CIRCULAR ECONOMY AND INTERNET OF THINGS, HAND IN HAND FOR A SMOOTH TRANSITION TOWARDS A SUSTAINABLE BUSINESS MODEL. QUALITATIVE RESEARCH ON HOW ROMANIAN COMPANIES PERCEIVED THIS TRANSITION AND NEXT STEPS

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Abstract

The paper aims to assess the contributions of Circular Economy (CE) and Internet of Things (IoT) into a world of a continuous transition, highlighting especially those that help companies towards a sustainable business model. Hand in hand towards the same main purpose to integrate sustainability in all the organizational activities, 7 Romanian organizations from various industries have responded to a qualitative interview, assessing the concept of digitalization as a key component in the developing process for a green future. Used as a starting point, the United Nations' 17 Sustainable Development Goals contribute to a clear vision in creating an efficient marketing strategy, by noticing the effects of a relationship between Circular Economy and Internet of Things through sustainability. As for sustainability, a question might be posed on how it is viewed today and what it represents in the nowadays context. In order to find out an assumed response that could be correlated with various field of activities, some analytical questions have been asked, based on the way of developing a sustainable strategy through digitalization, the main role of the digital instruments, the types of the resources used and the consumer and public perception onto the business model, directing the research towards the creation of hypotheses based on a thought process of sustainability. The transition towards a sustainable business model is reflected in this research through the perception of Romanian companies from different fields, identifying their green practices, and use of digital solutions, by highlighting the importance of circular economy and the IoT component.

Keywords: sustainability, marketing strategy, Internet of Things, circular economy, digitalization

JEL Classification: Q01, M00, M30, L10, L86, O30

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1. Introduction

The intersection between the Internet of Things and Circular Economy represents at this moment state-of-the-art research, correlated to the modern technologies which generate benefits to the economic environmental and the social pillars. Nowadays, more and more companies ask themselves how they can insert digitization into their sustainability strategy or how they could further promote the technological practices that they have already adopted, in order to be considered green organizations, but, at the same time maximizing their profits. The premise that stood at the forefront of the present research includes the concept of a smooth transition towards a sustainable business model, achievable through and with the help of technology. By becoming progressively modern, digital, and innovative, many companies channel their efforts towards the adoption of a sustainable system, supporting and promoting the relationship between the CE and IoT.

In one of our previous research projects, we studied how digital instruments and, especially, the Internet of Things (IoT) help companies to adopt a Circular Economy and transition towards a sustainable business model. A case study through desk research has been conducted upon one of the biggest groups of companies, Schwarz Group, involved mainly in the retail industry, but supporting its circular needs through other companies of the group. Overall, the conclusion was that IoT was one of the most useful instruments during the journey of becoming sustainable but posing its challenges mainly in its inclusion in the companies' business strategy. Another important point was the experience gained during this journey and the lessons learned that should help the companies to improve their strategies, but also to help other companies not to go blindly on these avenues.

The case study on Schwarz Group proved the efforts brought in by big companies, using instruments not only for their own business models, but also supporting their partners and the supply chain and, more important, trying to educate their customers to become smart, sustainable, and green. But what about smaller companies? Did they start their journey towards sustainability? And if the answer is yes, how did or does it go? Do they have any recommendations for those that are still thinking on how to do it?

Romania, as a European Union Member State since 2007, applies the *acquis communautaire* including that on sustainability, and with the new proposed Directive on corporate sustainability reporting companies will be obliged to adopt a sustainable business model [01]. Also, in May 2022 Romania ranked 1st place among Central and Eastern Europe's countries in terms of fixed broadband speed (*CEE: fixed broadband internet speed 2022*, no date). We have the context, the instruments, and the precedents, to be able to ask the questions: *Are Romanian companies on their way to sustainability? Are the IoT and digitalization part of the tools used to support their journey?*

In order to find out the level of preparedness and the tools used by the Romanian companies in their efforts to turn their linear business model into a circular one through digital

instruments, especially IoT, we got in touch with a series of Romanian companies and asked their representatives to fill in a short and focused questionnaire.

2. Designing the interview

The concept of circularity includes a series of characteristics, starting from the principles of sustainability and ending with the life cycle of products. This concept is intensively promoted by the European Commission in its attempt to adopt global well-being through a sustainable development seen as an approach of economic, environmental, and social pillars.

