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An analytical reading of some transfer experiences to green universities: Morocco, Egypt and America

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Abstract :

This study aims to highlight a set of experiences - Morocco, Egypt, America - in the field of transforming universities into Sustainable universities "green universities, ", "green campus", after sustainability has become an important indicator in the classification of universities.

The analytical descriptive approach was used to achieve the objectives of the study which concluded that developed environment plays an effective role in heading towards green universities; the universities under study are taking advantage of the natural renewable resources according to their own strategies. The study recommended using all available resources to work according to the Green Metrics.

Key words: Green universities; Morocco; Egypt; America; Green Metrics

JEL classification codes: I23, Q01

ملخص:

تهدف هذه الدراسة إلى تسليط الضوء على مجموعة من التجارب – المغرب ، مصر ، أمريكا – في مجال تحويل الجامعات إلى جامعات مستدامة "جامعات خضراء" ، "حرم جامعي أخضر" ، بعد أن أصبحت الاستدامة مؤشرا هاما في تصنيف الجامعات.

تم استخدام المنهج الوصفي التحليلي لتحقيق أهداف الدراسة التي خلصت إلى أن البيئة المتطورة تلعب دورًا فعالا في التوجه نحو جامعات خضراء؛ تستفيد الجامعات قيد الدراسة من الموارد الطبيعية المتجددة وفقًا لاستراتيجياتها الخاصة. وقد أوصت الدراسة باستغلال جميع الموارد المتاحة للعمل وفقًا للمقياس الأخضر العالمي.

الكلمات المفتاح: جامعات خضراء، المغرب، مصر، أمريكا، مقياس أخضر.

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1. Introduction.

The human being and the environment are inseparable elements, whatever the circumstances and reasons, but the increase in human activity in order to keep pace with the developments imposed by the times led to environmental violations and crises.

This prompted the international community to encourage increased investment in the environment as a prerequisite alongside the social and economic requirements of sustainable development and the search for a new model for institutions working to keep up with their plans.

For academic institutions and higher Education ways are being sought in which universities, their leaders, lecturers, researchers, and students can engage their resources in responding to the challenges of balancing between the human quest for economic and technological development with environmental preservation, this is termed "the green university".

1.1. Research problem

With increasing concerns about different environmental issues, universities need indicators that go beyond measuring pure energy efficiency, but rather interest and knowledge of local and societal constraints and benefits that affect sustainability. University case studies can help find examples of successful strategies and practices and make them a benchmark for comparison and self-monitoring towards building green universities. From the previous submission, the main question is:

"What are the advantages and strategies that allow universities to go towards green universities?"

1.2. Research Hypotheses

Based on the research problem and as an initial answer to it, the following hypotheses can be presented:

H1: Economic and social environment plays an important and effective role in the direction of universities towards the concept of green universities;

H2: The universities under study are taking advantage of the natural renewable resources according to their own strategies.

1.3. Research objectives

Based on the previous proposition of the research problem, this study aims to achieve a set of objectives, the most important of which are:

- clarify the concept of green universities and try to detail the most important internationally approved standard for their classification;
- Highlighting some of the experiences of Arab and foreign universities in turning towards green universities to benefit from their experiences;
- Emphasizing the importance of green universities and the need to shift towards them as one of the main pillars for achieving sustainability in the higher education and scientific research sector.

1.4. Importance of the Research:

It can be limited to the following points:

- Taking note of the role of green universities as a modern strategic direction in establishing sustainable development;
- To highlight the prominent scientific position of green universities;
- Clarifying the role of green universities in protecting and preserving the environment in light of current climate changes and environmental problems.

1.5. Research Methodology

The study relies on the deductive descriptive analysis methodology, in the light of which exposure and analysis of the literature related to the subject of the study are carried out within its field, through:

- Research variable extrapolation: green universities and their classification criteria;
- Analyzing studies and their results, which show the most important university strategies for shifting towards green universities.
- Monitoring some of the experiences of universities turning towards sustainability, analyzing them and extracting comparisons and benefiting from them.

