

Assessment of Financial Condition in Companies Applying Circular Economy Principles

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Abstract. Extraction and use of raw materials have a significant impact on the environment by increasing energy consumption and CO₂ emissions. Because of it, every year humans generate 2.5 billion tons of waste. In recent years, EU has been working on laws on waste management. In March 2020, the European Commission presented the circular economy plan, which involves more eco-friendly production and waste recycling. Special attention is paid towards sectors that require a lot of raw materials usage, e.g. electronics, plastic, textile and construction. Being a great solution, the application of the circular economy principle still raises an essential question whether and how much it is effective. In order to achieve the set goals it's necessary to constantly monitor the processes, therefore the evaluation of the efficiency of the circular economy and its impact on the company's financial indicators is still a problem. The aim of this research is to develop a model for assessing the financial condition of companies applying circular economy principles. These are the main objectives that have been set: 1) describe the concept, theory and principles of circular economy after analysing the scientific literature; 2) summarise empirical studies after analysing the circular economy principles and the assessment of the financial conditions of companies. It was found that in order to evaluate how the implementation of the circular economy principles changes the financial condition of companies, different authors use different methods. It is emphasised that the financial condition of companies applying circular economy principles can be assessed using a composite indicator.

Keywords: *circular economy, principles, financial conditions, company.*

Introduction

Relevance of the article

Along with the growth of the world population, the demand for raw materials and the amount of waste is growing. However, the supply of basic raw materials is limited, and some EU countries are dependent on resources supplied by other countries. In addition, their extraction and use have a significant impact on the environment and increases energy consumption and CO₂ emissions. For this reason, billion tons of waste are generated every year. In recent years, the EU has been actively working on updating legislation on waste management. In March 2020, the European Commission presented a new circular economy action plan, which includes proposals for more sustainable product design, waste reduction and recycling. Special attention is paid to resource-intensive sectors related to electronics, plastics, textiles and construction. In 2021 February, the European Parliament approved a new circular economy action plan and called for the establishment of mandatory 2030 purposes of use and consumption of materials in 2022 March. The Commission has announced the first package of measures to accelerate the transition to a circular economy. The proposals include the promotion of sustainable products, a review of the Construction Products Regulation and a strategy for sustainable textiles. In such case, the application of the circular economy principles is a great solution, but the key issue in applying them is its effectiveness. In order to achieve the set goals, it is necessary to constantly monitor the progress of the process and evaluate the effectiveness of the circular economy. Therefore, the need to evaluate the efficiency of the circular economy is relevant and debatable.

Level of problem investigation

In recent years, the concept of the circular economy has received increasing attention. Souza et al. (2022) claimed that the linear flow of production causes several problems, mainly concerning the environmental pillar of sustainability. To find out more, scientists Aboulamer et al., (2020), Dewick (2020) and others discussed the origins of the circular economy, the concept, identify the differences between the linear economy and the circular economy, presented the methods based on which the connections between the financial condition of companies and the application of circular economy principles are evaluated. In the scientific literature, the topic is little studied, only few articles by foreign authors are written, and no research on the topic has been conducted

in Lithuania. Aboulamer et al. (2020) wrote about the impact of the implementation of CE principles on the financial condition of companies and sought to find out what influence the application of circular economy principles has on the increase in the value of other types of assets of the company and how to assess the value of such assets. as well as that, Aboulamer's (2017) study, which was done in 2017, found that applying the principles of a circular economy increases the market equity value of companies. Using a cost-benefit analysis, Ramos et al. (2022) successfully assessed the financial health of a company applying circular economy principles. Bartolacci et al. (2018) found that companies which apply circular economy principles more actively have a higher ROA than those that do not. However, Charlo et al. (2015) and Lee's et al. (2009) studies showed that there were no significant differences in the evaluation of the financial condition between companies that apply the circular economy principles and those that do not. Bakan et al. (2022) claimed that our responsibility today is not to think about what we could do for a better world but think of what should we do to make our ever-changing world better and more sustainable.

Scientific problem – how to assess the financial condition of companies applying the circular economy principles?

Object of the article – an assessment of the financial condition of companies applying the circular economy principles.

Aim of the article – to develop a model for assessing the financial condition of companies applying circular economy principles.

Objectives of the article:

1. After analysing the scientific literature describe the concept, theory and principles of the circular economy.
2. To summarise empirical studies after analysing circular economy principles and the assessment of the financial conditions of companies.

