secretariat. Programs and directions are proposed and decided by the steering committee comprising the UI Green Metric secretariat, regional, and national coordinators.

Currently, the network comprises 719 participating universities located in the dynamic and diverse Asia, Europe, Africa, Australia, America and Oceania, 1.997.294 faculty members, 16.413.522 students, with more than US$ 7.529.219.073 total research funds on environment and sustainability.

2-4- How can universities participate?

To participate in the ranking is simple. The sustainability director or other persons in charge can visit www.greenmetric.ui.ac.id to learn about the ranking and if interested can e-mail the UI Green Metric secretariat (greenmetric@ui.ac.id) to get an invitation letter and access to the system. If you have already participated in the rankings, you will be sent an invitation to participate. If you decide not to participate due to particular reasons, it would be appreciated if you inform the secretariat. Of course, you can join the survey again in the future. It is always useful if your university appoints a person in charge of a contact person. You are welcome to contact the secretariat for any inquiries regarding the survey (Integrated Laboratory and Research Center, 2019, p. 04).

2-5- How was UI Green Metric World University Ranking developed?

The decision to establish UI Green Metric was influenced by a number of factors: (Integrated Laboratory and Research Center, 2019, pp. 04, 05)

- **Idealism:** Future challenges to civilization include population pressure, climate change, energy security, environmental degradation, water and food security and sustainable development. Despite many scientific researches and public discussions, governments around the world have yet to commit to a sustainable agenda. Concerned people at Universities' Indonesia have come to the idea that universities have a privilege to help develop a consensus on key areas for action. They include such concepts as the Triple Bottom Line, the 3 Es (Equity, Economy, Environment), Green Building, and Education for Sustainable Development (ESD).

UI Green Metric World University Rankings serves as a tool for universities to deal with sustainability challenges our world is facing. Universities can work together to reduce negative environmental impacts. UI GreenMetric is a nonprofit institution; therefore, many universities can participate for free.

- **UI GreenMetric World University Rankings model:** Although UI GreenMetric was not based on any existing ranking system; it was developed with an awareness of a number of existing sustainability assessment systems and academic university rankings. Sustainability systems that were referred to during the design phase of UI GreenMetric included the Holcim Sustainability Awards, GREENSHIP (the rating system recently developed by the Green Building Council of Indonesia which was based on the Leadership in Energy and Environmental Design (LEED) system used in the U.S. and elsewhere), the Sustainability, Tracking, Assessment and Rating System (STARS) and the College Sustainability Report Card (also known as the Green Report Card).

In general, the instrument adopts environmental sustainability concept that has three elements, i.e. environmental, economic, and social (Figure 5). The environmental aspect includes natural resource use, environmental management, and pollution prevention, whereas the economic aspect includes profit and cost saving. The social aspect includes education, community, and social involvement. These three aspects are captured in the UI GreenMetric criteria. See figure (05).

In addition, university academic ranking systems that were studied during the design phase of UI GreenMetric included: The Times Higher Education World University Rankings (THE) sponsored by Thompson Reuters, the QS World University Rankings, the Academic Ranking of World Universities (ARWU) published by Shanghai Jiao Tong University (SJTU), and the Webometrics Ranking of World Universities (Webometrics) published by Cybermetrics Lab, CINDOC-CSIC in Spain. UI has been one of the members of the International Ranking Expert Group (IREG) Observatory since 2011.

During the early stages of the design of UI GreenMetric assistance was sought on the issues from experts in both ranking and in sustainability. These included the holding of a conference on university ranking and video conferences as well as expert meetings on sustainability and green building. The latest expert workshop on UI GreenMetric was held on 14 - 16 April 2019 at University College Cork, in which rectors and representatives from the following universities shared their experiences: University College Cork, Ireland; Universidade do Minho, Portugal; Mahidol University, Thailand; University of Turin, Italy; Universidad Nacional de Colombia, Colombia; University of Nottingham, UK; Umwelt - Campus Birkenfeld, Germany; Miguel Hernández of Elche University, Spain; Dublin City University, Ireland; Inseec U, France; Federal University of Santa Catarina, Brazil; University of Sao Paulo (USP), Brazil; King Mongkut's University of Technology Thonburi, Thailand; University of Groningen, Netherland; Universidad Autónoma de Occidente, Colombia; Universiti Utara Malaysia, Malaysia; Université de Sherbrooke, Canada; Escuela Superior Politécnica De Chimborazo, Ecuador; University of Milan-Bicocca, Italy; Bogor Agricultural University (IPB), Indonesia; National Pingtung University of Science and Technology, Chinese Taipei; Shinshu University, Japan; Wageningen University & Research, Netherland; King Abdulaziz University, Saudi Arabia; Universita di Bologna, Italy; Chulalongkorn University, Thailand; Universidad de Alicante, Spain; Al-Zaytoonah University of Jordan, Jordan; Universitas Sumatera Utara, Indonesia; Srinakharinwirot University, Thailand; University of Valladolid, Spain; University of Central Punjab, Pakistan; Chaoyang University of Technology, Chinese Taipei; National Cheng Kung University, Chinese Taipei; Universitas Gadjah Mada, Indonesia; Siam University, Thailand; Roma Tre University, Italy; Universitat Politecnica de Valencia, Spain; University of Chieti and Pescara, Italy; RUDN University, Russia, National Pingtung University of Science and Technology, Chinese Taipei; University of Zanjan, Iran; and National Chi Nan University, Chinese Taipei.