2. Green universities: A theoretical framework

Global warming, environmental pollution increased waste, loss of biodiversity and climate change are all global environmental problems that threaten the lives of the planet's inhabitants.

As a training institution and a cradle for the education of "future leaders", the university does not define its goals and orientations internally, but rather receives them from local communities and plays an important role in studying and finding appropriate solutions to their problems and meeting their different needs, especially with increasing concerns about environmental issues and the recent need to respond to climate change, universities must Creating knowledge and integrating sustainability in education, research and programs, as well as promoting environmental issues for society.

Under such a circumstance, green university efforts have been initiated worldwide. (Antje & al., 2012, p82)

2.1. Green University definition:

Universities are identified as "key hubs within cities for innovation and environmental education, representing a precious opportunity for enabling the necessary generational behavioral change toward taking on more sustainable attitudes in daily lives". (Sonetti, Lombardi, & Chelleri, 2016, p1) In order for the university to be able to influence general environmental behaviors, it must be proactive in caring for sustainability issues. Green University has been defined as "a higher education institution, in which a part of the university, or the university as a whole, encourages, manages, and participates in mitigating environmental, economic, social, and health problems arising from resource utilization as much as possible". (Li & al., 2010)

Green universities refer also to "The universities that work to achieve sustainability in the curricula of teaching and scientific research through the provision of specialized courses» (Bridgestock, 2012), and to "Educational institutions that meet their needs of natural resources; energy, water and materials without compromising the ability of current and future generations to meet their own needs". (greenofficemovement, n.d), Through the foregoing, we conclude that green universities are educational institutions that

work to achieve sustainability in their various activities, functions and goals.

2.2. Ranking of green universities according to Green Metrics

A large amount of material/water flow and energy consumption exist during the operation of one university through both direct (the use of classrooms, laboratories, offices and catering) and indirect (commuting and consumption of food and drink at work) activities by students and employees. These activities bring significant environmental impacts due to the complexity and diversity of their operations. Typical issues include solid wastes, wastewater discharge, noise and air pollutants; therefore, it is important to identify more sustainable options for reducing their environmental footprints. (Geng, Kebin, Bing, & Tsuyoshi, 2012, p16)

Green universities are classified according to Green Metric World University Ranking prepared by the University of Indonesia as a platform for universities around the world to share their information and practices to achieve sustainability in their campuses and provided opportunities for each university to examine their strengths and weaknesses in promoting green university and sustainable development. (Ronnachai & M. Hollmann, 2016)

This classification is based on the following main criteria:

a. Setup and infrastructure (15%):

This standard clarifies whether the campus deserves to be called Green Campus by providing basic information about the university's policy towards the green environment based on the following indicators:

- The ratio of the open space to the total area of the campus;
- Forest area on campus;
- Cultivated area on the campus;
- The total open space over the total number of campus personnel;
- University budget for sustainable efforts.

b. Energy and climate change (21%):

The energy and climate change standard is receiving the most attention on the global green scale and is based on the following indicators:

- Using energy-saving devices on campus;

- Implement smart and eco-friendly buildings on campus;
- Number of renewable energy sources on campus;
- Total electricity use relative to the total number of campus personnel;
- The proportion of renewable energy produced;
- Elements of implementation of green buildings as outlined in all building and renovation policies;
- Greenhouse gas emissions reduction program;
- The proportion of carbon emissions compared to the number of campus personnel. (Greenmetric UI, n.d.)

c. Waste (18%):

Similar to a small living community, one university generates great amount of solid wastes, such as organic wastes from campus canteens, municipal solid wastes from both administrative units and student dormitories, hazardous and toxic wastes from specifical abs, etc. Consequently, an effective solid waste management system should be established so that these wastes can be safely collected, delivered, treated and finally disposed of. (Geng, Kebin, Bing, & Tsuyoshi, 2012, p16)

–Waste treatment and recycling are among the main catalysts and incentives for creating a sustainable environment. This standard is based on the following indicators: (Greenmetric UI, n.d.)