Methods of the article

The theoretical concept of the circular economy, its origin and the application of its principles in relation to the financial condition of companies were analysed using the general scientific research method – comparative analysis and synthesis of scientific literature.

1. Theoretical framework for the circular economy and company financial conditions assessment

1.1. Origin, development and principles of the circular economy

Despite the fact that the theory of the circular economy and its use in practice is rapidly gaining popularity, certain difficulties arise in order to define the concept of the circular economy. Different authors tend to understand this concept and the main principle of it differently (Blomsma, 2017). The conducted literature research revealed that 16 different combinations are used to identify the main principles of the circular economy. The majority, 35–40% of the definitions consisted of three main R's – reduce, reuse, recycle. For example, Jiao, & Boons (2014) argue that the concept of circular economy covers holistic activities that include efforts to reduce, reuse, recycle in recycling, circulation and consumption processes. 23% of concepts included the definitions of reuse, recycle, but did not include the concept of reduction. No other 3R combination was used more than 10% of definitions. Only 3–4% of definitions found in the literature were similar to the official definition of the EU 4R circular economy principles (European Commission, 2011). Based on this data, it can be observed that a large part of the respondents, when talking about the basic, most important principles of the circular economy, do not mention one of the main principles, which is reduction. It is believed that this is due to the reluctance of the respondents to reduce production and consumption, as it is likely that this would have a negative impact on the economy and profits (George, Lin, & Chen, 2015). Not only the main principles of the circular economy but also the goals are interpreted differently. The largest part of the literature identifies the improvement of the quality of the environment as the main goal of the circular economy (Sauve, 2016; Lieder, & Rashid, 2016; European Commission, 2011; Geissdoerfer et al., 2017). Some researchers claim that the social

aspect is missing when defining the main goals of the circular economy and say that the goals of the circular economy should include concepts such as creating welfare for society, and caring for people (Murray, Skene, and Haynes, 2013; Moreau et al., 2017). The goals of the circular economy are also very rarely associated with concern of the well-being of future generations, and their quality of life (Geissdoerfer et al., 2017). Typically, the circular economy is perceived differently in different sources.

It is clearly observed that the 3R combination is the most frequently found in the literature and consists of the concepts of reduce, reuse and recycle. It is also noticeable that since the beginning of the examination of circular economy (CE), this combination has been used most often. To summarise, the circular economy theory is becoming more and more popular and attracts the attention of various authors, therefore it is likely that the concept of the circular economy will gain integrity in the future.

The concept of the circular economy has gained momentum since the 1970s. Table 1 provides definitions of the circular economy.

Table 1

Circular economy definitions

Author	Description
Yuan (2003)	“It is an economy at its core with a circular, closed flow of materials and the use of raw materials and energy in several stages.”
Bocken et al. (2006)	“It is an economy whose principles are design and business model strategies that slow down, narrow and close resource loops.”
Geng, & Dobrstein (2008)	“It is the implementation of a closed cycle of materials throughout the economic system.”
MacArthur (2013)	“It is an industrial economy whose purpose and design is to restore, re-engineer and reuse.”
Weber (2016)	“It is an economy that is regenerative by design and aims to keep products and materials useful and valuable throughout their lifetime.”
General (2022)	“It is an economy built from societal production and consumption systems that maximize the service provided by the linear nature-society-nature flow of materials and energy.”

Source: created by the authors.

Several authors, such as Andersen (2007), Ghisellini et al. (2016), and Su et al. (2013) attribute the emergence of the concept of the circular economy to scholars Pearce and Turner, who have studied the influence of natural resources on the economy, on the acquisition and consumption of raw materials for production. They sought to find out how the cycle of obtaining raw materials, production, consumption and waste takes place in the context of the modern economy. Pearce and Turner were inspired and greatly influenced by Boulding’s (1966) work, who described the Earth as a unified, closed-loop system with limited assimilative potential and based on this idea came to the conclusion that the environment and the economy must work in balance because they are directly one dependent on the other. Stahel (2013) emphasised the resale of used goods for recovery as the most appropriate model in a loop economy, allowing industries to make a profit without spending on waste recycling processes. The modern understanding of the circular economy and its practical application to economic systems and industrial processes has evolved to include different features and contributions from various concepts that share the idea of a closed loop. The most popular concept of the circular economy theory that has received the most attention has been presented by MacArthur (2013), who introduced the circular economy as an industrial economy whose purpose and design is to restore, re-engineer and reuse. Scholars Geng, and Dobrstein (2008) stated similarly and defined the circular economy as the implementation of a closed cycle of materials throughout the economic system. Webster (2016) declared that a circular economy is one that is restorative in design and aims to keep products and materials useful and valuable throughout their lifetime. Mendoza et al. (2022) stated that the circular business models, aimed at narrowing, slowing, and closing resource loops, can potentially generate significant economic and social benefits, promote resource security and improve environmental performance. Accordingly, Yuan et al. (2006) argued that the core of a circular economy is the circular, closed flow of materials and the use of raw materials and energy in

