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DIGITALIZATION OF THE EUROPEAN GREEN DEAL (EGD) AND SUSTAINABLE DEVELOPMENT GOALS (SDG) - A FACTOR IN EMPOWERING SUSTAINABLE LOCAL PROJECTS: A REVIEW OF LITERATURE AND POTENTIAL ACHIEVEMENTS

Aleksandra Gajović[1]

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Original Article

[1] Faculty of organizational sciences, University of Belgrade

Corresponding Author:
Aleksandra Gajović

Email:
agajovic55@gmail.com

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ABSTRACT
The Sustainable Development Goals and the European Green Deal are calls to action for countries around the world, and especially for the member states of the European Union, to address and practically solve many common problems. When discussing the European Green Deal (EGD) in particular, these problems are predominantly ecological in nature. The goal of decarbonization is closely linked to the structure of the economy, and to properly implement the provisions of greening the economy, proper education is necessary. For mass education, the use of IoT is a step towards the digitalization of education, project and other networking, as well as harmonious innovations on the path to sustainability. To highlight the importance and interdependence of these areas, the paper presents a systematic review of the literature on these fields.

Key words: *sustainable development, European Green Deal, IoT, education, eco-entrepreneurship*

1. INTRODUCTION

The phenomenon within social development, called the "ecological model" of human development, was first defined by Bronfenbrenner (1979). The Sustainable Development Goals (SDGs) are by definition global: "a call to action to end poverty, protect the planet" and promote peace and prosperity for all inhabitants by 2030 (UN Serbia). The SDGs are presented as a global call for action to preserve and protect the environment, climate, prevent poverty (UN Serbia). They were adopted by the European Commission in 2019 (Smol et al., 2020) and represent a tool for strategic economic growth and development of countries. ESD is considered an opportunity for the development of a circular economy, the use of clean and reduction of dirty industries, and a financial future for all development projects where waste becomes a valuable renewable resource (Smol et al., 2020).

Sustainable development is projected as a "new ideal", and education that will be directed towards it gets its strongest platform with the publication of the "Report of the United Nations World Commission on Environment and Development", entitled "Our Common Future" (Orlović Lovren, 2021). In this Report, submitted to the UN as early as 1987, the most famous definition of sustainable development, formulated by the Brundtland Commission, was published for the first time (Orlović Lovren, 2021).

Online education during the current Covid-19 pandemic has become a counterpart to traditional education (Ljujić, 2021). However, the process of transition from traditional to online education is complex, and there may be difficulties in realizing this process (Ljujić, 2021). The essence of higher quality environmental education is reflected in the contribution to the entire community, not the individual. This highlights the importance of knowing the environment and the human being in the central place (Marouli, 2021).

Digitalized education has been recognized as effective through access to learning and networking, and it also has application results. The concept of mobile learning (M-learning) provides three integrated distance learning models aimed at contributing to the Sustainable Development Goals: collective partnership, quality education and improving access to education (Kim, 2020). In order to achieve global networking, especially of young people in higher education, global academic networks are proposed to complement the missing data on the topic of sustainable development goals, as proposed by Solís et al. (2018). Sustainable use of the Internet is important for networking young people because it enables easy interaction via social networks that young people regularly use (Hasim and Salman, 2010).

2. METHODS

The method of content analysis of literature and synthesis, as well as comparative analysis of available empirical data from selected areas which are topics of the paper, was used in the work

3. RESULTS

3.1. SUSTAINABLE DEVELOPMENT GOALS

The 2030 Agenda was adopted by the United Nations General Assembly in September 2015 (Bennich et al., 2020). It encompasses 17 SDGs, 169 associated targets, and more than 230 indicators that indicate the progress and development of these goals (UN, 2018). The Sustainable Development Goals are characterized by universality, making them applicable to all nations and stakeholders around the world regardless of their economic and sustainability status (Bennich et al., 2020). The roadmap with detailed sustainable development goals set a turning point for the development of countries at every stage of development or need for its implementation (Pradhan et al., 2017). All SDGs function as a set of interdependent elements contributing to the global security and operational system (Pradhan et al., 2017). Implementing the SDGs requires more tools and science-based analysis for implementation, making them complex and ambitious to achieve (Griggs et al., 2017). Policy makers are currently facing challenges for implementation and making progress in economic, social and environmental sustainability globally (Griggs et al., 2017).