In 2010, 23 indicators were used within the five categories to calculate the ranking scores. In 2011, 34 indicators were used. Then in 2012, the indicator of "smoke-free and drug-free campus environment" was removed and 33 indicators were used to evaluate the green campus. In 2012, the indicators were also categorized into 6 categories including the education criteria. One change being considered was the formation of a new category for sustainability education and research. In 2015, the theme was the carbon footprint. We added two questions related to this issue in the energy and climate change section. We also improved our methodology by adding a few sub-indicators that were related to water and transportation in the 2015 ranking. A major change in methodology was done in 2017 by considering new trends in sustainability issues. In 2018, the theme was Universities, Impacts, and Sustainable Development Goals (SDGs). We added detailed answer options to the following indicators: total area on campus covered in forest, planted vegetation, water absorption besides forest and planted vegetation, energy efficient appliances usage, smart building implementation, ratio of renewable energy produce/production towards total energy usage per year, elements of green building implementation, greenhouse gas emission reduction program, all of waste and water criteria, ratio of parking area to total campus area, transportation initiatives to decrease private vehicles on campus, transportation program designed to limit or decrease the parking area on campus, shuttle services, Zero Emission Vehicles (ZEV) and pedestrian policy on campus, and the existence of a university-run sustainability website. We also added a new question on Education Criteria, i.e existence of published sustainability report. We changed the question of the bicycle into Zero Emission Vehicles by considering the green transportation related to universities worldwide. What is new in 2019

questionnaire is changes in the options for answers and more explanation about smart building indicators.

2-6- Realities and challenges:

The goal of creating a world university sustainability ranking was done with an understanding that the diversity of types of universities, their missions and their contexts would pose problems for the methodology. In particular, we are fully aware of the fact that universities differ with regard to their levels of awareness and commitment to sustainability, their budgets, the amount of green cover on their campus and many other dimensions. These issues are complex, but UI GreenMetric is committed to continually improving the ranking so that it will be both useful and fair to all (Integrated Laboratory and Research Center, 2019, p. 06).

2-7- What is the methodology? see tables (1) and (2).

Table -01-: Categories used in the ranking and their weighting

NO	Category	Percentage of total point (%)
01	Setting and Infrastructure (SI)	15
02	Energy and climate change (EC)	21
03	Waste (WS)	18
04	Water (WR)	10
05	Transportation (TR)	18
06	Education (ED)	18
TOTAL		100

Source: (Integrated Laboratory and Research Center, 2019, p. 07)

Table -02-: Indicators and categories suggested for use in the 2019 ranking

NO	Categories and Indicators	Points	Weighting
01	**Setting and Infrastructure (SI)**	300	**15%**
SI 1	The ratio of open space area to the total area	200	
SI 2	Total area on campus covered in forest vegetation	300	
SI 3	Total area on campus covered in planted vegetation	200	
SI 4	Total area on campus for water absorption besides the forest and planted vegetation	300	
SI 5	The total open space area divided by total campus population	200	
SI 6	Percentage of university budget for sustainability efforts within a year	300	
	TOTAL	1500	
02	**Energy and Climate Change (EC)**		**21%**
EC 1	Energy efficient appliances usage	200	
EC 2	Smart building implementation	300	
EC 3	Number of renewable energy sources in campus	300	
EC 4	The total electricity usage divided by the total campus population	300	
EC 5	The ratio of renewable energy production divided by total energy usage per year	200	

EC 6	Elements of green building implementation as reflected in all construction and renovation policies	300	
EC 7	Greenhouse gas emission reduction program	200	
EC 8	The total carbon footprint divided by total campus population	300	
	TOTAL	**2100**	
03	**Waste (WS)**		**18%**
WS 1	Recycling program for university waste	300	
WS 2	Program to reduce the use of paper and plastic on campus	300	
WS 3	Organic waste treatment	300	
WS 4	Inorganic waste treatment	300	
WS 5	Toxic waste treatment	300	
WS 6	Sewage disposal	300	
	TOTAL	**1800**	
04	**Water (WR)**		**10%**
WR 1	Water conservation program implementation	300	
WR 2	Water recycling program implementation	300	
WR 3	Water efficient appliances usage	200	
WR 4	Treated water consumed	200	
	TOTAL	**1000**	
05	**Transportation (TR)**		**18%**
TR 1	The total number of vehicles (cars and motorcycles) divided by total campus population	200	
TR 2	Shuttle services	300	
TR 3	Zero Emission Vehicles (ZEV) policy on campus	200	
TR 4	The total number of Zero Emission Vehicles (ZEV) divided by total campus population	200	
TR 5	The ratio of the parking area to total campus area	200	
TR 6	Transportation program designed to limit or decrease the parking area on campus for the last 3 years (from 2016 to 2018)	200	
TR 7	Number of transportation initiatives to decrease private vehicles on campus	200	
TR 8	Pedestrian path policy on campus	300	
	TOTAL	**1800**	
06	**Education and Research (ED)**		**18%**
ED 1	The ratio of sustainability courses to total courses/subjects	300	
ED 2	The ratio of sustainability research funding to total research funding	300	
ED 3	Number of scholarly publications on sustainability	300	
ED 4	Number of events related to sustainability	300	
ED 5	Number of student organizations related to sustainability	300	
ED 6	University-run sustainability website	200	
ED 7	Sustainability report	100	
	TOTAL	**1800**	

Source: (Integrated Laboratory and Research Center, 2019, pp. 07,08)

3- University of Wageningen Netherlands (ranked first in the world):

The most important elements that Wageningen University has focused on for sustainability, It is as follows: (The Official Website of the University of Wagening, 2020).

