Entrepreneurship within the Circular Economy and the Role of Information and Communication Technologies

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Abstract: This scientific article aims to highlight the importance of the transition from the linear economy to the circular economy and the business opportunities that can be developed based on the principles of this new type of economy. At the same time, the paper tries to determine the role of ICT's in developing such innovative and sustainable long-term entrepreneurial initiatives. Based on an empirical analysis, the results of the research showed that the circular economy produces positive effects on the medium and long term both from an economic point of view, as well as for the environment and health. Also, the results showed that Romania is at the beginning in the process of transition to the circular economy and it takes time, financing, regulations and state support for companies that have or want to start businesses based on certain strategies specific to the circular economy. On the other hand, the exhibitions in this scientific paper have shown that digital technologies are one of the main pillars that stands up the development of an innovative and inclusive long-term entrepreneurial initiative.

Keywords: circular economy; entrepreneurship; information technologies; sustainability

JEL Classification: O44; Q01; Q53; Q56; I31

1. Introduction

The main objective of this scientific article is to empirically analyze the opportunities for developing in Romania some entrepreneurial initiatives within the circular economy (CE), by integrating the new information and communication technologies (ICT).

This work is addressed especially to the researchers, policy makers and entrepreneurs who are interested in the challenges and opportunities generated by the CE.

Circular economy is a concept that is becoming step by step the fundamental model of sustainable economic growth globally.

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This new type of economy implies, in a general description, an optimization of the resources by recycling and reusing the products, thus creating a harmony between the economic activity and the environment. At the same time, to cover the energy needs, the circular economy proposes alternative sources, such as solar energy, wind energy, biomass or the use of waste (Reshid et al., 2013).

Thus, the main purpose of the CE is to renew the linear economy model, where production is realized quickly with low costs, with an economic model based on goods with a long service life, which can be easily repaired, recycled and reused.

Given that the circular economy model is based on processes characteristic of natural environments, and nature is a complex system that works optimally, we can consider that developing such an economy will produce sustainable benefits from all points of view (economic, environmental, health and so on).

In recent years, more and more governments and companies, internationaly, have carried out research on how business projects can be implemented, using the principles of circular economy. Following the innovative solutions discovered, as well as due to the fact that Europe is increasingly dependent on imported resources, states such as Germany, Netherlands, France, Nordic countries etc. they began to intensively encourage this type of economy.

For example, the Netherlands has established that by 2050 the economy will become a 100% circular one.

In the European Union (EU), the most developed countries regarding the initiatives in the field of circular economy are Germany, the UK and France, while at the opposite side ranks Cyprus, Malta and Greece.

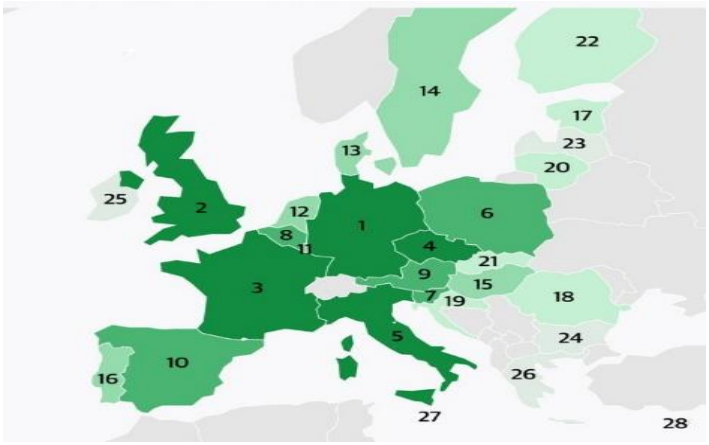

Figure 1. Index of the Circular Economy in the European Union

Source: "Recycling International: https://recyclinginternational.com/business/circular-economy-index-germany-is-number-one/15414/"

2. Literature Review

Internationaly, there are plenty of scientific studies that analyze the role and the modalities to develop the CE, which is currently one of the most sustainable ways of economic growth in the long term. At the moment it is demonstrated the direct link between the global domestic product and the resources consumption, resulting in the fact that economic development depends on natural resources, where rarity is the main feature (Krausmann et al., 2009).

A study carried out in 2015 by the Waste and Resources Action Program showed that the transition to the CE can create up to 3 million additional jobs in Europe by 2030, which could substantially contribute to reducing unemployment, especially in developing EU countries.

Also, in the case of developing states, the circular economy can also play a determining role in the construction field. There are scientific researches which show that in developing states it is necessary to invest heavily in new infrastructure and new buildings in order to support industrialization and increasing urbanization (Brueckner & Lall, 2014).

Thus, given that in order to satisfy such a demand a much larger stock of materials will be needed, the approaches of the circular economy are likely to provide some of the future material needs for developing countries.