multiple stages. Bocken et al. (2016) categorised circular economy principles as design and business model strategies that slow, narrow and close resource loops. General (2022) presented the circular economy as an economy that is created from societal production and consumption systems that maximise the service provided by the linear production-society-flow of natural materials and energy.

Summarising the definitions of the circular economy presented by different authors in Table 1, it can be said that in one way or another, all the definitions of the circular economy include the aspect of a closed system and resource conservation. Based on these definitions, a summarising definition of the circular economy can be formed by stating that the circular economy is an economy whose main goal is to create a closed system in which raw materials and waste are reused, and the created products are characterised by a long existence and the possibility of reuse.

1.2. Methodologies for assessing the financial condition of companies

After analysing and summarising the scientific literature on financial analysis, it can be stated that financial analysis is a means of knowing economic processes, the purpose of which is to objectively assess the company's financial condition in order to make appropriate management decisions and project business development opportunities (Janovič, 2012). Janovič (2012) distinguished many different types of financial analysis. One of the most popular is the retrospective financial analysis, otherwise known as the evaluation of financial results obtained in the past. Another popular type of analysis is the ratio analysis. It is an analysis of financial statements that helps interpret the financial conditions of a company. Janovič (2012) offered prospective financial analysis for those seeking to forecast the company's financial condition. This type of analysis is performed when the factors of the indicator to be calculated are not defined by points but by probability distributions of their possible values. Data for analysis are taken from the companies' forecast financial statements. First, financial indicators are selected, then factors influencing the final value of selected financial indicators are identified and factors, probability distributions of possible values and averages and standard deviations are selected.

In order to assess the financial condition of companies, an innovative methodology for calculating KPIs (key performance indicators) is also presented (Sedaravičiūtė, 2020). In contrast to traditional indicators, KPIs allow companies to assess whether previously set long-term goals have been achieved. It is recommended that the main KPIs analysed be annual sales per employee, cost-related KPIs, operational efficiency ratios, EBITDA (earnings before interest, taxes, depreciation and amortization) and EBITDA margin. Labonaitė, and Subačienė (2014) present the net profitability assessment methodology. Regardless of the type of company or sector, each of them strives for the best possible results. Usually, these results are associated with generating and increasing profits. Net profitability defines not only the efficiency of the company's operations but also the efficiency of financial management. This methodology for assessing the company's financial condition includes three stages. First of all, the companies' research sources that will be compared are selected, the factors influencing the net profitability are evaluated and lastly, the results are analysed. According to Mackevičius, & Valkauskas (2012), in order to assess the company's financial condition and its operational prospects more objectively, it is appropriate to use the composite indicators analysis methodology. In order to carry out a detailed assessment of the company's financial condition, an assessment system consisting of partial, integrated and composite indicators is proposed.

The methodology of complex analysis of general sales profitability is based on a similar principle (Mackevičius et al., 2008). This methodology includes the analysis of the factors of gross sales profitability, the analysis of the relationship between gross and net sales profitability, the analysis of the relationship between gross and net sales profitability and solvency indicators, and the evaluation of gross and net sales profitability indicators. In order to assess the uneconomical nature of company managers, also it is appropriate to calculate the difference between net sales profitability and gross sales profitability.

In order to evaluate how the implementation of the circular economy principles changes the financial condition of companies, different authors used different methods. For example, Aboulamer et al. (2020) used a financial indicator that measured cash flows and the risks associated with cash flows, in other words, the cost of capital, in order to assess the financial health of a company. The author claimed that a successful business applying circular economy principles must correctly assess the financial value and risks associated with CE investments. It is also emphasised that if real investors pay attention to companies that properly allocate their finances and invest in the implementation of CE, more and more companies will want to increase the amount of money allocated to CE funds. Another example is Bartolacci et al. (2018) work, where using the ROA (Return on Assets) indicator, the researchers demonstrated a positive correlation between the ROA indicator and the amount of recycled waste. Dheskali et al. (2020) evaluated the FCI (investment in fixed capital) indicator by applying quantitative modelling and based on it created a three-equation model, which evaluated the financial status of different biotechnological companies taking into account the implementation of CE principles in their activities.