There are seventeen core SDGs that address economic, social and environmental issues present in all countries, identified by the United Nations (Kraak et al., 2018). All SDGs are tangible and can be observed geospatially (Kraak et al., 2018). Maps have been created that enable analysis and practical application (MacEachren, 2004). Each set of goals consists of indicators and targets that are analyzed and show progress in the observed country on which those goals are analyzed (Kraak et al., 2018). Data for all countries is transparent, so as to be of general benefit, indicating countries' desire for economic progress and government transparency (Zuiderwijk & Janssen, 2014). Software that can be used to assist in implementation and status analysis (Software

as a Service (SaaS)) is available to everyone, making the implementation and analysis easier (Kraak et al., 2018). The United Nations (UN, 2018) in its Resolution adopted at the General Assembly, adopted the 2030 Agenda for Sustainable Development which has a people focus, is transformative and universal, while the goals are comprehensive, cannot be separate and have three dimensions of sustainability: economic, environmental and social (UN, 2018).

It is impossible to track the global situation at every moment, so the United Nations has created three groups of indicators to make it simpler (Kraak et al., 2018). They have 3 tiers:

- The first tier has a clearly established methodology for which appropriate standards have been developed. Data is monitored and generated for 50% of the observed countries and populations where the indicator is measurable;
- The second tier of indicators has an international methodology for which standards have been set. For this tier there is a challenge because countries do not regularly generate such data;
- The third tier has no internationally established methodology or standards. Space has been left for this tier to be developed and implemented in the future (Kraak et al., 2018; UN, 2018).

In United Nations Resolution 68/261 (UN, 2014), agencies processing data in each country individually are obliged to ensure the credibility of statistical data, and 17 SDGs have been created, which individually state:

- Goal 1. End poverty in all its forms everywhere,
- Goal 2. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture,
- Goal 3. Ensure healthy lives and promote well-being for all at all ages,
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all,
- Goal 5. Achieve gender equality and empower all women and girls,
- Goal 6. Ensure availability and sustainable management of water and sanitation for all,
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all,
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all,
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation,
- Goal 10. Reduce inequality within and among countries,
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable,
- Goal 12. Ensure sustainable consumption and production patterns,
- Goal 13. Take urgent action to combat climate change and its impacts,
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development,

- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss,
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels,
- Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

3.2.THE EUROPEAN GREEN DEAL

In December 2019, at the COP25 (The Conference of the Parties) session, the European Green Deal (EGD) was presented (European Commission, 2019). This deal is a plan for climate neutrality of the European Union and a set of policy initiatives for climate neutrality (Kougias et al., 2021). In October 2020, the European Parliament called for a reduction of the carbon footprint (greenhouse gases (GHG)) by 60% by 2030, with the possibility of postponing the deadline to 2040 (European Parliament, 2020). Quantitative analyses on these issues are particularly carried out by the European Commission's Directorate-General, whose results are used for policy-making scenarios (Hainsch et al., 2022). The EGD is a tool for the strategic economic growth and development of countries, and was adopted by the European Commission in 2019 (Smol et al., 2020). It is considered an opportunity for the development of a circular economy, the development of clean and reduction of dirty industries, and a sustainable financial future for all development projects where waste becomes a valuable renewable resource (Smol et al., 2020). To address political turbulence within the institutions of the European Union, climate change strategies and the Green Deal are the right choice (Schoenefeld, 2021). That the Green Deal and the Paris Agreement are planetary significant actions is also shown by the fact that the current US President (probably Congress at the President's proposal) has allocated a budget of $2 billion for green investments through the scientific postulates of investing in infrastructure, the energy sector, housing, all kinds of innovation, food production and environmental justice (Peters et al., 2020).

The overarching principle of the Green Deal is to ensure social inclusiveness and promote decarbonization, all in the aim of economic and industrial progress through a transformation that should be politically and financially sustainable (Claeyrs et al., 2019). However, there are challenges in implementing the Green Deal, such as economic and political challenges in repaying bank loans intended solely for this purpose (Dowson et al., 2012). The implementation of the Green Deal is mostly about the positive consequences for the environment and the health of the inhabitants, where the most prevalent sources of danger are emissions of harmful gases, which concern all countries of the European Union, their inhabitants and the harmful consequences they leave on the environment and health of the inhabitants (Haines & Scheelbeek, 2020). It remains unknown whether the current implementation and promotion of eco-standards by many companies is just "greenwashing" (eco-manipulation) and an opportunity to increase profits, or an expression of a lack of financial resources and inability to perceive the financial benefits of green investments (Pettifor et al., 2015). Utilizing the opportunities provided by the green agenda, the company strengthens its ESG positions (Князева & Бойко, 2023).