This is demonstrated in a recent study, which indicates that improved commercialization of secondary construction materials between developed and developing countries could provide an important way to meet future construction needs (Wiedenhofer et al., 2019).

The benefits generated by the CE are not only economic. The large-scale implementation, in all possible fields, of this type of economy creates medium and long term benefits on environment quality and reduces the negative effects caused by climate change.

For exemple, it is a study that have shown that the efficient use of resources can reduce greenhouse gas emissions by up to 60% over the next 30 years (Ekins & Hughes, 2017).

Other authors conducted a study in which they estimated the impact of the circular economy on reducing CO_2 emissions in five EU states. Their results showed that, by applying the strategies of the circular economy, by 2030 CO_2 emissions should decrease by 66% in Sweden and France, 67% in the Netherlands, 68% in Finland and 69% in Spain (Wijkman & Skanberg, 2015).

Also, like other studies sugest, the CE creates health benefits on medium and long-term (Kodros et al., 2016 & Alsford et al., 2017).

On the other hand, there are some groups that have expressed concern about the exponential growth of recycling and the subsequent downstream set up of markets for secondary materials because in this way certain toxic and dangerous materials, which in other conditions would have been eliminated from the market, will remain in circulation (Hervey, 2018).

This phenomenon is also supported by other researchers, which explains that the reuse of recycled plastics can pose health risks because plastic waste contains harmful pollutants, such as bromine diphenyl ether (Leslie et al., 2016).

The scientific literature highlights the very important role of investments in digital development and accessibility, a critical component of government strategies, through which innovation is supported in all sectors of the circular economy (Pagoropoulos et al., 2017 & Wheatley, 2018). These researchers believe that digital technologies are one of the main engines of the CE and show some clear examples on how it works (smart digital applications or platforms).

Another author emphasizes an additional aspect characteristic of the CE, namely changing consumer behavior (Lewandowski, 2016). He states that, based on advanced ICT's, certain patterns of demand have changed, meaning that many consumers choose products or services for their practical usefulness without being interested in their material form.

Thus, some companies can provide practical digital products using virtual channels and can communicate with customers online, thus reducing a considerable part of the costs and contributing to the saving of material resources.

3. Best Practices

At the international level there are numerous examples of best practice regarding entrepreneurial initiatives based on the CE principles.

In Denmark, the beer company ***Carlsberg Group*** has started a project that aims to reduce CO_2 emissions associated with packaging. Through this project, the Carlsberg Group, in partnership with the local company EcoXpac, the academia and the Innovation Foundation, wants to create the first 100% biodegradable beer bottle made of wood fiber.

Also in the beverage industry, the Dutch company ***Vitens***, the most renowned producer of drinking water in this country, has started a very important project whereby by-products such as calcium, iron or humic acid, are transformed into inputs for other economic sectors (eg. humic acid is used by those who have business in the agricultural field as soil fertilizer).

In the US, the fashion company ***Levi Strauss*** has created a partnership with the company I: CO, through which collects used clothing and footwear from any brand on the market, which they subsequently recycle or rebuild. The collected products are transformed by industrial processes into insulating materials for buildings or new textile fibers for clothes or footwear.

Related to the same industry, the Dutch company ***DyeCoo*** has developed a system for dyeing fabrics that do not use water or other chemicals other than dyes. Specifically, it uses pressurized carbon dioxide that dissolves the dye, which is subsequently printed deep into the fabric.

Then the CO_2 is recycled and reused in another production process. Through this system, the company manages to carry out its activity much faster, saving energy and money.

Also in the US, but this time in the technology industry, ***Dell*** has implemented a program that recycles electronic products from 83 countries, and some of the recovered parts are reused in the technological processes of obtaining new products.

Similar is the example of the ***Panasonic*** company in Japan, which in 2001 started a comprehensive recycling program called Panasonic Eco Technology Center through which it recycles, sorts and reuses a huge amount of electronic products.

In terms of the automotive industry, ***Daimler*** in Germany produces cars made up of approximately 85% recyclable components, and almost the entire recycled quantity is sold as parts or reused in the production process of new cars.

In the energy field, the Canadian company ***Enerkem*** uses a technology specific to the CE through which it extracts carbon from products whose life cycle has ended and which cannot be recycled. Subsequently, the carbon extracted is converted into a gas that can be used to produce biofuels, as well as certain chemicals, that contributes to the production of a wide range of products.

Another type of CE is the collaborative economy, where consumers become users. An example of an entrepreneurial initiative developed in this regard is ***Grover***, an online platform that allows the rental of technical devices for a fixed period, with the purpose of reducing the amount of electronic waste. This type of business is based on the idea that certain consumers need different technical devices only during certain periods of time, therefore it is advisable for them to rent those products, thus reducing the costs and the production of goods that have no utility on a long time.