2. Summarisation of the conducted studies regarding the assessment of the financial condition in companies applying the principles of the circular economy

In order to assess the impact of the application of the principles of the circular economy on the financial condition of companies, more and more authors are starting research that seeks to find appropriate ways to assess this dependence. Table 2 presents some of the results of research conducted on the importance of the circular economy for companies.

Table 2

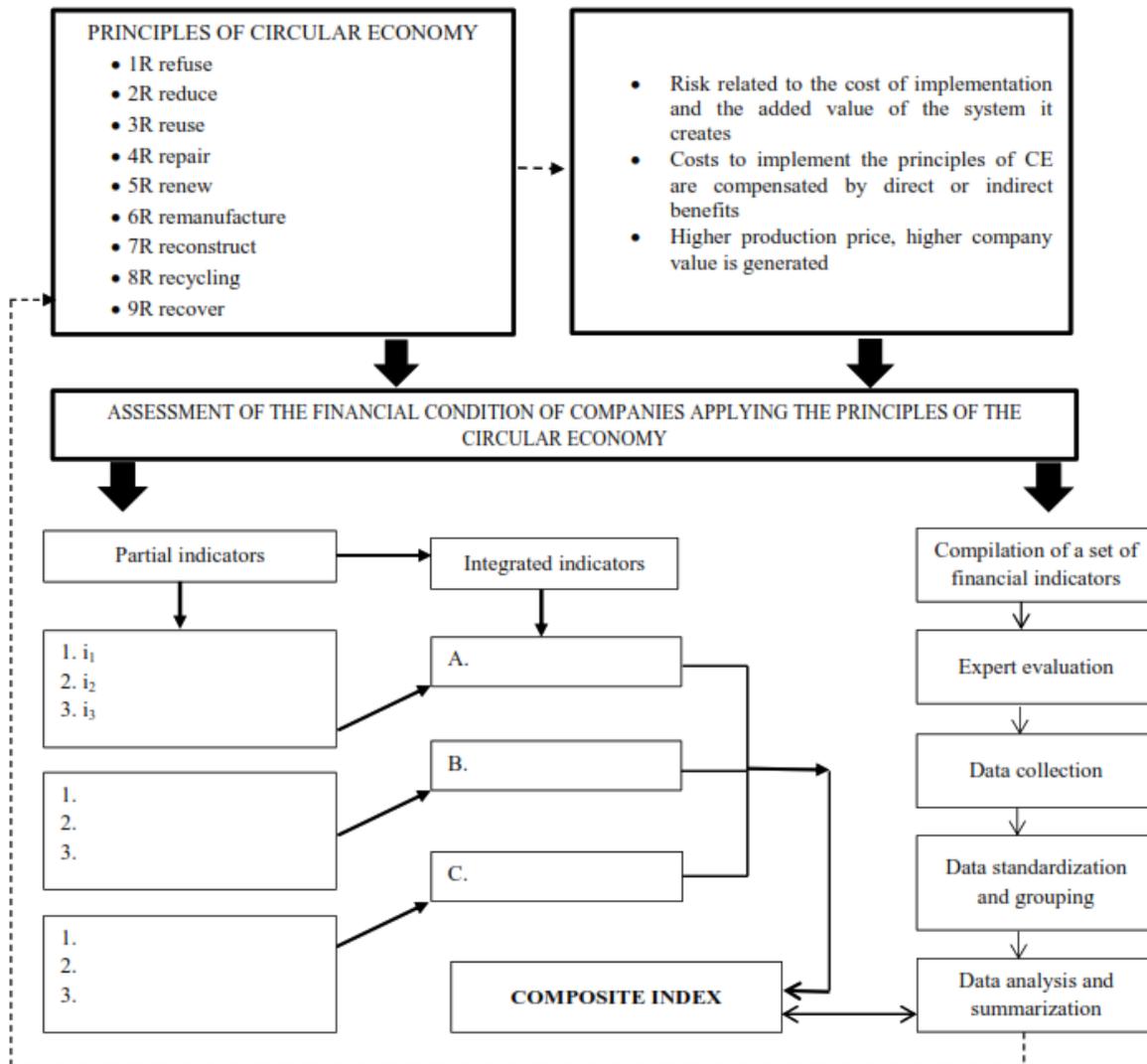
Results of research on the importance of the circular economy for companies