3.3. THE EUROPEAN ENVIRONMENT AGENCY (EEA) HAS HIGHLIGHTED 12 MAJOR KEY ENVIRONMENTAL ISSUES:

1. Climate change, caused by an increase in the concentration of CO2 in the atmosphere, exceeding pre-industrial times by 50%. Between 1990 and 2018, EU greenhouse gas emissions decreased by 23%, while the economy grew by 61%;
2. Stratospheric ozone depletion caused by the release of chemicals known as chloro and bromofluorocarbons, which are used as refrigerants, industrial cleaning agents, foaming agents and other fire extinguishers;
3. Loss of biodiversity in European ecosystems, which have more than 2,500 habitat types and around 215,000 species, of which 90% are invertebrates, and almost every European country is facing endemic species;
4. Major accidents causing serious environmental damage;
5. Acidification resulting from the combustion of fossil fuels and sulfur and emissions of nitrogen dioxide into the atmosphere where gases react with water vapor to form sulfuric or nitric acid, reaching the ground through rain and, after deposition, leading to a number of undesirable changes in terrestrial and aquatic ecosystems;
6. Tropospheric ozone and other photochemical oxidants exceeding ozone air quality guidelines in many European regions;
7. Freshwater resource management is an issue in many parts of Europe. Water losses in distribution systems, water pollution and degradation of water habitats are among the major challenges;
8. Forest degradation, resulting from air pollution, seriously threatens the sustainability of forest resources in central and eastern regions, and raises the risk of fires in southern Europe;
9. Threats to coastal zones are a problem in many parts of Europe. Physical changes to the coast, such as construction and erosion, and water pollution threaten coastal habitats;
10. Waste generation and management caused by a steady increase in the amount of waste and its toxic components;
11. Urban stress is an issue in many European cities. Poor air quality, excessive noise and traffic congestion are some of the factors contributing to urban stress;

Chemical risk associated with excessive chemical loading. More than 10 million chemical compounds have been identified, of which about 100,000 are produced commercially (European Environment Agency, 2020; Communication..., 2019).

The EGD plans to introduce sustainability as the main theme in all European Union policies. The ways in which this will be realized (according to the European Green Deal, 2018, pages 16-21) are:

1. “Ensuring green finance and investment and enabling a fair transition”,
2. “Greening national budgets and sending appropriate price signals”,
3. “Mobilizing research resources and supporting innovation”,
4. “Activating education and training”,
5. Green Oath: “Do No Harm”.

In order to mitigate the damage incurred and provide prevention (European Green Deal, 2018), the solution is to make all European Union policies and actions compatible, which provides assurance for a successful and proper transition. Rosenow and Eyre

(2016) predict low energy savings as a result of the implementation of the Green Deal and the delegation of responsibility of companies dealing with energy. The concerted European steps to prevent decarbonization include social inclusion, green business and green investment, through green business in industries, and other socio-economic aspects (Leonard et al., 2021). Investing in renewable energy sources and energy efficiency is challenging for the poor population (Guertler, 2012). However, the long-term profitability of these investments indicates that the financial part of the Green Deal should be flexible in order for the project to be successfully implemented (Guertler, 2012). The Green Deal could significantly mitigate the crisis and transition through lower prevalence of harmful particle (carbon) emissions through the modernization of industries that should implement decarbonization (Elkerbout et al., 2020). This also requires a solution for the successful operation of enterprises, but what is common to post-pandemic recovery and reducing pollution and the greenhouse effect are small steps towards long-term improvement and financial investment (Elkerbout et al., 2020). By adopting the European Green Deal, the European Commission has created a tool needed to strengthen strategic economic growth and encourage the development of a circular economy, which might provide a bright future for projects aimed at green development (Gajović et al., 2023).