–The university's waste recycling program;

–A program to reduce the use of paper and plastic on campus;

–Treatment of organic waste;

–Treatment of inorganic waste;

–Disposal of sewage.

d. Water (10%):

Campus water use is another important indicator of the Green Metrics; it depends on the following indicators:

- Implementation of the water conservation program;
- Implementing a water recycling program;
- Use of efficient devices to rationalize water use;
- Treated wastewater.

e. Transportation 18 (%):

Vehicles contribute to increasing the level of carbon emissions and pollutants at the university. Therefore, the number of individual

vehicles on the campus must be reduced and replaced with environmentally friendly public and mass transit vehicles or bicycles, which helps to create a healthy environment. This standard is based on the following indicators:

- Total vehicles (cars and motorcycles) in proportion to the number of campus personnel;
- Campus zero-emission policy on campus;
- Zero emissions of vehicles to the total number of campus personnel;
- The ratio of the parking space to the total area of the campus;
- Programs to reduce or limit parking space on campus during the past 3 years;
- Number of public and mass transit initiatives to reduce the number of private vehicles on campus;
- Campus pedestrian path policy.

f. Education and research (18%):

This standard depends on the university's role in creating interest in sustainability issues for the current and future generation. It depends on the following indicators:

- Ratio of sustainability research funding to total research funding;
- Scientific publications on the environment and sustainability;
- Scientific events related to the environment and sustainability;
- Number of student organizations related to the environment and sustainability;
- Providing a sustainability site managed by the university;
- Existence of a sustainability report.

2.3. Benefits of the Green Metrics

The most important of these benefits can be summarized in the following:

a. Global reach:

International cooperation is considered one of the most important advantages of the green education effort, as international exchange activities can develop students 'cultural skills, increase their self-reliance and self-awareness, in addition to strengthening relationships between institutions and countries and opening up to

various green university practices to develop the possibility of competition. (Geng, Kebin, Bing, & Tsuyoshi, 2012,P18)

b. Raising awareness of sustainable environmental issues:

The world faces many civilizational, population and environmental problems headed by environmental pollution, the unjust use of natural resources, global warming ... etc. Thus, the universities' interest in these issues and the endeavor to address them through green education is considered a serious participation in solving contemporary environmental issues.

Green education can also provide multiple possibilities to give students, faculty and staff the opportunity to put sustainability into practice.

c. Social change and development of work:

Although the adoption of Green Metrics for competitive arrangement between universities is mainly focused on raising awareness of environmental issues, it will contribute in the future to social change events and confront societal developments and environmental challenges in the university's vicinity. (البكري، 2017، ص26)

3. Experiences of switching to green universities

With the increasing awareness of countries, bodies and individuals on environmental issues, a new concept of development emerged called sustainable development; its lines were formulated at the Stockholm Conference in 1972 and emerged to the horizon in 1987 after the publication of the report of the World Committee on Environment and Development (Burnland).

So that sustainable development becomes an imperative necessity for all countries to adopt their principles in their various sectors and institutions. The higher education and scientific research sector had a distinctive footprint in this context through the experience of green universities, which was considered a reference base used in building modern development models aimed at the sustainability of universities. In this regard, three international experiments were chosen for study and analysis.

3.1. The Moroccan Experience: Mohammed V University "Green university of Tamesna"

The energy policy of the Moroccan government is based on diversifying the energy mix in order to create a balance between the

use of traditional and renewable energy. Morocco has a privileged position in terms of the volume of energy resources that form the basis of green economies and renewable energy sources.

The Kingdom of Morocco depends on the production of electrical energy on thermal plants, and then hydropower comes second, while wind energy is the last.

