

The Current Study of Sustainability Approach in Technical Universities

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Abstract – Sustainability is a national and international approach, addressed by many organizations. In the university environment, actions are reduced and less valued. That is why this paper proposes to present the current state of involvement in the sustainable development of some universities that form the Romanian Alliance of Technical Universities (ARUT). This article will evaluate the implications of each university in the development of sustainability to align the university environment with the demands of the environment. The three responsibilities of sustainability, economic, social, and environmental, will be assessed. The qualitative assessment is used for the universities that form the ARUT group. The results of the research show that the 5 universities play an active role in inter-university cooperation on a national and international scale, but they can improve on environmental responsibility and a good example could be issues regarding the exploitation of geothermal energy, since not even half of the potential of water is used thermal to produce thermal energy. This research presents ratings among the 5 universities, estimates made based on online information provided on their websites. At the end of the research, a basic concept model for university sustainability is presented.

Keywords: sustainable development, technical university, ARUT, sustainable university, students, environment, efficiency

I. INTRODUCTION

Sustainability is the idea that anything can survive and grow without consuming future generations' natural resources [1]. This is based on knowing the needs of the present without jeopardizing the resources of future generations. Therefore, this concept is made up of 3 big responsibilities: *economic*, *social*, and *environmental* [2].

Economic development is a relatively simple form of sustainability. People tend to achieve economic development to raise living standards and to protect and improve the environment, both for themselves and for others future generations.

Social development is the fair distribution of opportunities between generations. Any company should invest in providing staff benefits as well as a safe work

environment. Companies that offer jobs that involve employee burnout are not sustainable [2].

Environmental protection, being the most discussed responsibility, refers to any activity that contributes to maintaining or improving the environment [2].

Sustainability is an organizational development direction that applies global principles and integrates 17 global sustainable development objectives with 169 targets. Any organization, regardless of its size or shape, can get involved in sustainable development. There are no restrictions on involvement, being a voluntary approach. Organizations show an increased interest in the last period, being a condition of the business network. In the last period, the universities also started to get actively involved in their sustainable development. Actions are carried out, smaller than in the private sector, but which will increase in intensity in the future. The sustainable university is the institution that educates the interested parties for sustainable development, responds to society's challenges, develops the university campus, reduces the footprint of greenhouse gases on the environment, empowers students and employees to interact and act, applies the principles of sustainability making it an element central in the university.

Sustainable development in higher education is based on the management of processes and activities, always with the fundamental and long-term goal of improving the services provided by state universities [3].

Currently, sustainability is no longer just a principle of action to make resources more efficient in an economic sense, but rather the responsible support of the environment in technical, economic, and social implementation. Sustainability involves the selection and involvement of technologies that solve problems so that future generations do not have to live worse than current generations [3]. Universities contribute to the training of students with the help of recent applications based on modern systems. The digital transformation in education requires the involvement of sustainable management because they can adapt to the changes imposed by new technologies [4].

Virtual learning is becoming very important for universities nowadays. Therefore, universities need to investigate how they could combine humanities with virtual learning to ensure good collaboration and engagement. Virtual learning technology has grown at an accelerated pace in recent years [4]. The teaching staff play an essential role in the preparation of students. An extremely significant indicator of the sustainable development of a university

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educational institution is the institution's active participation in the relevant fields on a national and international level, the growth of an external network of collaboration, the organization of highly esteemed academic events, and the development of an external collaboration network [4].

The paper is structured in three parts. In the first part, the universities that make up ARUT are presented. The next part includes the evaluation of the universities' activity for sustainable development. The third part includes a conceptual model for university sustainability based on the assessment from the second part. The research concludes with conclusions, discussions, and limitations.

II. METHODOLOGY

The purpose of this research is to qualitatively assess the implications for the sustainable development of the universities that form the ARUT group. For this estimation, the qualitative assessment of university websites and strategic reports is used. The main activities of the universities on the three responsibilities of sustainability are presented below: economic, social, and environmental.

III. EVALUATED TECHNICAL UNIVERSITIES

The *Politehnica University of Timisoara (UPT)* was founded in 1920 and became an advanced research university. Today it is one of the Romanian schools with tradition, recognized nationally and internationally, both through the work of generations of teaching staff and through the exceptional work of prestigious academics, having 10 faculties [5].