So, what does sustainability represent and how is it viewed today? In a historical approach, the concept of sustainability was strongly influenced by psychological, behavioral, and institutional factors through which people understood and implemented the need to trade, live and consume in a sustainable way [02].

Nowadays, the importance of Circular Economy concept is given by many international polices, academic research and innovations, such as green strategies for climate change, by encouraging bio-based products and developing sustainable activities for all sectors. Regarding the actual European context, promotion of the Circular Economy has become a key element for many companies (M. Åkerman, et al., 2020), with the business ecosystem becoming greener and smarter and the impact of sustainability on this system representing a strategy for the future (World Commission on Environment and Development, 1987).

Industrial revolutions have helped humanity to evolve and the 4th one, also known as Industry 4.0 or "smart factory", has introduced the Internet of Things (Erboz, 2017). Introduced by Kevin Ashton in 1999, only 10 years later he realized that IoT is not only a system to track things with the help of the internet, but also a way to sum up, take inventory and assess which would support sustainability and a circular business model (Ashton, no date).

In the modern world, the association of the three concepts: Circular Economy, IoT and sustainability is given by the technological influence, combined with the effects of global challenges. Over time, technological innovations brought considerable improvements in human life and in the activities of companies, transforming classic industries into fast ones, emphasizing a behavior harmful to the environment, namely: excessive consumerism. To stop this type of excess, sustainability was emphasized by promoting economic, social, and environmental integrity, complemented by the new technologies that could bring added value by reducing the carbon footprint.

Through this qualitative research using a targeted questionnaire we wanted to see how the Romanian companies adapted or try to adapt their business models to a circular one considering: 1. The 17 Sustainable Development Goals (SDGs) established by the United Nations (UN); 2. Motives that brought them to the decision to adopt a sustainable business

strategy; 3. Tools used in their works, identifying also the digital ones; 4. The part played by the digitalization in their endeavors; 5. Resources used to become sustainable; 6. Ways and means used to make their new business model known to their customers and the general public, how it was perceived and forecasts on attracting new customers. Given that we have targeted companies that were already involved in such a transition towards the Circular Economy, we also asked the representatives to include recommendations for those companies that find themselves during the thinking process on how to do it and with the emphasis on digitalization and IoT.

Out of the 7 answers received we noticed that a wide range of business areas have been covered. Representatives of companies involved in consultancy, packaging, including production of, fashion, and digital platforms have offered their views on sustainability, digitalization and IoT, and circular business models.

3. Interpretation of the interview – a state of the art of mixing Circular Economy and Internet of Things aiming the transition towards a sustainable business model

3.1. The UN 17 Sustainable Development Goals (SDGs)

Since September 2015, when all the UN countries decided to adopt the 17 SDGs, more and more entities and people started to work towards peace and prosperity, tackling poverty and deprivations in general, calling on health and systems' improvements, economic growth, all of them fighting climate change and saving nature [03].

Our analysis discovered that Romanian companies are aware of the UN 17 goals with an average of 6 goals being addressed in their business models. All respondents have adopted at least 2 goals in the business model with one of them adopting all 17 Goals (Figure 1, below)

The one Goal adopted by all our respondents was *Goal 12 - Responsible Consumption and Production,* showing that companies are aware that consumption and production are those operations that should be addressed first when adopting a sustainable business model, referring not only to an internal adoption, but also in their relations with various stakeholders, partner companies and clients. According to the UN stats, Europe is one of the three regions that together account for 70% of the global domestic material consumption (DMC), food waste taking the lead and also electronic waste. The term "domestic material consumption" (DMC) refers to the entire quantity of raw materials required by a country's economy to produce products and provide services for domestic and foreign consumers (— *SDG Indicators*, no date).

Not surprisingly, *Goal 13 - Climate Action* was the next one in adoption, with a couple of exceptions, all our respondents confirming this goal as being adopted by the company. Climate change is one of the reasons for these efforts on sustainability and circularity and more is needed in order to achieve net zero by 2050 as per Intergovernmental Panel on

Climate Change (IPCC) plans. In 2021 carbon emissions registered a record high, whipping out the reductions of 2020 because of the pandemic. IPCC considers climate change a *code red* for humanity with disastrous consequences if not taken seriously: extreme weather, increasing oceans' levels, biodiversity loss and less agriculture and food production (— *SDG Indicators*, no date).