3-1- About The University of Wageningen:

Wageningen University & Research is a collaboration between Wageningen University and the Wageningen Research foundation **'To explore the potential of nature to improve the quality of life'.**

That is the mission of Wageningen University & Research. Over 6,500 employees and 12,000 students from more than hundred countries work everywhere around the world in the domain of healthy food and living environment for governments and the business community-at-large.

The strength of Wageningen University & Research lies in its ability to join the forces of specialised research institutes and the university, It also lies in the combined efforts of the various fields of natural and social sciences. This union of expertise leads to scientific breakthroughs that can quickly be put into practice and be incorporated into education, This is the Wageningen Approach.

The scientific quality of Wageningen University & Research is affirmed by the prominent position we occupy in international rankings and citation indexes, The domain of Wageningen University & Research consists of three related core areas:

- Food and food production;
- Living environment;
- Health, lifestyle and livelihood.

3-2- The Strategy of The University of Wageningen:

This strategic plan is a call upon new and existing partners, students, alumni and citizens to explore with us the potential of nature, to participate in defining and understanding the challenges facing us, to engage in discussing and navigating trade-offs, and to work with us on evidence-based and socially inclusive answers that drive transitions. This Strategic Plan is an invitation to join us in finding answers together.

3-3- - Global Challenges and The Ambitions of The University of Wageningen:

In the 21st century we face major global challenges crossing the borders of nations and sectors. Humanity is over-consuming nature and its natural resources, urban centres are becoming overpopulated, a major part of the population faces malnutrition and the climate is changing rapidly. Wageningen University & Research (WUR) provides high quality knowledge, education and research to develop and implement paths of change addressing these global challenges and to design and accelerate the necessary transitions, We cannot do this alone. We need partners- both our current and new ones, both national and international ones. Simultaneously, we aim for continuous internal renewal, change and improvements to maintain and strengthen our high quality, societal impact and global position.

3-4- Areas of great interest by The University of Wageningen:

the most important are the following:

- Energy: Wageningen University & Research aims to achieve optimal energy systems and to improve awareness of energy consumption; not through a whole array of individual measures, but through a fully operational Energy Management System.

Every year WUR generates around 65 million kWh of wind energy with windmill parks.

As a signatory to the Multi-Year Agreement 3 for energy (in Dutch MJA-3), WUR has committed to achieve 30% energy efficiency in the period 2005-2020. By following the path set out in the Energy Efficiency Plan (EEP), we are making excellent progress. Compared to 2005 an energy efficiency improvement of 22% was realized in 2016. We also reduced our CO_2 emissions for energy by 79%.

For some time, through our three 26-turbine windfarms in Lelystad, we have been delivering as much energy to the public grid as we consume. Not only do we produce green wind energy, we also purchase it with for our everyday use. See figure (06).

Through Figure (06) we note Sustainability is also a priority in our housing policy. All the new buildings on Wageningen Campus (Atlas, Forum, Actio, Orion and Helix) meet high sustainability criteria and are served by a geo-thermal system. This system heats and cools these building in a sustainable way and reduces our CO_2 emissions.

The University intends to achieve more energy savings in the coming years by paying close attention to energy management. All parts of the Organization can assess their energy consumption and realize their own energy-saving potential through, for example, insulation, LED lighting and sustainable technology deployment. One of the excellent results of this approach is the central facility for freezing research materials at very low temperatures.

The WUR Energy Vision for 2030 was drawn up in 2013, with operational security, affordable energy, and sustainability as the primary objectives. In the years ahead, WUR will vigorously pursue the energy strategy based on this vision.

- Construction: Building projects have a direct impact on the environment. It is for this reason that Wageningen University & Research factors in sustainability in its new-build projects and in all matters concerning existing buildings. Sustainability is important not only during the construction phase, but also when buildings are delivered and are in use.

<u>**Campus = 70% climate neutral**</u>

Wageningen University & Research uses the GreenCalc+ method to calculate the sustainability of buildings. The target for new-builds and renovations is 215 but it is far exceeded in practice; for example, Orion scores 480, Forum scores 360, and Helix scores 520.

The university's ambitions for sustainability extend beyond the building and embrace the interior as well. We make a conscious choice to reuse old furniture. General * Technical support services apply the new world of philosophy work in Actio and managed to reduce the premises and square meters of offices to 70% and 80% respectively compared to the previous situation. In addition, much less paper is used because people have increased the amount of work they do digitally. Optimum use of daylight, along with natural ventilation and cooling can be used provided the building is suitable.

Water consumption is being reduced in various ways on Wageningen Campus. In Gaia and Lumen, a 'grey water' circuit is in operation to cut down on the use of drinking-quality water in cases in which this is unnecessary. RIKILT has adapted the air-conditioning system, which is now using much less water than before, and water-saving taps have been fitted in the buildings. Water is pumped up in some places as an alternative to tap water, Centralisation to Wageningen Campus has raised the

water efficiency. On the Annual Introduction Days and Sustainability Day, the Green Man helps to draw extra attention to drinking tap water (rather than bottled water) and to refilling bottles.

With the increasing focus of education and research on the Vagingen campus, we are determined to use the space as efficiently as possible. A 28% decrease in the number of square metres used has been reported, despite a sharp rise in student and staff numbers.