Residents of the United Kingdom, which has incorporated the implementation of the Green Deal into its legislation, in most cases see the opportunity to apply for this package of programs as savings, energy conservation in their homes, and financial savings (Marchand et al., 2015). The authors (Dobbs et al., 2021) gave suggestions for adaptation in such adversities, not calling them a crisis, but only a need for adjustment and a change in the management and implementation of the provisions of the Green Deal. In these new situations, with the constant need to create new, more innovative approaches to work, pressures from environmental activists are particularly challenging (Dobbs et al., 2021). The creators of the Green Deal have excluded the importance of the benefits that forests have on quality of life and the environment and have given suggestions on how to bridge the missed steps (Aggestam et al., 2021). The observed shortcoming is communication between stakeholders, data availability, financial expenditures, goals and policies, but also the knowledge of participants in the communication process (Aggestam et al., 2021). The Green Deal proposes actions for energy saving, conservation of natural resources, which also conceals hidden costs, so investment is more valuable than it appears (Booth and Choudhary, 2013). A special marketing connection is needed to work on improving communication in the development of technical and other skills that arouse local interest, with personal recommendations from users, citizens (Gillich et al., 2017). Savings measures are overestimated, subsidies need to be increased due to the exclusion of funds needed for the installation of items for warmer homes, and then also the global social benefit such as the reduction of harmful gas emissions (Booth and Choudhary, 2013).

3.4. THE SITUATION IN THE EU

In the countries of the European Union, two principles are applied in waste treatment through a combined performance indicator consisting of landfill, incineration, recycling, and then composting (Castillo-Giménez et al., 2019), and the best results are achieved by Austria, Germany and Denmark. By updating the global statistical database on e-waste, it shows that the world produced 53.6 million tons of e-waste in 2019, and that e-waste generation will increase to 74.7 million tons by 2030, which is a significant increase (Forti et al., 2020).

The authors Hainsch et al. (2022) provided an overview of scenarios, research projects and other significant European Union scenarios, which are presented below:

1) European Commission scenarios,
   a) Energy Roadmap 2050 scenarios,
   b) Clean Energy for all Europeans package,
   c) A clean planet for all scenarios;
2) Related EU research projects;
3) Other European scenario studies (Table 19);
4) The openENTRANCE scenario definition approach and quantification.

The REEEM project is based on studying the "role of technologies in an energy-efficient economy [through] model-based analysis of policy measures and transformation pathways to a sustainable energy system" (REEEM, 2019; Hainsch et al., 2022).

Stakeholders, including market actors, consumers and decision-makers, are contained in a set of priorities and focused on six dimensions:

1) Economic,
2) Political,
3) Environmental,
4) Global factors,
5) Social,
6) Technological.

The REFLEX project - "Analysis of the European Energy System" - analyzes two main scenarios based on the PRIMES 2016 scenario, which is part of the European Commission's Clean Energy Package (Capros et al. 2016; Hainsch et al., 2022). This project contains scenarios with a lower level of ambition when it comes to decarbonization (Herbst et al., 2016; Hainsch et al., 2022). The goal of achieving net-zero GHG emissions by 2050 has been established, which has led to the development of studies on the technical feasibility of such projects along with the socio-economic impacts they have on society (Hainsch et al., 2022).

3.5. EXAMPLES OF GOOD PRACTICE OF NATIONAL PROJECT MODELS FROM THE ENVIRONMENT

Capital investments were made in: regional operational programs, infrastructure, environment, education and other forms of growth. From 2014 to 2020, Poland invested 77.6 billion euros (Breznitz & Ornston, 2017). Another overview of the structure indicates the budgets used for various research and innovation activities as strategic goals: enterprise research and development, enterprise research and development capacities, generally innovative enterprises and for research potential capacities, technical assistance (Breznitz & Ornston, 2017).

Human capital is the most important bottleneck for obtaining funds for development projects, research and innovation (Breznitz & Ornston, 2017), and an economic problem (VAT loss) may also arise when university resource potentials (knowledge) are used and funds are obtained from the European Union. The authors (Inamorato dos Santos et al., 2023) emphasize the importance of digital education, which is also highlighted by the Council of the European Union as lifelong learning, development of other competencies, which is also cited as a learning model in all European policy docu-

ments. The basic model (DigComp framework) was introduced by the scientist Ferrari in 2013, and the European Commission has developed it into three additional models currently in use:

1. DigComp for Consumers (2016),
2. DigCompOrg (2017),
3. DigCompEdu (2017),
4. DigComp 2.2 (2022),

cited according to the research (Inamorato dos Santos et al., 2023).