Quality Education, Goal 4, is recognized as another important aspect that should be adopted by the business environment. Heavily hit during and after the pandemic, education is considered one of the top priorities also by the Romanian companies, 50% of the respondents adopting this goal and it is not only about children being in schools and learning, but also about what they learn and the overall education of population about recycling, reuse, and sustainability in general.

It is recognized that without help, support, and cooperation a sustainable model cannot be adopted and applied. That is why 50% of the respondents confirmed the adoption of *Goal 17 - Partnerships for the Goals*. At global level, foreign direct investments (FDI), Official Development Assistance (ODA) and access to the internet are recognized as the most important instruments, especially for developing economies, in tackling sustainability (SDG Indicators). At the company level, this goal is translated in their partnerships with their stakeholders. Clients and partners, downstream and upstream, define the capability of the company to adopt a circular business model in a sustainable way.

33% of the respondents had included in their business models *Goal 6 - Clean Water and Sanitation, Goal 9 - Industry, Innovation and Infrastructure and Goal 11 - Sustainable Cities and Communitie*s.

Goal 5 - Gender Equality, Goal 7 - Affordable and Clean Energy, Goal 8 - Decent Work and Economic Growth, *Goal 15 - Life on Land and Goal 16 - Peace and Justice Strong Institutions* have been adopted by 25% of the respondents, while *Goal 2 - Zero Hunger, Goal 3 - Good Health and Well-being, Goal 10 - Reduced Inequality and Goal 14 - Life Below Water* have been adopted by 10% of them.

Consultancy companies are focusing mainly on Goal 12 and Goal 17, while those involved also in production and consumption focus also on Goals 6 and 13.
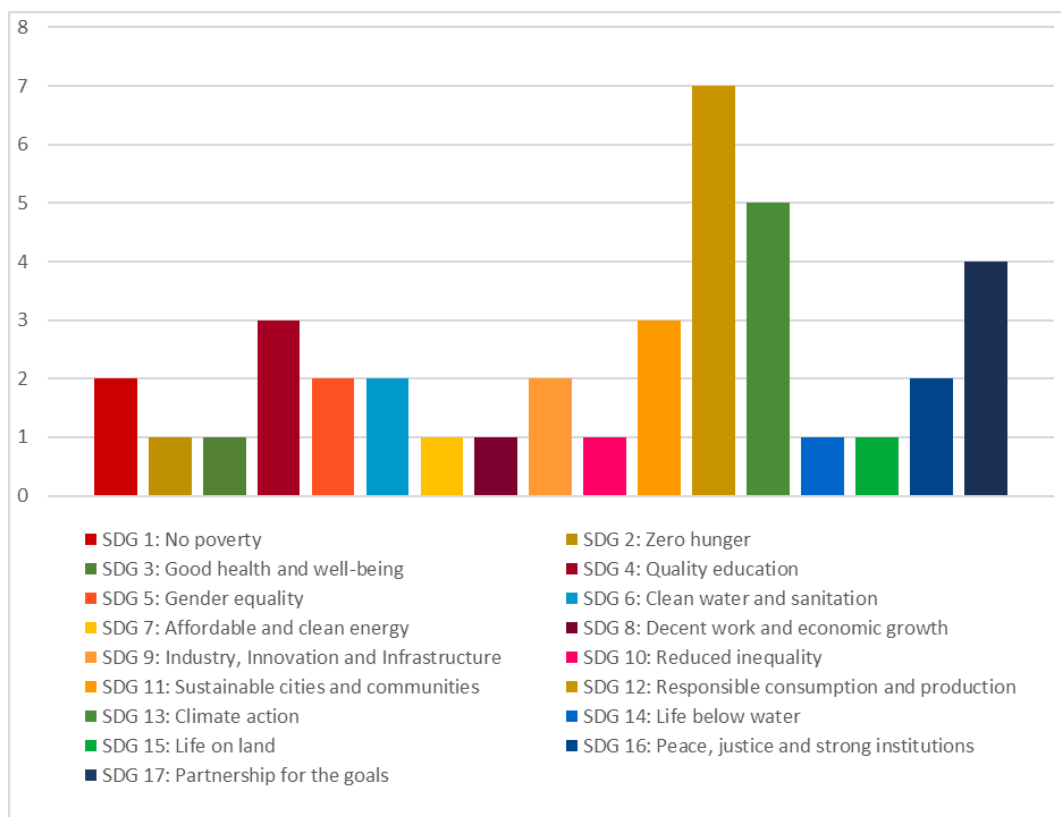
Figure 1. Sustainable Development Goals assumed by companies.