Sustainability plays an equally important role on the terrain of Wageningen Campus. The wide, open central area, unlike the edges, is more reminiscent of a park, with trees planted in the grass and large artificial ponds. The area is composed of grass, water, and trees with open perspectives – a place where students and academic staff can meet. The design focused, amongst other things, on ecological green structures (hedgerows, green and ecological corridors), and on sustainable water management, which enables Wageningen's historic city canals to be flushed clean. Biodiversity is another hot issue at Wageningen UR, so much so that it forms the basis of the Flora and Fauna policy on Wageningen Campus.

Wageningen Campus pursues an integrated approach to pest control, based on prevention combined with sustainability. In the past, chemicals were used to lure and kill pests. The Integrated Pest Management System (IPM) combats pests in a sustainable manner; the aim is to prevent nuisance by ensuring that buildings are well maintained and expert monitoring is in place to detect pests. At the start of 2013, more than 20 pest prevention workers were trained to recognise incipient and existing pest nuisance in and around buildings and to advise on ways of combating it.

In short, Wageningen University & Research is mindful of the needs of flora, fauna, and human beings on the campus. As a result, Wageningen Campus is 78% climate-neutral and one of the most sustainable knowledge campuses in the world.

- Procurement: Wageningen University & Research implemented a sustainable procurement policy in January 2008. The Executive Board continued this policy in the 2013 Wageningen University & Research Procurement Policy. In this new policy Wageningen University & Research conforms to the sustainability criteria of Netherlands Enterprise Agency (RVO).

Wageningen University & Research purchases 100% sustainable

In addition to following these criteria, Wageningen University & Research internally coordinates the procurement wishes and requirements in terms of sustainability. Wageningen University & Research makes use of a sustainability panel, which receives extensive employee input regarding sustainability in procurement processes.

The Procurement department evaluates every procurement contract to see whether it is possible to purchase products and services which are even more sustainable and what that would cost. The purchasers also incorporate sustainability aspects into all project plans and state the results in the final reports. This policy of sustainable procurement applies to all products, from construction materials to coffee cups, and to services such as cleaning. The Procurement department evaluates the sustainability percentage of all purchases for a particular year by carrying out a sustainability scan. This scan is based on the sustainability criteria and product groups as prepared by RVO and as established by the Dutch Ministry of Economic Affairs. In 2013 Wageningen UR achieved again 100% sustainability in procurement.

Examples of sustainable procurement are the purchasing of 100% of copying paper in accordance with the EU Eco label and FSC Mixed & Controlled Wood, and awareness of the benefits of regional suppliers. Additionally, Wageningen University & Research discourages suppliers from sending unsolicited hard-copy catalogues and leaflets. These are regarded as an unjustifiable use of raw materials and energy.

The previous method of carrying out tenders and offers wasted large amounts of paper. In the preparatory phase, dozens of copies were made of the various draft project documents. Until recently, applicants were required to submit their offers in triplicate. This resulted in boxes and boxes of documents. The Procurement department now carries out purchasing and procurement procedures entirely digitally.

The ordering and invoicing procedures are being digitalised by means of the electronic ordering system proQme. Orders are sent out by e-mail. In addition, suppliers are encouraged to send their invoices by e-mail. As Wageningen University & Research deals with large numbers of orders and invoices, the use of paper, toner cartridges and postal services has been drastically reduced.

- **Waste:** Sustainable waste processing starts with optimal internal waste separation. But what is optimal sustainable waste separation? It doesn't always have to mean that absolutely every last bit of waste has to be separated. In some locations, waste flows are so small that it's not efficient to separate them. Paper, cardboard and plastic are always separated at all Wageningen University & Research locations.

Optimising waste flow in Forum building has reduced waste by 25%

Wageningen University & Research produces approximately 2 kilotonnes of waste per year. In recent years a number of agreements have been reached with the waste processing companies regarding to sustainable waste processing. These agreements include the following:

- Wheelie bins are emptied on a set route and a set day. This reduces the number of transport kilometres. This route is also evaluated on a yearly basis and optimised where necessary.
- The general waste produced in Wageningen is weighed.
- Per waste flow separate agreements have been reached regarding sustainable processing.
- Every quarter, Wageningen University & Research receives information about costs, tonnages and transports.
- The waste processing companies are responsible for implementing a quality assurance system and an environmental management system, improving waste collection efficiency, providing waste disposal instructions and ensuring sustainable processing methods for each waste flow.
- Waste sorting tests are being carried out in Lelystad and Wageningen in order to optimise waste separation.
- Green waste is used as compost on Wageningen University & Research property.

In the Forum and Orion buildings on Wageningen Campus, waste is collected in accordance with the EcoSmart concept. Using EcoSmart's collection methods 16 waste flows are separated. The largest waste flows are paper, cardboard, plastic, biodegradable waste, packing material and general waste. Separating the waste in this way means that large amounts of raw materials can be made suitable for reuse. EcoSmart's goal is to recycle 100% of all waste for reuse, Due to EcoSmart's methods, the Forum building generated 25% less waste for processing as compared to the reference year 2009.

The waste policy is an integral component of the overall operational management. Preventing waste generation is an important aspect. Wageningen University & Research's approach to waste processing follows Lansink's Waste Hierarchy: Prevention - Reuse and preparation for reuse - Recycling - Recovery - Disposal.