The *Politehnica University of Bucharest (UPB)* is the oldest and most prestigious engineering school in Romania. The tradition is linked to the year 1818, when Gheorghe Lazar founded the first technical school, and teaching was done in Romanian. It was located at Sfantul Sava in Bucharest. It currently has 15 faculties, and its name was changed to Politehnica University of Bucharest. [6]. „The founder of education in the Romanian language in Wallachia, the great enlightener and patriot Gheorghe Lazăr, establishes in 1818 in Bucharest, at the Sfântu Sava monastery, "an Academy with science, even in the language of his mother", within which the first technical school in who were trained, in a special group, the first engineers,, [7].

The *Technical University of Construction of Bucharest (UTCB)* is the continuation of the "School of Bridges and Roads" (with a faculty degree) established in 1851 in Bucharest, today having 7 faculties [7].

The *Technical University of Cluj-Napoca* includes twelve faculties which is split between the two university hubs of Cluj-Napoca and Baia Mare, plus extensions in the nearby cities of Alba Iulia, Bistrița, Satu Mare, and Zalau. The Bologna system-organized educational offer consists of continuing education courses as well as bachelor's, master's, and doctoral degree programs [8].

"In Moldova in 1562, the first attempt was made to lay the foundations of what would become, much later, higher education, through the establishment of the Latin School in Cotnari. Through the education reform of 1948, the Polytechnic Institute "Gh. Asachi" from Iasi, which operated until 1993 when, as part of the reform of higher education in Romania, the Polytechnic Institute "Gh. Asachi" from Iasi becomes, on May 17, 1993, the

"*Gheorghe Asachi*" *Technical University of Iasi (TUIASI)*, and today it has 11 faculties [9].

IV. RESULTS

This part includes the results of the assessment on the three responsibilities of sustainability. The public information found on the websites of the universities is presented. From the evaluation of the activities, a general conclusion was formulated regarding the involvement of each university on the three responsibilities of sustainability.

1. *Politehnica University of Timisoara, Romania*

UPT has several implications for sustainable development which are presented below [5]:

Economic responsibility

- ✓ It contributes significantly to the development of the entire region.
- ✓ The year 2020 was the year of the Polytechnic in Timisoara.
- ✓ In 2022, the foundations were laid for fruitful collaborations between companies and the university to generate an ecosystem of entrepreneurs to strengthen the local entrepreneurial spirit, business partners joining with the experience they possess.

Environmental responsibility

- ✓ UPT constantly adapts to the latest trends required in the field and supports principles of sustainable development.

Social responsibility

- ✓ UPT leads to the fulfillment of the competence requirements of the social environment by ensuring professional training at university and postgraduate level.

2. *Politehnica University of Bucharest, Romania*

UPB has several implications for sustainable development which are presented below [6]:

Economic responsibility

- ✓ To develop experts in a range of technical domains who can apply important information from the sciences, engineering, and the humanities and advance technology.
- ✓ UPB aims to develop partnerships with universities in the EU as well as with the most prestigious ones in the world.

Environmental responsibility

- ✓ Educating engineers in management skills, adapting to the demands of the market economy and new technology, and advancing the values of sustainable development and environmental protection.

Social responsibility

- ✓ It encourages training that is fully competitive and tailored to a society's needs, subject to the integration process into the European and global Community.
- ✓ University professors and lecturers can benefit from a sabbatical year if they have carried out research grants, have worked in the university and have acquired scientific and didactic prestige through evaluation, keeping their title holder status, benefiting from a basic salary, without being able to have another employment contract.
- ✓ Projects are carried out for the community for the training of skills and abilities that are not fully

covered by the university curriculum (for example the EduFinUPT project carried out during 2021-2022).

3. Technical University of Construction of Bucharest, Romania

UTCB presents several sustainable development implications which are outlined below [7]:

Economic responsibility

- ✓ The general development of UTCB is a symbol for the significant rise in the university's national and international profile, as well as the improvement in the efficacy and efficiency of student learning services.

Environmental responsibility

- ✓ Organization of the "Think smart, create green" contest. Creating infrastructure and urban areas that are future-proof is essential to the goals of smart cities.
- ✓ An extremely important activity regarding the dissemination of research results, but also regarding a future international collaboration activity – it is the participation of UTCB in collaboration with the Romanian Geoexchange Society in the Pan-European Network of Centers of Excellence for Surface Geothermal Energy used in Civil and Historical Buildings [10].

Social responsibility

- ✓ UTCB's fundamental mission is to „be a national center for training new generations of specialists and performing scientific research in the field of construction”.

4. Technical University of Cluj-Napoca, Romania

The university presents several implications in sustainable development which are presented below [8]:

Economic responsibility

- ✓ Some aspects of the research environment include performance rooted in the perspective of the economic environment, visibility, and international cooperation, but also scientific originality and interdisciplinarity.