3.2. Motives that brought them to the decision to adopt a sustainable business strategy.

During our research we also wanted to find out what were the reasons behind their decision to take the turn towards a sustainable business model. The one answer across the board was responsibility towards society, economy, and environment, accompanied also by social pressure. We have also noticed the desire to become an example and influence others, either companies or the public itself. Research and science have also been mentioned from the point of view that nowadays it is much easier and cheaper to adhere to sustainable practices and technologies.

Both the environmental factors, as well as the social or governmental ones (ESG), are pillars that would influence the activity of a company towards a sustainable development, making also a profit in a responsible way with the help of environment, society, and employees. The legal factors that put pressure on non-financial reporting, as well as the climate emergency we face, definitely determine the managerial decisions to take a step towards a sustainable business.

3.3. Tools used in their activities, also identifying the digital ones

Many tools have been mentioned, but also practices adopted in order to become more sustainable. Various platforms are used according to the specific nature of the business, either for operations like CRMs, accounting, management of documents or meetings, or the business itself is represented by a platform or interlinked platforms. As for practices, by using online meetings in order to avoid transport, outsourcing various services or basically reducing the consumption and when not possible recycling, reusing and repairing, the companies switch steadily to a sustainable business model.

Social media and blog features are an integral part of the companies' ways to communicate to their clients and potential customers and to make their business model known to the public, but also to educate the consumer and their partners towards a sustainable way of living or doing business.

3.4. The part played by the digitalization in their endeavors

There was no big surprise when all of them answered that digitalization helped them to become more sustainable and by using data collected, including through IoT, it offered them the support to design and adopt swift business decisions. Predictability was also mentioned in the overall context of using data, an advantage that should not be neglected and it is quite encouraging that it was already noticed and used in the nowadays sustainable business models.

Also, more and more companies are starting to make the transition towards a sustainable business with the help of the IoT component, found in the digitization segment, allocating time and resources to future better models. Thus, building a green strategy becomes a priority for any organization in any industry, as a need in the mission of many companies involved in combating the climate challenges.

3.5. Resources used to become sustainable

The impact and the need for resources in the transition process of a company towards sustainability are important factors in all stages of an activity, starting with the product, and continuing with the price, placement, and promotion. Among the three types of resources: material, financial and human, the interviewed companies had to choose and argue about the resource or resources with the highest involvement as an effort in the company's process to become sustainable.

Human resources have the highest percentage in the selection with 50%, compared to 30% financial resources and 20% material resources. The reasons of the interviewees who chose human resources relate to the need and awareness of the staff to specialize and have expertise in a field of the future, such as sustainability. Also, in this sense, the support

offered by companies by presenting specialized training, implementing retraining programs, and adapting today's employees to the jobs of tomorrow's market, has been highlighted as an element that should be on the agenda of any business with a solid strategy in the medium and long term.

3.6. Ways and means used to make their new business model known to their customers and the general public, how it was perceived and forecasts on attracting new customers

According to specialists, being green is not easy [4]. Starting from the concept of Corporate Social Responsibility (CSR), communication can be seen as a key element in thinking, implementing, executing, and re-evaluating a strategy on sustainability. Depending on the industry, the type of activity and the sustainable development objectives assumed, the way a company communicates and the tools it chooses to use can substantially be different.

Most of the respondents expressed their choice to use the Internet, as the main means of communication to make their business model known to clients, but also to the general public. Types of communication such as internal and external, using Social Media channels and online press, are the most common nowadays, in accordance with their popularity among the audience. One of the companies, known for taking responsibility for the fulfilment of the annual objectives of valorization and recycling of packaging, mentioned the fact that in the field in which it operates, in Romania there are currently only 16 such organizations, and these are published on the website of the Ministry of the Environment. For this reason, being a niche activity, communication is done in specialized magazines.

3.7. Perception of the business model by customers and the general public

Considering that the 7 companies, that we have analyzed, are companies that have already started the transition towards a sustainable business model or started their business from this concept, we evaluated the perception of customers and the general public on this model, from the point of view of the company's reaction. Thus, the answers found were based on the green marketing mix, through the 4Ps (product, price, promotion, and placement), interpreted from the point of view of the degree of notoriety of the activity.