It should be noted that the development of educational policies in the field of education, along with all accompanying regulations, encourages the development of digital technologies and the opportunities they provide (Spante et al., 2018). This is justified by the level at which the Council of the European Union supports the development of competencies for digitalization, online learning and lifelong learning (European Union, 2018).

3.6. POTENTIALS FOR INNOVATIVE ECO-ENTREPRENEURSHIP OF YOUTH AT THE LOCAL LEVEL

Researchers used the "Triple Bottom Line Conception" method and found that young people as residents of local communities can significantly contribute to sustainable development through their entrepreneurial projects by applying this concept (Dalibozhko and Krakovetskaya, 2018). In the report on the Covid-19 pandemic, the Organization for Economic Co-operation and Development (OECD, 2021) states that the so-called Global Youth Report concludes that Public Administration is the center of building trust for younger generations. Space should be given for the development of a platform aimed at transforming youth leadership for the circular economy, which prepares users for new skills and jobs, thereby empowering young entrepreneurs for the circular economy (Liu, 2020).

4.DISCUSSION

4.1. INTERNET OF THINGS (IOT)

Improving business operations and new business opportunities are also noticeable in the industry, while digital transformations call for a new system of decision-making and management (Feroz et al., 2021). Digital transformation strategies encompass organizational, production, and process transformations (Matt et al., 2015). Radical transformations are characterized by the implementation of new technologies that provide new values and functions (Feroz et al., 2021). The Internet of Things (IoT) enables inter-object communication and data collection (Raiwani, 2013). Data collection is subject to various areas, project solutions, businesses, but can also be used for private communication. The special importance of IoT is in the industry where it is focused on end-users by enabling rapid interaction through networks that have a great impact on the individual, consumer or participant in the business process (Raiwani, 2013). This author also states that IoT can improve the quality of business when it comes to workers, the industry of business owners, but also the quality of life of individuals. The application of digital transformations is applied in industry, data analysis, cloud computing, IoT and other stimuli for digital progress (Feroz et al., 2021).

IoT can make a great contribution to consumers, producers, businesses, governments and every country individually (Tu et al., 2017). One of the advantages provided by

IoT is the transparency of requested information, communication, and comparative access to data (Raiwani, 2013). This author recognizes that the future development of IoT will contribute to the optimization of information that is useful for, or already part of, society and business entities. The Internet of Things (IoT) enables access to various dimensions of the physical world. It integrates data, characteristics, environmental content, and everything together into a knowledge base (Piccolo et al., 2022). Such a knowledge base represents a quality foundation for further development or access for other experts. Experts receive ready data, project solutions that can be applied in various projects, national, scientific or other problems depending on the scope. Ali et al. (2017) highlighted the possibility of application in education.

4.2. POTENTIALS OF IOT APPLICATION IN DIGITAL EDUCATION IN LINE WITH SDGS AND EGD

Education on improving and protecting the environment has been recognized as an important issue globally, where IoT stands out as a quality way of communication (Tu et al., 2017). Flexible curricula implemented through digital content, learning through courses specifically designed for each group, are topics that higher education institutions should focus on (Benavides et al., 2020). Learning through games finds application. The support in the development of a gamified way of learning presented by Subhash and Cudney (2018) provides an enthusiastic look at the application in higher education. Such application has been proven possible in various formats designed for pupils and students. The authors Subhash and Cudney (2018) note that Spain is the leading country in this area of developing learning through gamification of scientific research. Platforms designed in this form represent precisely a form of machine learning and the Internet of Things (IoT). The authors Ramlowat and Pattanayak (2019) emphasized that with the emergence of IoT, communication has been enabled on individual relationships between people, machines, but also on the human-machine relationship.

The development of education itself has been enhanced through the encouragement of a rapid reaction of educational systems to new circumstances caused by the Covid-19 pandemic. Ali et al. (2017) presented an IoT platform model that can be used for education in the field of medicine. They named the platform model "IoT-based Flipped Learning Platform (IoTFLiP)". Ramlowat and Pattanayak (2019) pointed out the importance of implementing IoT in several different educational models. IoT is a key tool for green consumer education with the application of green marketing (Tu et al., 2017). Information technologies, IoT provide efficiency and quality in education, speed of communication and cost savings, while on the map of Green Information and Communication Activities, three segments can be observed: Computing, Infrastructure, and Manufacturing.

4.3. APPLICATION OF IOT IN EDUCATION FOR THE PUBLIC SECTOR AND INDUSTRY

A study conducted by Feroz et al. (2021) can assist decision-makers in all sectors, especially the public sector.