As a result of the Kingdom's interest in renewable energy, a center has been established to develop its applications and implement activities in various fields of renewable energy, such as studies, technology transfer, training courses and equipment manufacturing.(صبري أبو السعد وآخرون، 2017)

The technology pole of the University of Mohamed V in Rabat, located in the city of Tamesna, is designed to become an environmentally friendly place where the environment and climate were taken into account in the design of its buildings and the quality of energy used "renewable energies" as well as water "rain water". Waste is also effectively recycled and green spaces created to reach the green campus sign.

The university has reached this mark by relying on a triple strategy that took into account high-tech environmental standards and energy economics concepts in the following areas: (www.um5.ac.ma, n.d.)

a. Green buildings:

The architectural study of the «Green Temesna Campus" project has already respected the main provisions for making internationally prescribed environmental buildings represented in:

- Arrangement of openings in buildings to reduce thermal emissions inside them;
- Construction of green stands and conference rooms;
- Installation of green walls in stands, conference rooms, classrooms and research laboratories;
- Insulating the porches of the buildings by inserting an effective insulator included in the waterproofing complex;
- Use of special bricks to improve the thermal efficiency of the walls;
- Rain water recovery for reuse in watering campus gardens;
- Installation of wind turbines for power generation;

- The use of solar energy;
- Installing a sewage treatment plant.

b. Green Courses:

The university focused on opening green branches in some specializations as follows:

- Master in Renewable Energies
- University degree in engineering technology and sustainable construction;
- Professional bachelors degree in energy efficiency and Effectiveness.
- Master in Renewable Energy Conversion Technology;
- Master in Environmental Law and Sustainable Development.

c. Research laboratories:

The university worked on developing laboratories for green research, which are:

- Solar power laboratory;
- Energy, material and environment laboratory;
- Thermal Energy Research Group;
- A research team on thermal systems and real flows;
- Fluid and Energy Research Group.

3.2. The Egyptian Experience: The American University in Egypt.

Egypt is a country rich in renewable energy sources, such as solar and wind energy, which led it to pursue a strategy to achieve sustainable development until 2030 to replace conventional energy sources with environmentally friendly sources.

The projects of installing power stations and connecting them to the roofs of buildings are among the most impacting on the economic and social dimension in Egypt, where solar energy is used in several areas, the most important of which are heating and power generation.

Egypt is working to deepen the national experience gained by transferring knowledge and benefiting from global experiences in this field, most notably the German experience, Singapore, UAE and Morocco, as well as technology transfer to expand the implementation of thermal generation projects for electricity in the field of exploiting Egypt's natural wealth from solar energy sources,

which leads to the early entry of Egypt into new technology (technically mature, environmentally friendly), and it is expected that the global demand for it will increase in the future, while the Egyptian industry has great potential to manufacture some of its equipment locally at a cost level below the global average.

The Egyptian Ministry of Higher Education recently paid attention to the inclusion of green curricula, directing scientific research to the field of sustainability and radical development in the university administrative apparatus within the framework of the sustainable development strategy.(صبري أبو السعد وآخرون، 2017)

In view of the leadership of the American University of Cairo experience in the field of sustainability, its strategies and practices have been included in the Green Universities Toolkit at the United Nations Environment Program as a global example of a green educational institution to be followed internationally.

The university occupied this position by adopting a strategy in which it focused on: (Dave, Gou, Prasad, & Li, 2014, P100)

a. Reducing energy consumption:

The university has formed an internal Work teams specialized in the field of energy, consisting of architects, engineers, facilities managers, budget officials, and members of the Faculty of Science and Engineering to prepare a strategy aimed at reducing energy consumption by at least a third of the quantity during a period of three years. It also prepared a dual plan, which aims to ensure that the heating, cooling and lighting systems are installed and used properly, and then reduce their excessive use; this resulted in a 35% decrease in annual university-wide energy consumption, equivalent to 2 to 2.5 million USD.

b. Spreading a culture of sustainability:

The importance of the awareness efforts carried out by the university in explaining the mechanisms and motives behind the green initiatives of its members and its surroundings is the reason for the success of the strategic plans for achieving sustainability, as their support depends on the extent of the latter's ability to convince them of the necessity of making some changes that inevitably lead to improving the university's functions, Rationalizing its spending,

enhancing its reputation and standing at the regional and global levels.