Low level of awareness, lack of education in this regard and relatively reduced responsibility in terms of purchasing behavior are some of the main reactions and types of response to sustainable practices faced by companies inclined to make these changes in society, for a better, cleaner, and healthier world. For example, as stated also by one of the companies in our research, the competition brought by the fast fashion industry to those companies that produce responsibly, from organic materials, without artificial dyes and encourages recycling and reuse, is seen as an effect of overproduction and non-compliance with the principles of circularity. In this sense, the importance of adopting responsible

behavior, both by companies and by consumers, becomes a decisive factor in determining future trends.

3.8. Attracting new customers by adopting a sustainable business model

Depending on the sustainable business model defined by experts through the lens of several categories, such as: social entrepreneurship, corporate intrapreneurship, creativity, innovation, and other approaches to sustainability challenges (Nikolay Dentchev, et al., 2016), we can appreciate qualitative answers in accordance with the companies' industry.

Thus, the 7 answers directed us towards the opinion according to which the level of awareness of the concept of sustainability in Romania is increasing, this being supported by the massive digitization present in many sectors of activity, including by adoption of IoT technologies, and above all, complemented more and more by the human behavior in their daily activities. The fact that people understand that resources are becoming limited due to the climate events experienced in the last decades, the level of responsibility gains a larger scope by supporting innovative solutions. That is why we can appreciate that the result of this particular question could be summed up in the following conclusion: the future belongs to the circular economy with an important touch coming from digitalization and its IoT resources.

3.9. Recommendations for those companies that find themselves during the thinking process on how to do it and with the emphasis on digitalization and IoT

The transition to a sustainable business model through digitalization represents a state of the art of the contemporary period, in relation to the social, environmental, and economic challenges of this world. From a broad perspective, we could note that the goal is only one: to contribute together to combating the negative effects we face at global level, without affecting economic efficiency. Joint efforts, governmental support and clear directions represent the premises for a company that would like to remain on the business map of the future.

The related answers of the 7 companies outline the concept of the importance of digitization, as well as its implementation in a responsible way. Calculating the carbon footprint, as well as finding and adopting solutions to help with this, it is another factor that should be taken into account. Also, innovation, hand in hand with research, reflects the future trajectory of any business that wants to be in the market trend, bringing, through its activity, value to society. Investments in human capital, development, and motivation towards sustainability practices, as well as those in innovative equipment or software, all these represent an increase in efficiency, alignment to the new business models and, even if they imply costs, an opportunity that they are not allowed to miss.

4. Methodology

During our research we have used a structured approach of a qualitative interview run through internet/ Google forms, on a number of 7 companies directly involved or already applying concepts of circular economy, but also with a digital component - IoT. We have used the structured approach because even if it gave us limited flexibility, our goal was to collect similar and realistic facts without any external intervention.

The interview consisted in 11 questions starting from those to identify the person and its role in the company and the company and its area of activity to the specific in which we tried to find out in which they have adopted concepts of the Circular Economy, how did they use digitalization and IoT in they endeavor towards sustainability, highlighting also the resources that they used. We have focused also on their marketing strategy through which they have promoted the new business circular model applied, but also to talk about the future, lessons learnt and next steps towards sustainability.

The questionnaire started from identifying the area of activity of the said companies and went through: 1. The United Nations' 17 Sustainable Development Goals (SDGs), highlighting those that were undertaken; 2. Reasons for adopting a sustainable business strategy; 3. Digital tools used on their way to sustainability and if these tools helped them; 4. Resources needed and used for this new approach; 5. Ways of communicating their business model and how it was perceived by the public; 6. Sharing their experience and best practices for other companies who are on their way towards sustainability through digital tools.

The answers for our qualitative questionnaire have been received over a period of 6 weeks from 7 companies that came back with extensive answers.

It is quite clear that society as a whole had and has a big influence in running various businesses. Highlighting the tools that emphasize the responsibility of a company, we find the relationship between the circular economy and IoT to be essential, as an element of awareness, development, and regulation of a green future. Even if there is still room of improvement, the methods adopted being quite basic at this moment in Romania, the rate of implementation of innovations is increasing. Following this idea, we can see more and more businesses that promote sustainability among consumers or partners, contributing to combating the challenges we face at global level: from pollution to waste or overproduction, we are dealing with a series of effects of activity generated by large industries as a response to consumer behavior.