Some of the recommendations given by Bashir et al. (2019) for the application of the Arduino platform specifically are:

- integrating it into educational courses,
- improving users' understanding of the interface and skills,

- mapping courses (curricula or project assignments),
- developing critical thinking, group learning, and collaborative problem-solving among university students,
- providing a solid foundation for the development and review of project activities,
- learning pathways and solution creation supporting education,
- accessibility, overview and monitoring, functionality,
- independent work, and more.

4.4. CREATING ENVIRONMENTALLY SUSTAINABLE PRACTICES

The creation of environmentally sustainable practices can be stabilized and developed with the help of IoT and artificial intelligence, integrating them into business models to address pollution and resource degradation (Demartini et al., 2019). Environmentally sustainable practices should be included in digital transformation systems, which should not be expected to bring immediate improvements but rather serve as a stimulus for progress, enhancement, and development (Feroz et al., 2021).

Improvement processes should focus on:

- sustainable practices,
- created through strategic processes,
- digital transformations,
- ensuring that all points are oriented towards environmental sustainability (Feroz et al., 2021).

The digitization of workplaces contributes to environmental protection and sustainability (Song et al., 2018). To properly implement these points and create final solutions, it is essential to answer the following questions: which digital business strategies needed by the organization should be included in environmentally sustainable digital transformations, how can environmentally sustainable practices be implemented in them, and what are the driving forces for sustainable digital transformation (Feroz et al., 2021)?

Although there are various controversial theories about artificial intelligence (AI), as well as positive integrative comments, AI has significant benefits for society, industry, and public administration, particularly through data provisioning and analysis, and mobile technologies (Vial, 2019). The application of IoT is particularly effective in Industry 4.0 (Rodríguez-Calderón & Belmonte-Izquierdo, 2021). The application of the Internet of Things (IoT) is realistic for measuring various factors in smart city systems: the content and quality of air, water, and soil, which can be significant for relevant institutions, scientific organizations, and the education of professional profiles (Dutta et al., 2017; Stojkoska & Trivodaliev, 2017; Piccolo et al., 2022; Shah & Mishra, 2016; Silva et al., 2013). Piccolo et al. (2022) highlight the key features of education about the Sustainable Development Goals (ESD-Education for Sustainable Development): problem-oriented, collaborative, interdisciplinary, equipping students with the necessary knowledge to be informed and to take action for a sustainable society, shifting the focus from traditional teaching models to concrete learning.

What is most important, and relates to the learning models addressed in educational models, is that Education for Sustainable Development (ESD) bridges informal and formal learning, as highlighted by Piccolo et al. (2022). ESD, or education oriented towards the Sustainable Development Goals, represents precisely the link in creating

models for knowledge acquisition, necessary learning, and includes pedagogy that is crucial for working with students and yielding results (Leicht et al., 2018). The potential of applying the Internet of Things (IoT) has also been recognized for engineering education through courses, especially in mechatronics (Rodríguez-Calderón & Belmonte-Izquierdo, 2021). This form of education is possible from the first to the final years of study and for graduates.

There are challenges in implementing IoT in education where textbooks are transformed into smart books (Moreira et al., 2018). The application of such data is possible in various technologies and projects. The main challenge is related to the need for constant data updating (Moreira et al., 2018). Involving students could simplify the necessary updating, considering that the end users are interested parties at the local or national level, and the solution creators in the case developed in this dissertation are students. IoT is also used for environmental sustainability in companies and generally, while (according to Feroz et al., 2021) there is also a lack of studies related to mapping in general environmental sustainability.

4.5. THE FUTURE OF "DO IT YOURSELF" SUSTAINABLE PROJECTS FOR STUDENTS AND IOT

There is significant potential in relation to the SDGs, education about them, and "Do It Yourself" (DIY) projects and technologies (Piccolo et al., 2022). The application of IoT is feasible in the development of projects linked to sustainable development goals, promoting engineering knowledge (Oliva-Maza et al., 2019). Oliva-Maza et al. (2019) recommend the development of such projects where young students are the focus, encouraging innovation among faculty, and resulting in increased productivity and regular student attendance. There is potential for the use of IoT in DIY projects where users employ interfaces with sensors, various other connected objects, and related technologies, allowing them to learn through practical examples, perform measurements, manage data, and more (Ramlowat & Pattanayak, 2019).