3.3. The American Experience: University of Oregon-UO

The United States is the owner of the largest balance of successful experiences in the field of undisputed renewable energies, especially solar energy which covers the southern parts of it heavily for most of the year, thanks to the generous support of the US Department of Energy for research in this field. (صبري أبو السعد وآخرون، 2017)

The University of Oregon experiment was taken as an example of the success of its experiment in converting to green universities.

The University of Oregon UO has observed all the criteria adopted in the global green standard in its strategy to shift towards the green university as follows: (Fullmer, 2019)

a. Setup and Infrastructure*:*

- The use of green roofs that absorb sunlight and reduce the temperature level in the various campus buildings;
- Regulation of cooling and heating using special tiles, which reduces reliance on central heating systems;
- Provide windows that automatically adjust heating or air conditioning when opened, as well as contain sensors that alert their users to the appropriate times to open them.

b. Energy and climate change:

- Take advantage of natural lighting whenever possible;
- Use solar energy that generates electricity and energy throughout the campus.

c. Waste*:*

- The use of many recycled materials in construction;
- Reducing waste by converting all packages into biodegradable materials;
- Recycle all cooking oils and use them to make low-carbon biofuels.

d. Water*:*

- Wastewater treatment and reuse in bathrooms.

e. Transport*:*

- Use bicycles and provide a service station to serve 4,575 bicycles;

- Using public and university transportation.

f. Education and research:

Providing a one-year program for graduate studies in the Department of Planning, Public Policy and Management, which teaches students how to implement sustainability tools, theories and policies in societies, academic institutions, governments and institutions.

4. Results and discussion

The experiments subject to study were chosen "University of Mohamed V - Morocco -, American University - Egypt -, University of Oregon - America -" for the following reasons:

- Sample of universities from both developed and developing countries;
- Mixture of classified and unrated universities worldwide;
- Same experience in different environments in terms of adherence to sustainable development standards;
- The difference in the transformation strategies of these universities and their environmental practices, despite the unity of purpose: a green university;
- Embody at least one of the Green Metrics, which is used in the Green Universities Ranking.

4.1. Analysis and discussion of experiences: Comparison

Considering Green Metrics the reference used in ranking universities in terms of their green practices, it was also adopted in this study to determine the similarities and differences between the experiences under study.

a. Setup and infrastructure:

The University of Oregon and Mohammed V University have taken this criterion into consideration despite their belonging to a different environment. The first belongs to an economically and socially developed country that has a solid and coherent infrastructure, which made it easy for the university to experience greenness and sustainability in terms of engineering and architecture, while the second belongs to a developing country that is experimenting in an effort to improve the ranking of its universities at the international level and also to achieve sustainable development goals that ensure economic and social development according to the

available material and human capabilities due to its pioneering experience at the level of the North African region in the field of green economy and sustainability, whereas, the American University in Egypt ignored this standard and considered it unimportant.

b. Energy and climate change:

The experiences of the universities under study have taken into account this criterion, but both of them are in their style and method. The American University in Egypt has chosen to form a research team specialized in energy research and a task force to implement the results of this research where its goal was not only to reduce energy consumption but to create renewable energy sources and reduce costs, especially as they belong to A developing country and poor in terms of energy resources such as petroleum and gas.