- **Catering:** Sustainability plays a crucial role in the choice of caterer at Wageningen University & Research. The current caterers meet the sustainable procurement guidelines issued by the Netherlands

Enterprise Agency (Rijksdienst voor Ondernemend Nederland/RVO) and purchase more than 50% of their product range from sustainable sources.

Emphasis on healthy food; 75% of range consists of very healthy and moderately healthy products

Wageningen UR has ten staff restaurants and countless vending machines where people can buy beverages and snacks. We all need to eat, but it's good to think about the consequences of our food choices.

Wageningen University & Research complies with the sustainable procurement guidelines of the Netherlands Enterprise Agency for the catering sector. Wageningen UR and the caterers have set themselves a goal: to sell only sustainably produced and healthy products in the restaurants and vending machines. It is clear from the sustainability policy, the annual health & safety and environmental audits and the satisfaction surveys that the caterers take sustainability very seriously and do everything possible to make it visible. More than 40% of the purchases are guaranteed organic, free of pesticides, artificial fertilisers and genetic manipulation, and produced with close attention to animal welfare. The Fairtrade products carry an extra logo. The coffee and tea served at Wageningen University & Research are sustainably farmed by Max Havelaar Fairtrade and Rainforest Alliance.

The caterers showed at the Sustainable Roadshow 2014 that they attach great importance to sustainability. Their commitment is illustrated by, for example, the locally-sourced products, the vegetarian croquettes made from mushrooms cultivated in coffee grounds, and the sale of refillable bottles that can actually be topped up by the caterer. Food waste – with awareness high on the agenda – is an important theme in the education and research programmes and the operational management at Wageningen University & Research.

Wageningen University & Research used to throw away almost three million plastic coffee cups a year. Recently, environmentally-friendly cups – the Cup2Paper cup – have been available in the offices. These cups are collected separately and recycled along with other paper.

- **Mobility:** Mobility is one of the themes in the sustainability and CSR policy of Wageningen University & Research (WUR) and is therefore a permanent part of operational management. The ambition is to decrease CO2 emissions related to all WUR transport by at least 2% each year.

Mobility Plan 2030 describes the way WUR wants to achieve this. The practical implementation for the coming period is outlined in the Mobility Implementation Agenda 2018-2022. The key words for our sustainable mobility policy are: safe, healthy, sustainable, accessible, and future-focused. Decreased and more sustainable mobility means lower CO_2 emissions, a decrease in particle emissions, lower noise pollution, an increase in general energy efficiency, no exhaustion of natural resources, and improved health.

Reducing transport movements and transitioning to more sustainable transport

The mobility policy primarily focuses on reducing transport movements: using a mix of digital tools makes work less time and place dependent. The transition to more sustainable transport is also encouraged: increased bicycle and train use, and decreased car and airplane use. A third point is improving the sustainability of "fossil" transport, by measures aimed at an efficient, greener vehicle fleet, and the facilitation of electric transport.

A selection of the initiatives so far:
- video conferencing to reduce transport movements, travel time, and CO2 emissions;
- installation of electric charging points for electric cars, e-bikes, and e-scooters;
- a bicycle scheme for staff members;
- additional cycle paths and bicycle parking on campus;

- creation of a bus lane with two extra bus stops on campus;
- regular mobility survey into commuter traffic among staff and students.
Wageningen University & Research is doing very well when it comes to cycling: 55% of the employees are cycling to work!
With regard to commuting, surveys show that over half (55%) of the employees travel by bicycle. Furthermore, 72% of students cycle to their study location. About 22% of students use public transport, while 6% of staff members use it to commute. See figure (07).
- **Study results:** Through this study, a series of results were reached, the most important of which are:

- Sustainable development is a continuous long-term development of society aimed at meeting the need of humanity now and in the future through rational use, the renewal of natural resources, and the preservation of land for future generations.
- Sustainable development aims to end poverty in all its forms everywhere, eradicate hunger, achieve food security, improve nutrition and promote sustainable agriculture, as well as ensure a healthy life and promote well-being for all at all ages... And so on;
- One of the objectives of the University World University Classification is to promote university-led social change in terms of sustainability goals, as well as to be a self-assessment tool in the sustainability of higher education institutions around the world;
- The most important areas of great interest from Wageningen University for sustainability are energy, construction, sustainable procurement, waste, food and mobility.