Environmental responsibility

- ✓ The study topics range from information technology and communications to renewable energy sources and ecology, with an emphasis on global objectives and views.

Social responsibility

- ✓ One of the main goals of the university is to expand the space of education and research to

Europe and the rest of the globe through a continuous process of internationalization.

5. Technical University “Gheorghe Asachi” of Iasi, Romania

The university presents several implications in sustainable development which are presented below [9]:

Economic responsibility

- ✓ TUIAȘI trains engineers with a high professional qualification, able to respond quickly and efficiently to the innovation, research, and development requirements of the economic environment.

Environmental responsibility

- ✓ The role of the university is to create a coherent but flexible system that generates knowledge and allows its functional integration into environmental protection structures.
- ✓ They also started a project with the theme: “Heat exchanger with uniform thermal flow integrated as a cold source in heating-air conditioning systems equipped with heat pumps”, where they have in mind the realization of a heat exchanger with uniform thermal flow.

Social responsibility

- ✓ To provide graduates with a genuine shot in the labor market competition, the university seeks to foster critical thinking and innovation. In addition, the institution speaks to every member of society to prepare them for lifelong learning.

V. THE DEVELOPMENT OF A CONCEPTUAL MODEL FOR UNIVERSITY SUSTAINABILITY

Based on the qualitative assessment carried out in the previous chapter, the main attributes of a conceptual model can be systematized. The main attributes identified on the three responsibilities of sustainability are:

- **Social:** community, university ethics, students, university campus, research education, power of employee-student interactions, student families, occupational health, and other stakeholders.
- **Environment:** setting and infrastructure, water management, resource efficiency, greenhouse gases, transport, other universities.
- **Economic:** national and international projects, international collaborations, research, education, formal and non-formal learning experiences.

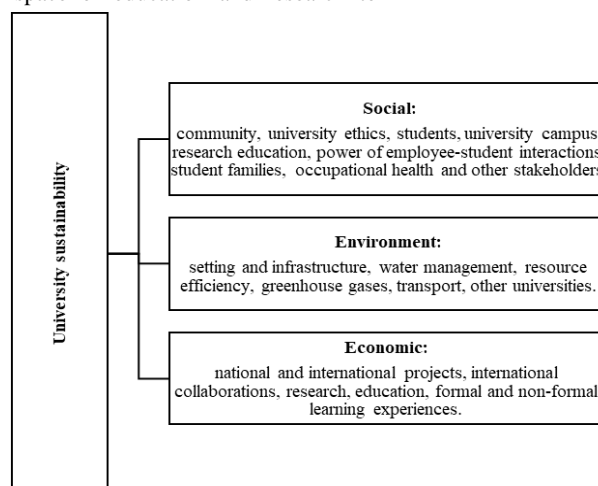


Figure 1. Conceptual model for university sustainability

VI. DISCUSSIONS AND CONCLUSIONS

This section presents the main findings of the study on sustainable development, through a brief examination of the information gathered from the websites of the 5 technical universities in the ARUT group in Romania, as also mentioned in the research methodology.

The Politehnica University of Bucharest has set out to train engineers who can easily adapt to the current requirements of the economy and new technologies, having managerial knowledge and promoting principles of sustainable development.

Improvements can be proposed on the environmental responsibility of the *Politehnica University of Timisoara*, because in the description found on the website there is no information about this pillar, but it places sustainability as a necessity and intends to find solutions to reduce the waste of resources from all the activities offered.

The *Technical University of Constructions of Bucharest* is focused on increasing the visibility of the university at the national and international level, as well as the training of new generations of construction specialists.

UTCB is in collaboration with the Romanian Geoexchange Society in the Pan-European Network of Centers of Excellence for Surface Geothermal Energy used in Civil and Historic Buildings.

It can be observed that the *Technical University of Cluj-Napoca* is focused on research directions related to the idea of remodeling the educational process to better respond to the real needs of the socio-economic environment.

It can be observed that the *“Gheorghe Asachi” Technical University of Iași* aims to stimulate critical thinking and creativity, offering equal opportunities to all members of society, to effectively respond to the demands of the economic environment. They also started a project with the title "Heat exchanger with uniform thermal flow integrated as a cold source in heating-air conditioning systems equipped with heat pumps", where they have in mind the realization of a heat exchanger with uniform thermal flow.

The limitations of this study refer to the information found on university websites which may be incomplete and thus those sustainability activities were not evaluated.

The future directions of this research refer to a semi-quantitative assessment of the capacity for sustainable development of the considered universities based on sustainability reporting indicators.

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