While the University of Oregon and Mohammed V University preferred the same method of reducing energy consumption, despite their different environments and their financial, human and financial capabilities that can make the difference in this area.

c. Waste:

The American University of Oregon is the only one who has taken into account this standard in its strategy of turning towards green universities, due to its affiliation with a developed country that is keen to consolidate the environmental dimension of sustainable development, where green fees are imposed and works to apply the principle of "who pollutes more pays more", while the American University in Egypt and Mohammed V University ignored this, because they belong to developing countries, and it receives polluted factories of developed countries in return for a small income.

d. Water:

The University of Oregon and Mohammed V University work according to this standard in an effort to govern water consumption in all facilities to maintain the ecosystem due to the scarcity of this resource in both countries., while the American University in Egypt ignored this due to the availability of fresh Nile water that meets its needs and chose to use the costs of water desalination in other areas such as educating individuals and raising their awareness in the field of sustainable development.

e. Transport:

Only the University of Oregon considered this criterion in its strategy of turning towards green universities, due to the awareness of its members and their broad culture that helped them to accept the idea of sustainable transportation such as bicycles and rapid and convenient mass transportation that most developed countries have. Whereas, Muhammad V University and the American University ignored this due to their prior knowledge of the privacy of its members' thinking and the fragility and weariness of its mass transportation means that do not observe human standards, not to mention environmental standards.

f. Education and research:

Both the University of Oregon and Mohammed V University worked with this standard while the American University in Egypt ignored this due to the different environments of their belonging and their areas of sustainable interest. Whereas, Morocco has worked to create green courses and create some research laboratories specialized in the field of energy only, while Morocco has worked to create green courses and some research laboratories specialized in the field of energy only, despite the multiplicity of scientific disciplines.

4.2. Results that can be used in Algeria

Through a presentation, reading and analysis of the experiences of universities in each of America, Egypt and Morocco that have a green university mark, or advanced global arrangements based on Green Metrics, especially as some of them are similar to Algeria in the environment and climate, a set of results has been extracted which are considered important to reach suitable applications to contribute to the transition towards green universities in Algeria. These results are as follows:

a. Results from the University of Tamesna experience:

- Energetic integration (between renewable and traditional resources) worked on the prosperity of the University of Tamesna and its achievement of the demand for sustainable development;
- The mechanisms by which renewable energies have been exploited have supported the green trend at Tamesna University;
- The inclusion of green specializations, activation and encouragement of scientific research centers and researchers in the

field of green energy and sustainability contributes to the path towards covering the rest of the green standards at Tamesna University.

b. Results from the American University in Egypt experience:

The American University in Egypt went to exploiting renewable sources for energy production, although it is initially expensive, but its results continue for very long periods, especially as the cost of generating electricity from renewable energy sources is decreasing, from there, one of the sustainable development goals can be achieved, which is preserving the environment and achieving economic development.

c. Results from the University of Oregon experience:

- The University of Oregon was built according to pioneering sustainability standards that contribute to rationalizing energy use, and there are many experiences that can be gained from the University of Oregon in the field of sustainable urban design, especially in what is related to how to deal with the hot climate, and work to reduce the absorption of buildings to heat;
- The university's interest in education and scientific research in the field of clean energy and technology has made it apply on the ground the modern research methods it has achieved in construction;
- The University of Oregon developed work programs aimed at conducting applied studies, preparing solutions to technical problems or developing technology, which led the university to create a clear system that achieves a link between it and institutions and the state to support sustainability in society;
- The university not only applied the green, higher education trends in effect around the world, but rather developed them.

4.3. Hypotheses test results and interpretation:

Through the presentation, reading and analysis of the experiments under study with a view to test the hypotheses, the following results were reached:

a. The first hypothesis that stated that: "***Economic and social environment plays an important and effective role in the direction of universities towards the concept of green universities***" was supported since the developed environment is considered a fertile environment in which investment is easy, unlike the developing environment that needs reclamation, in addition, the level of

economic and social development reflects the strategy of the state including the university in achieving sustainability. This was evidenced by the experiments under study as follows:

The University of Oregon has observed all the criteria of the global green economy without exception, due to its affiliation with an evolving environment in all economic, social and technological terms.