The same concept applies to businesses such as ***Uber*** or ***Airbnb***.

4. The Role of ICT's in Business Development within the Circular Economy

The development of ICT's enable the implementation of CE innovative strategies in almost all sectors of activity. These evolution allow a significant change regarding the functioning of the economy by creating extensive possibilities for virtualization of economic processes, de-materialization and a high transparency of products and material flows.

The new digital technologies, especially the developed ones (eg. 5G), have the ability to collect and analyze large volumes of data on human behavior, external conditions, materials etc. and thus it can identify the main challenges in terms of resource management and can offer practical and systemic solutions to solve these challenges.

According to the Ellen Macarthur Foundation, there are a number of technologies that support the transition to circular econmy, and thus contributes to the development of smart cities (Sukhdev et al., 2017). Such technologies include those that can help extend the life cycle of products by monitoring usage patterns and their status, so that any problems can be remedied quickly and simply as they occur.

On the other hand, there are technologies for collecting large volumes of real-time information on a wide range of flows (flows of materials, products, people) or informations related to energy demand, waste, or optimal mobility routes. The collected informations is used to allocate resources as efficiently and quickly as needed.

Also, the ICT's play a fundamental role in the process of development of circular business models, such as sharing platforms, retrieval and distribution systems for remanufactured products, logistics and so on. Currently, there are many such mobile applications (Project Sunroof, Waze, Portico, LeanPath, and so on.) that have been created and operates based on the principles of CE, and their number is constantly increasing in all fields of activity.

With the large-scale introduction of the new 5G technologies it is expected that private, public or public-private entrepreneurship initiatives, which promotes strategies characteristic to the CE, will grow exponentially, considering that these technologies will create the logistical technological framework necessary for the development of these entrepreneurial initiatives in almost all fields of activity.

5. The Development of the Circular Economy in Romania

Romania, like other developing countries, is at the beginning in terms of creating and developing economic growth strategies based on the principles of the CE. Among the biggest challenges facing our country in the process of transition to a CE we find: institutional capacity to regulate this type of economy, access to finance and technology, infrastructure, innovation capacity.

This current state of Romania is also evidenced by the fact that aur country is at the end of the ranking regarding the level of collected and recycled waste (Figure 2).

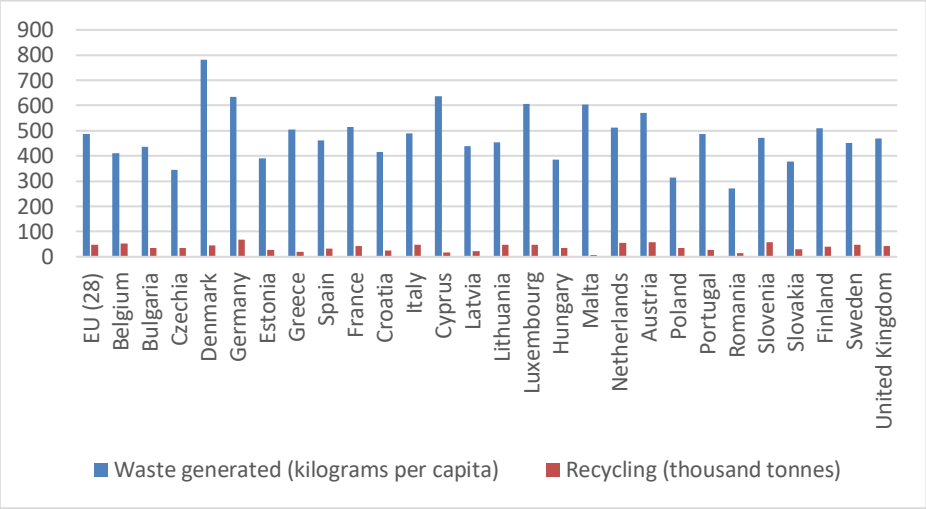

Figure 2. The Level of Collection and Recycling of Municipal Waste, EU (2017)

Source: made by author based on Eurostat data

This shows that at present in our country there is no developed and integrated management that will ensure / stimulate a good waste collection and recycling, in order to be reused later in production processes.

As we can see from Figure 3, in 2016 between the countries of the European Union, Romania is on the penultimate place in terms circular materials use rate.