A new paradigm empowers students and individuals to educate themselves in line with the SDGs – ESD (Education for Sustainable Development), aiming first to empower them to think and act according to the SDGs (Piccolo et al., 2022). A game has been developed to educate elementary and high school students about water quality and its environmental impact (Tziortzioti et al., 2018). Gamification (using video game formats) is possible for energy-saving topics through education and competitions (Mylonas et al., 2021).

Engaging students in environmental protection projects focused on air quality, where they are directly involved through campaigns and voluntary activities in the United States, has shown good results (Chen et al., 2020). Some authors (Bashir et al., 2019) have provided recommendations for using the Arduino platform and the solutions created within it for students from their first year of studies, by including it in courses, developing independence, and recognizing that this platform represents an excellent map and tool for motivating learning and thinking. The technical capabilities of IoT are important, considering that the open-source Arduino platform plays a significant role in electrical engineering projects (Piccolo et al., 2022).

Authors Rodríguez-Calderón & Belmonte-Izquierdo (2021) presented the "IoT Maker Lab" platform, which serves as a workshop for idea development, demonstrating the practical results of such applications. The Arduino platform not only aids in the development of engineering skills but also offers a new learning model that is accessible and

easily mastered regardless of the users' level of expertise (Bashir et al., 2019). Smart Water Management Systems, PlantVillage, and Peter Ma's innovative application for identifying waterborne diseases are proof that the application of digital technologies in the field of environmental sustainability is possible (Goralski & Tan, 2020). Artificial intelligence can be applied to enhance environmental sustainability, creating solutions for improvement and protection of the environment through the use of IoT data (Balogun et al., 2020).

Feroz et al. (2021) confirmed that an IoT model exists to assist decision-makers in public, private enterprises, and other stakeholders in creating sustainability strategies and environmental impacts. The Internet of Things (IoT) can connect all areas of an individual's life, such as protection, healthcare, safety, recycling, and processes occurring in the environment and its protection (Ramlowat & Pattanayak, 2019). The recommendation is for management systems to focus on digitalization changes, board discussions, and process improvements, which brings numerous benefits for managerial duties and decision-making (Feroz et al., 2021). Research results on the quality and principles of the Arduino platform, its effectiveness, indicate efficiency, sparking interest, and user results that have led to the awarding of project solutions developed using this platform (Bashir et al., 2019).

5. CONCLUSION

In the realm of the new economy, digitalization and innovation stand as pillars shaping the future landscape of economic and social development. These paradigms not only revolutionize traditional industries but also foster the emergence of new economic models driven by connectivity and sustainability. Embracing digital education through projects aimed at empowering EGD (European Green Deal) and SDG (Sustainable Development Goals) is key to economic resilience and fostering sustainable growth and eco-entrepreneurship among young people. By equipping youth with digital skills aligned with the SDGs, we pave the way for a more inclusive, circular, and environmentally conscious economy. Integrating EGD, SDG, and IoT (Internet of Things) within our educational frameworks not only enhances economic empowerment but also nurtures a culture of innovation and sustainability. Through IoT-enabled solutions, young entrepreneurs can create impactful ventures addressing urgent social and environmental challenges. As we move towards a digitally driven economy, the synergy between education, entrepreneurship, and sustainable development becomes imperative. By leveraging digital tools and technologies, we empower youth to become agents of change, driving economic growth while ensuring environmental stewardship. The future of our economy lies in embracing new paradigms that prioritize connectivity, innovation, and sustainability. Investing in digital education that encompasses EGD, SDG, and IoT lays the foundation for a resilient and prosperous economy that promotes economic advancement and environmental care.

While the potential is immense, it is important to note that there are still few practical results and empirical studies on this topic, as both SDG and EGD are relatively new concepts and their operationalization is just beginning, particularly in Southeastern European countries. Numerous new solutions through social organization practices, software solutions, and green platforms are expected. Therefore, this paper primarily applied a comparative analysis of theoretical solutions and literature sources. Given that the Green Deal is a product of the EU's green and development policies, and SDG is also a political platform for the desired integral development of the UN, theory is

currently a bit ahead of practice in this field, strategically aiming to promote sustainable development and green transition. Hence, more comprehensive research works on this topic are anticipated following this one.

Note:The literature review used in this paper is a result of the author's doctoral dissertation, which is in the final stages of publication.

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