Conclusion

In conclusion, in light of the growing role of the green economy, the transformation has become one of the necessities that most of the world's economies are heading towards today, by focusing on the Green University, which is an essential pillar for building sustainable societies and economies that remain inherited for future generations due to its positive effects on various economic, social and environmental issues in light of the challenges of sustainable development that the world is currently experiencing, highlighting its effective role by seeking new models of economic growth with philosophy and dimensions. Sustainable development in order to build sustainable economies that are keeping pace with the various developments and challenges that the world economy is currently experiencing.
- **Study suggestions:** Through this study, a series of proposals were reached, the most important of which are:
- The need for more attention to universities due to the active role in achieving the Sustainable Development Goals;
- The need to benefit from the expertise of universities ranked first in the world ranking of universities in order to achieve sustainability.
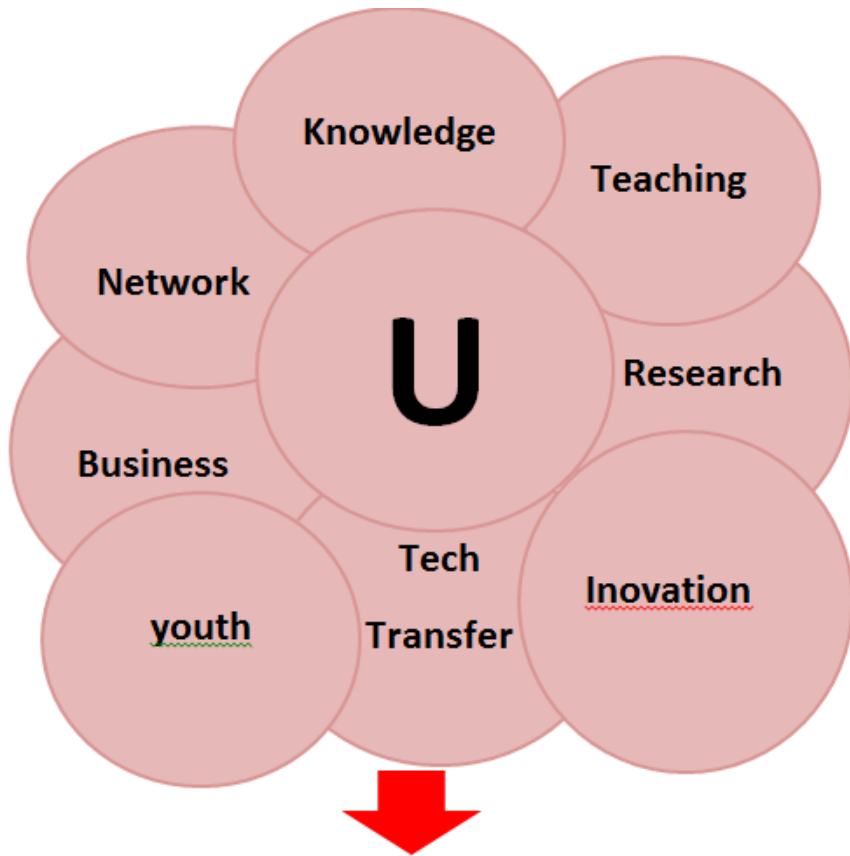
Figure **-01-: Definition of sustainable development**
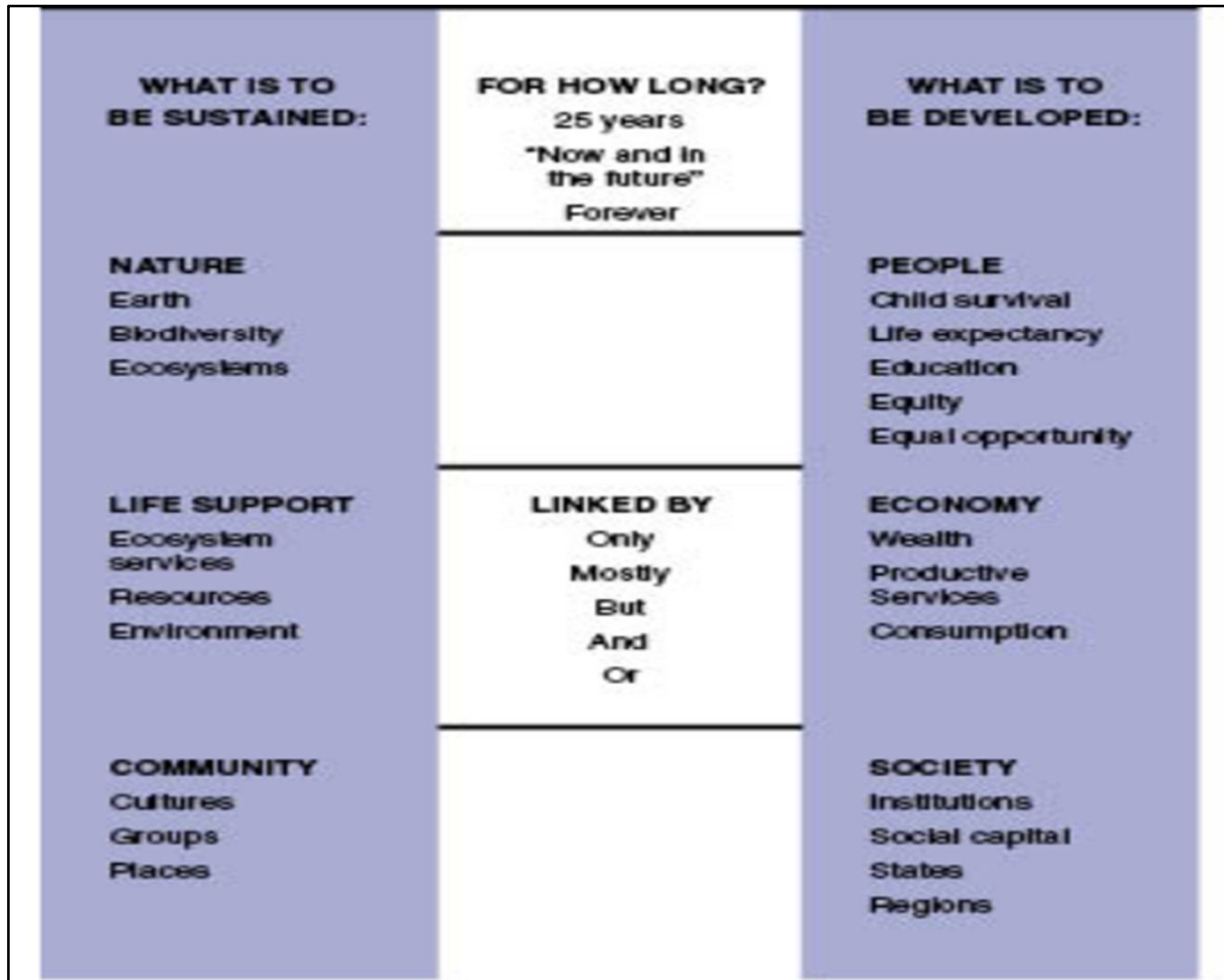
Source: (Robert W & and others, 2016, pp. 02,03)