The University of Tamesna has taken into account four criteria: setup and infrastructure, water, energy and climate change, education and scientific research such as providing branches and green specialties at all levels, but the efforts of the University of Tamesna in the green direction do not rise to what the University of Oregon offers in terms of expanded and field programs that include all aspects Sustainability to serve the university and society in general and all governmental and non-governmental institutions.

This difference between the levels of sustainability in the two universities is due to the fact that the first belongs to a developed environment and the second to a developing environment.

In spite of this, the University of Tamesna benefited from Morocco's experience in converting to a green economy and its strategy in supporting aspects of comprehensive sustainable development and providing the environment and the material, financial and human capabilities necessary for transformation.

As for the American University in Egypt, it has worked with only one criterion: energy and climate change.

Although the American University in Egypt and Tamesna belong to two developing countries, the big difference in terms of the number of approved standards is due to the capabilities and means provided by the Kingdom of Morocco in order to go to sustainability in all facilities, but Egypt is considered a newcomer to the green trend except its focus on the exploitation of solar energy in Production of electricity for heating, solar reverse cooling and lighting, which is reflected in the compliance of the American University in Egypt with the energy and climate change standard.

b. the second hypothesis which stated that: "***The universities under study are taking advantage of the natural renewable resources according to their own strategies"*** was supported because this

relates to the local supply of energy produced from renewable sources where the universities in the study are located in areas where the sun shines almost throughout the year, and this is what made them focus on producing clean energy by using solar energy, but Each university according to its own strategy where:

Although Egypt is relatively late in the field of sustainability, it relied on the principle of "starting from where others stopped" in the field of reducing energy consumption and harnessing the technologies needed to exploit natural resources in the production of clean energy, and this made the American University in Egypt a pioneer and an example to be followed in this field.

As for the University of Oregon and Tamesna, they followed strategies that differ only in terms of the techniques used in exploiting renewable resources to reduce conventional energy consumption.

5. Conclusion:

The current study aimed to provide an intellectual framework for some universities' experience in converting to green universities in some countries, based on theoretical and survey studies,

To achieve the goal of the current study, a theoretical background supported by a set of experiments in this field was presented to benefit from it.

In the light of what has been presented, it is clear that universities are vital organizations that reflect the nature and reality of societies. Therefore, it has become necessary to shift towards the more service-oriented patterns of society in light of the green economy, these patterns lie mainly in:

- Focusing on the sustainability of the university's research function and goals for green innovation;
- The application of the green campus concept is not only a simulation of western higher education trends; rather, successful local policies can be pursued that are compatible with economic trends and available capabilities;
- The state's application of the green economy approach contributes to providing the appropriate environment for transformation towards green universities.

- **Recommendations:**

Some recommendations have been formulated according to

the Green Metrics standard that can be able to contribute in the direction of the transition to green universities based on what has been seen in this context, in order to enable the Algerian University to overcome the obstacles that lead to the decline in the performance of Algerian universities in the green scale:

- **Setup and infrastructure:**
- Benefiting from worldwide green building experiences as a first stage, pending the formation of specialists in green architecture at the local level;
- Undertaking greening of the university's surroundings - a tree for each student -.
- **Energy and Climate Change**
- Exploiting natural energy whenever possible;
- The need to - shift to alternative energies.
- **Waste**
- Conducting training sessions for the different members of the university on the importance of maintaining the cleanliness of the university and its surroundings through waste recycling;
- Conclude agreements with waste recycling centers in order to get rid of waste first and provide an additional source of income for the university.
- **Water**
- rationalizing the use of water;
- Water desalination and treatment for reuse in cleaning.
- **Transport**
- Providing student transportation buses that respect environmental standards;
- Encourage and motivate students to use bicycles.
- **Education and Research:**
- Inclusion of green theoretical and practical courses;
- Opening applied graduate studies in green disciplines.

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