Author	The aim of the research	Method
Aboulamer (2017)	To explain the magnitude of the potential increase in the market equity value of companies when this new, CE, economic paradigm is adopted.	Quantitative analysis
Aboulamer, Soufani, & Esposito (2020)	To explore the impact of the ability to value other types of assets on investments in the circular economy.	Qualitative conceptual
Delfina Ramos, Luis Fonseca et al. (2022)	To assess the impact of the application of circular economy principles on the company's finances. It has been established that the quantitative analysis of costs and benefits is a suitable method in order to assess the influence of the application of CE principles on the company's finances.	Quantitative analysis
Bartolacci, Paolini, Quaranta, & Soverchia (2018)	To assess how environmental protection and the financial condition of companies that handle waste are correlated. The results showed a positive correlation between ROA and volume of waste treatment and between ROA and the percentage of garbage cleared.	Quantitative analysis
Lee et al. (2009)	To find out whether the financial indicators of leading companies in the field of social responsibility and irresponsible companies differ.	Quantitative analysis

Source: created by the authors.

Aboulamer (2017) argues that the application of the circular economy principles in business is a measurable process that creates added financial value. However, not all companies can benefit from the application of CE principles and be valued equally. Aboulamer et al. (2020) claimed that from a financial value perspective, potential circular economy models must be credible. In any traditional valuation, appraisers rely on two components: cash flows and the risk involved in turning those cash flows into a cost of capital. Anticipation and stability of cash flows are the main contributions of a business based on the principles of a circular economy. Ramos et al. (2022) presented a benefit-cost financial analysis (CBA), which is an analytical tool that helps assess the appropriateness and effectiveness of economic investments. The research conducted by these authors demonstrates that investments in the field of environmental management in companies are important for the entire company's activities. Bartolacci et al. (2018) conducted a study, during which they sought to determine the impact of investments in the application of CE principles in the company's activities on the company's ROA indicator.

In Figure 1 the theoretical model of financial condition assessment in companies applying circular economy principles is presented.



Source: created by the authors.

Fig. 1. Theoretical model of financial condition assessment in companies applying circular economy principles

Figure 1 illustrates the initial step of identifying the circular economy principles employed by the selected companies under examination. As has already been mentioned, the application of CE principles to companies is usually associated with certain risks and higher costs, growing liabilities, and at the same time it generates greater added value for the company in the future. Therefore, the possible consequences of the application of CE principles for the company are represented by a dotted line.

After summarising both the theoretical provisions and the conducted scientific research, it was found that the researchers pay attention to the connections between the application of circular economy principles and the financial condition of companies. It is emphasised that the impact of applying CE principles on the financial condition of these companies can be analysed based on the trends of certain financial indicators. Among these indicators, profitability measures such as ROA (Return on Assets) and ROE (Return on Equity) hold particular importance. Thus, this study aims to validate the arguments put forth by scientists. The main defended statement is made: Companies that actively apply circular economy principles in their activities have better financial results.

Conclusions

1. Following a thorough analysis of the scientific literature, this study presents an overview of the circular economy, its theoretical origins, and its core principles. The circular economy is defined as an economic model aiming to establish a closed-loop system, wherein raw materials and waste are continually reused, and products are designed for prolonged use and reutilisation. Additionally, the key principles of the 9R circular economy are identified.
2. This study investigates the methods employed to assess the financial condition of companies. It was discovered that such assessments typically involve the calculation of both absolute and relative financial indicators. Additionally, the evaluation of net profitability, the determination of KPI (Key Performance Indicators) metrics, and the computation of a composite indicator are commonly utilised approaches to gauge a company's financial health.
3. Summarised empirical research has examined how the implementation of the circular economy principles affects companies' financial condition. The studies have explored the impact in various ways, including evaluating how the application of the circular economy principles contributes to the growth of the company's other types of assets and their corresponding value. Furthermore, these studies have analysed changes in the market equity value for companies that adopt circular economy principles. Additionally, a cost-benefit analysis was conducted to assess the financial condition of companies embracing the circular economy approach, along with determining differences in the ROA indicators among these companies.

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