Figure **-02-: Dimensions of sustainable development**
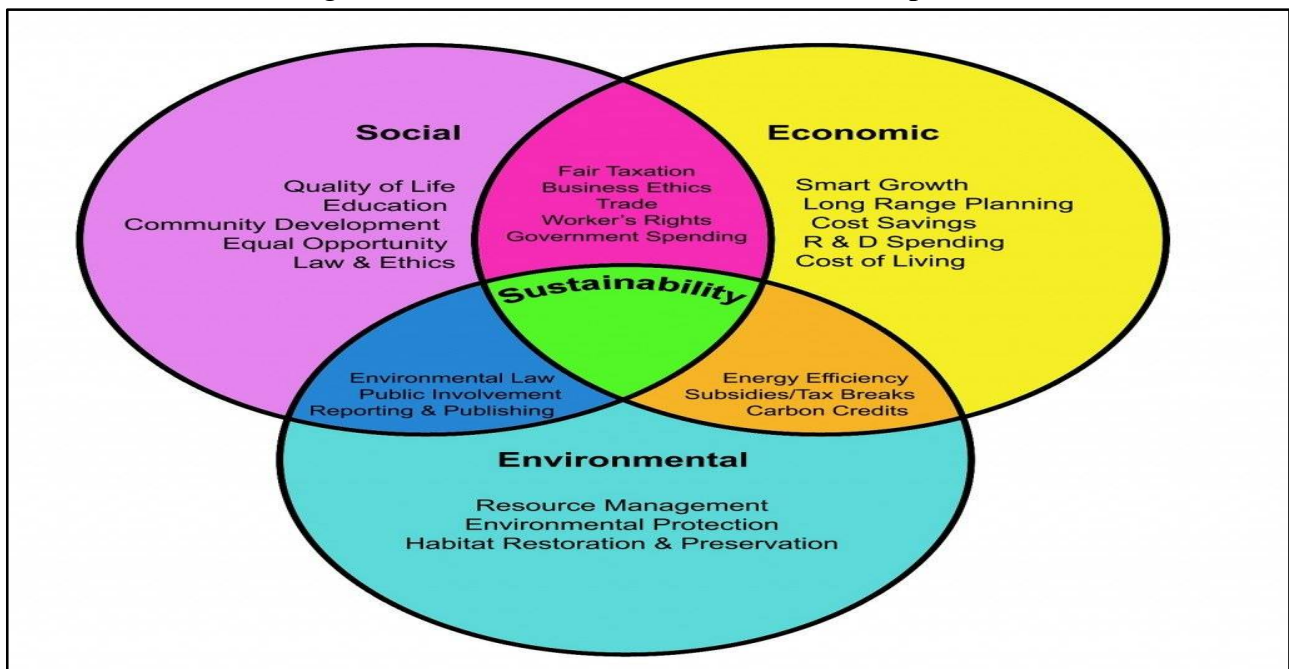
Source: (Christopher, 2018)

Figure**-03-: Support of universities to achieve SDGs:**

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SUSTAINABLE DEVELOPMENT GOALS

|					
End poverty in all its forms everywhere	End hunger, achieve food security and improved nutrition and promote sustainable	Ensure healthy lives and promote wellbeing for all at all ages	Ensure inclusive and equitable quality education and promote lifelong	Achieve gender equality and empower all women and girls	Ensure availability and sustainable management of water and sanitation for all
Ensure access to affordable, reliable, sustainable and modern energy for all	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Reduce inequality within and among countries	Make cities and human settlements inclusive, safe, resilient and sustainable	Ensure sustainable consumption and production patterns
Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels		Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development Finance	

Source: (Joy , Samiya, & Saleemul, 2018, p. 02)