The main findings of this work, according to the answers generated after the qualitative interview, direct us to the following facts:

- More and more companies are starting to make the transition towards a sustainable business model with the help of the IoT component, understanding the effects of a reasonable activity supported by digitization.

- Sustainable Development object number 12: sustainable consumption and production, is the most assumed by the majority of companies that support sustainability both inside the company and outside it.

- The adoption of digital solutions for business, although it represents a must have of this modern period, is part of the future strategy of a green company.

Starting from the principle, "the more you reuse, the more you reduce", we should also consider the value chain of the companies. This principle of circularity is applied to the area of raw materials and re-use resources and highlights a series of measures one should adopt to reduce the carbon footprint, such as circularity. Thus, the ultimate goal is the reduction of carbon footprint, circularity being a measure that companies take in this regard.

The most interviewed companies responded that they use a digital management system in their activities, setting meetings on digitals platform and trying to reduce the use of paper. Also, using rental services instead of buying various products and materials is a big contribution to the achievement of a sustainable behavior, regardless the industry. One of the answers stated that the calculation of the carbon footprint is an essential aspect for their organization, but it should be for any other organization that wants to become responsible now and in the future. The level of emissions generated by the activities started may be different depending on the field, but the hypothesis of trying to protect the natural, social, and economic environment should not be excluded and even more, to be of utmost importance for their future. This must also be supported by the application of the main principles of circularity, which through repair, reuse, and recycling, contribute to the image of a company that wants to be seen as sustainable.

5. Conclusions

Nowadays, sustainable development is seen as a trend among companies willing to become responsible, while maximizing their profit through environmentally friendly methods, but also emphasizing future directions in the entrepreneurial field. The transition towards sustainability brings both opportunities and challenges on a domestic or global level, also representing an innovative concept that highlights the interconnected system between the Circular Economy and the Internet of Things. Starting from the concept of "common journey" [5], we appreciate the fact that transition comes hand in hand with trends.

Exploring the future by adopting sustainable business models among companies that aim to be present on the market through innovations, technology, and artificial intelligence, is

one of the options, but also the opportunity of this era. The role of technology within a circular economy is becoming more and more critical, the in-depth of this transition from linearity to circularity being given by the complexity of recycle, reuse, and reduce processes. Boosting a company's potential could be activated by implementing technology-based solutions. Increasing the degree of responsibility could be achieved by adopting activities that respect the principles of circularity in relation to the environment, society, and governance pillars.

In this paper, in order to find out the perception of companies about the status of the transition towards a sustainable business model, a contemporary approach was highlighted through the launch of this qualitative endeavour. The use of different industries, such as sustainability consulting, fashion, technology, packaging, and non-financial reporting, have helped the design of this research in an academic and professional way, reflecting the status quo of the Romanian market. Understanding the motivations of the 7 companies that appeared in the interview, we have been able to highlight the emerging role of the IoT component in the activities they are already undertaking, as well as in the future strategy present in the mission, vision and values designed in a responsible way. Circular economy is increasingly attracting the attention of companies, being part of the strategy of rethinking their image in the market, from the point of view of the assumed sustainable development objectives.

Considering what it was mentioned during this paper, as well as the results drawn with the help of the interview, the combination of some premises found in the specialized literature with the main findings highlighted on the basis of a qualitative research, we could state the fact that today's businesses undertake lots of efforts towards a responsible activity model, having in mind the environmental, societal and economic aspects, realizing the importance of digitization in all the sectors of the activity that they carry out. Investing in the resources of the company, such as financial, human, or material, also represents a defining point of an ecosystem of exploitation, production and sale and implicitly clearing, reusing, and reducing resources, with medium and long-term effects.

In conclusion, the relationship between the circular economy and the Internet of Things, seen as an interdependent relationship encompassed in the activity of companies with sustainable perspectives, underlines the important perception of the concept of sustainability in Romania, both from the point of view of companies that channel their efforts towards the reconfiguration of an ecological model, as well as of consumer, which dictates the demand in the market at a certain moment, for a certain industry. In this sense, niche industries, such as those presented in this qualitative research, are the central element of a future economy, a circular economy characterized by innovation, digitization, and technological interconnectivity.

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