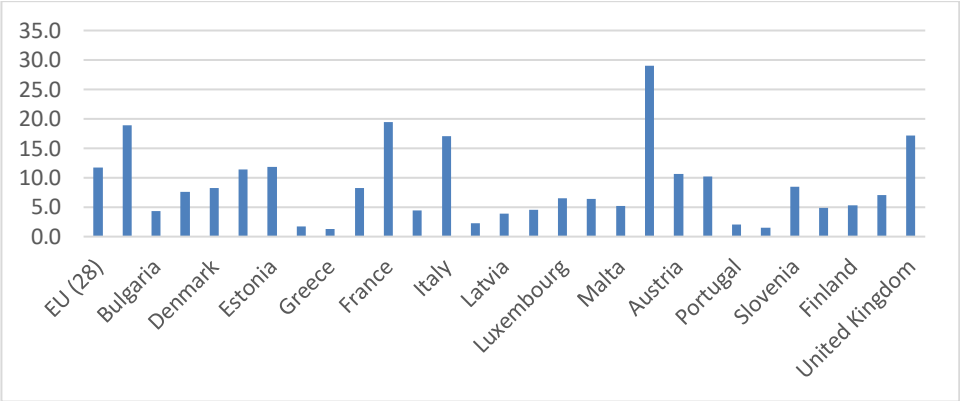

Figure 3. Rate of Use of Circular Materials in the EU (28), 2016

Source: made by author based on Eurostat data

Even more worrying is the fact that the rate registered by Romania in 2016 of 1.5% is well below the average rate of the European Union (11.7%), while the difference from the first ranked France is 18 percentage points. The results of this situation can also be observed in the level of gross value added produced in the CE sectors (Figure 4).

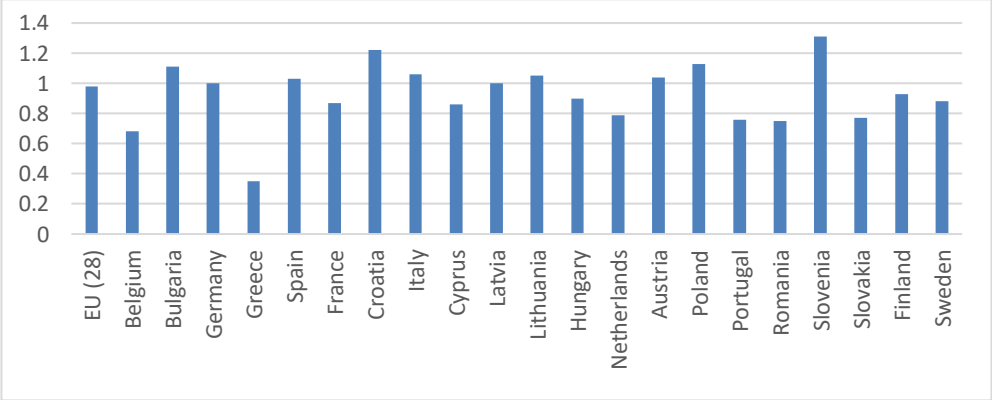

Figure 4. Gross Value Added Produced in the Circular Economy Sectors, EU (2016)

Source: made by author based on Eurostat data

Romania ranks among the worst performing countries in the European Union in terms of gross value added (% GDP), obtained in the circular economy sectors.

All these data show that now in Romania there is not a high number of business practices and strategies developed based on the principles of the CE.

Even if the benefits of this type of economy are obvious, the lack of internal regulations, the deficient infrastructure, the lack of financing and the low level of support for startups in developing innovative entrepreneurial initiatives make the transition to the CE difficult.

However, the economic potential for developing some businesses is high, and with the introduction of new ICT's in Romania on a large scale, we believe that many entrepreneurs will develop businesses that will maximize the benefits of this type of economy, in all its aspects.

Also, we think that the good practice examples presented represent only a part of the business models that can be implemented in Romania, at the level of all country regions, by adapting them to the specific and local characteristics.

6. Conclusions

Considering all the aspects presented in this paper, we consider that it is imperative that the states (especially the developing ones such as Romania) should support the establishment of new, innovative companies, which will develop businesses using the principles of the circular economy, with positive effects on medium and long term both at microeconomic level, as well as mezzo and macroeconomic level.

One way to support these types of innovative businesses is to implement the new 5G information and communication technologies at national level, which is one of the main tools that an entrepreneur can use in developing a business in the field of circular economy.

At the same time, the results of the research showed that the transition to this type of economy creates sustainable and inclusive economic growth, but for this restructuring to produce the desired long-term effects, it will be necessary that innovations investments to increase and to adopt government regulations that create the necessary framework to mitigate the health and environmental risks associated with waste management practices.

The circular economy can represent for Romania the most important way of economic growth and unemployment reduction, concomitant with the decrease of imports of raw materials and products.

The chosen topic is very complex, as well as the challenges for identifying the best opportunities for development of entrepreneurial initiatives in this field, which underlines the need to further analyze other specific issues specific to the development of such entrepreneurial activities in Romania.

7. Acknowledgment

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