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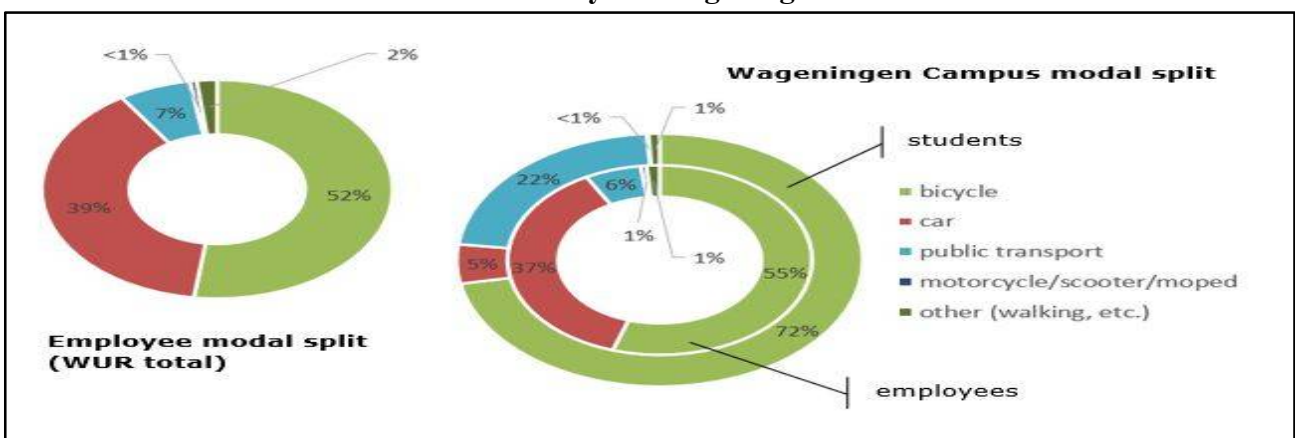Figure **-05-:** **UI GreenMetric World University Rankings model**
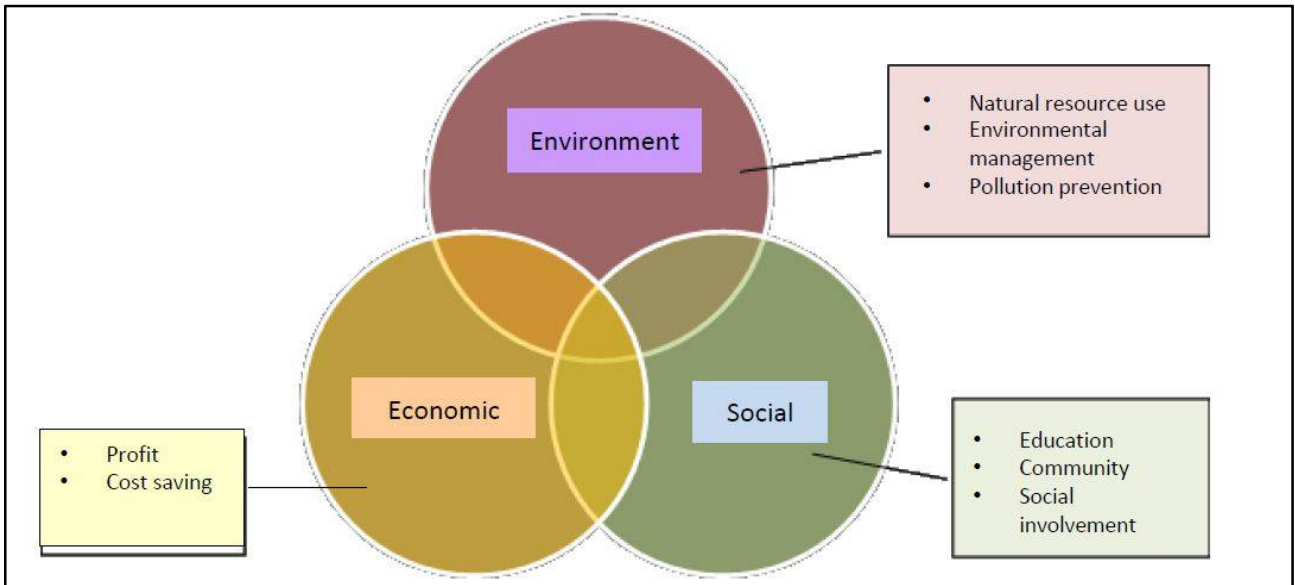
Source: (Integrated Laboratory and Research Center, 2019, p. 05)

Figure **-06-:** **Energy consumption at The University of Wageningen**
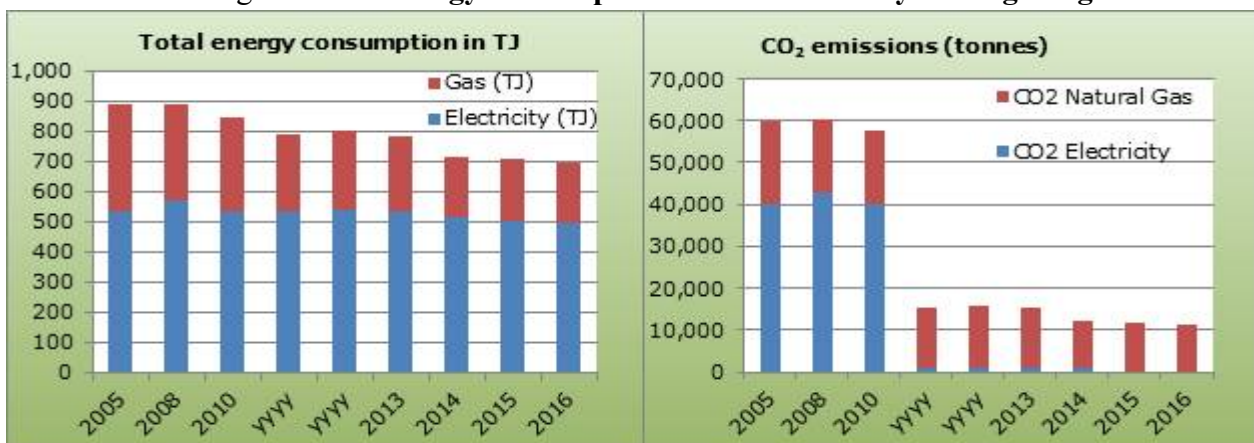
Source: (The Official Website of the University of Wagening, 2020)

Figure **-07- :** **Statistics On The Number Of Uses For Various Means Of Transport At The University Of Wageningen**

Source: (The Official Website of the University of Wagening, 2020)

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