

CHALLENGES OF IMPLEMENTING CIRCULAR ECONOMY BUSINESS MODELS IN GEORGIA

Beka Baiashvili*

Ivane Javakhishvili Tbilisi State University
Tbilisi, Georgia

DOI: 10.7906/indecs.23.4.5
Regular article

Received: 15 April 2025.
Accepted: 20 August 2025.

ABSTRACT

The purpose of this article is to examine the challenges and opportunities associated with introducing a circular economy in Georgia, with a focus on evaluating the attitudes and behaviours of the population. The study is based on a quantitative methodology within which a structured questionnaire was used ($N = 617$). The study's results showed that the population's behaviour in the field of waste management is mostly neutral or negative. The Paradox of Education and Behaviour has been identified: the high academic degree of the majority of respondents (63,4%) does not directly correlate with pro-circular behaviour. It is noteworthy that individuals have more responsibility in the work environment than in the family, which is explained by the structural arrangement of the environment, rather than by the growth of personal consciousness. The study has shown a positive trend in terms of awareness, but the behaviour still contains uncertainty, especially in the management of household and electronic waste. According to the study, the transition to a circular economy for Georgia is not only an ecological but also an economic and geopolitical imperative. For a successful transformation, it is necessary to work in four key areas: strong governance and regulations, creation of auxiliary infrastructure, catalyzing the private sector, and community education.

KEY WORDS

circular economy, sustainable development, waste management, behavior, Georgia

CLASSIFICATION

JEL: O44

*Corresponding author, *η*: beka.baiashvili275@eab.tsu.edu.ge; +995 598 700 279;
#35, Building 1, Villa micro district, GE – 3700 Rustavi, Georgia

INTRODUCTION

The global economic system is undergoing a historical transformation, driven by the growing unsustainable instability of the traditional linear model. This model, based on cheaper and more accessible resources, generates a huge amount of waste and causes the exhaustion of natural capital, posing humanity with the most significant environmental and social challenges [1]. A logical response to these challenges is the Circular Economy (CE). This economic paradigm aims to eliminate waste and pollution through design, prolong the lifespan of products and materials, and regenerate natural systems. The roots of the concept go back to the 1966 work of K. Boulding [2], where the Earth is described as a closed system with finite resources, which requires finding an equilibrium point between economic growth and environmental maintenance.

The circular economy is closely linked to a broad framework of sustainable development and is often regarded as one of the most important tools for achieving it. If sustainable development determines a comprehensive goal (“what we want” to achieve – a fair and sustainable society), a circular economy offers a practical mechanism (“how to” achieve it) through the reorganization of the economic system. This connection is particularly noticeable in the context of the UN Sustainable Development Goals (SDGS), where CE directly promotes purposes such as sustainable consumption and production (SDG 12). The global political impulse is obvious in the example of the EU’s “New Circular Economy Action Plan”, which CE views not only as an ecological necessity but also a powerful driving force of economic competitiveness, innovation, and job creation [3, 4].

Implementation of the principles of circular economy is not a universal process; It is highly dependent on the local economic, regulatory, and socio-cultural context. Developed and developing regions face different barriers and abilities, which are evident in the cases of Europe and Latin America. Against this backdrop, the transition to a circular economy for Georgia is a crucial strategic task; however, a critical research gap exists in this regard. Currently, there is a lack of empirical data on the level of public awareness of the circular economy in Georgia, as well as the specific barriers to consumer behavior. This information vacuum creates uncertainty for both policymakers and potential investors and impedes the development of effective strategies [5].

The article, after the introductory part, proceeds to a detailed description of the research methodology, showing research design, data collection, and analysis tools. This is followed by a theoretical framework that reviews the conceptual connection between the circular economy and international experience, as well as the challenges related to sustainable development and its introduction. The subsequent part of the work presents the results of an empirical study that analyzes the consciousness, attitudes, and behavior of the Georgian population on waste management. In this part of the study, special attention is paid to the differences between the behavior of the family and at work. The work is completed with concluding and strategic recommendations that summarize the main findings and offer four key directions for introducing the circular economy in the country.

CIRCULAR ECONOMY BUSINESS MODELS: A BRIEF LITERATURE REVIEW

The second half of the 18th century is often regarded as the beginning of the concept of a circular economy. In 1798, Thomas Malthus published a work “An Essay on the Principle of Population” [6]. In the work, the author suggests that the world’s population will grow at a geometric rate, and if this pace is maintained, people will no longer be able to provide themselves with resources [7]. The problem raised by Malthus is one of the major challenges in the world today. However, the author cites the reduction of wars and other inhumane practices

as a way of resolving this challenge. Accordingly, his work cannot be considered the foundation of the circular economy [6]. The roots of the concept of a circular economy date back to the 1970s [8]. Pioneer was K. Boulding's work, published in 1966. In the publication, the author describes the Earth as a closed and circular system in which resources are strictly limited. According to the author, it is necessary to find an equilibrium point that will maintain the environment and provide economic growth [1]. The linear economic model is focused solely on the use of resources. The circular economy aims to reduce excessive consumption and promote the long-term use of primary resources. Accordingly, the circular economy is the best theoretical option for achieving the equilibrium point mentioned by Boulding [2, 9]. Circular Economy can be considered as an important driving model of sustainable development [10, 11]. The same is repeated in the World Economic Forum's 2014 report on "Circular Economics" [12].

According to the European Parliament's information page "Circular Economy: Definition, Meaning and Benefit", the circular economy within itself implies a reduction in waste to a minimum level. Upon completion of the product's life cycle, the materials used in its production should remain in the economy for as long as possible. The reuse of such materials creates significant additional value. In the same article, the European Parliament identifies one of the major problems with traditional economics: planned obsolescence. The term is often used in linear production, which aims to create a product that soon becomes obsolete, forcing the consumer to buy a new one. The European Parliament requires measures to overcome this practice [13]. In 2020, the EU published a "New Circular Economy" action plan, according to which the fundamentals of sustainable production can be established through mutually agreed-upon work. Studies show that a circular economy can increase EU GDP by 2030 by 0,5% and create an additional 700 000 jobs [14].

In support of the circular economy, the EU will focus on the industries of textiles, electronics, food, plastics, and their packaging materials [15]. To achieve this goal, the EU and its allies must accelerate the rate of pro-growth policies. The discussion of the fifth industrial revolution above represents another step toward achieving this goal. People's consumption rate must be subject to certain boundaries. To achieve this, it is necessary to reduce resource spending and double the scale of the circular economy within the next decade [16].

METHODOLOGY

The present research employs a quantitative research methodology. This approach was chosen to facilitate a systematic collection and analysis of numerical data, enabling the identification of statistical patterns, trends, and connections related to the circular economy.

To fill out this research gap, this work shows the following tasks:

- **the purpose** of this research is to conduct an empirical study of the challenges and opportunities associated with introducing the circular economy in Georgia, with a focus on evaluating public awareness, attitudes, and behavior. In particular, the study aims to: 1) quantify measurement of public awareness of the principles of circular economy; 2) analyze the prevailing behavioral patterns in terms of waste management and resource consumption; and 3) identify the major barriers to the introduction of circular business models, as the public perceives.
- **the object** of this research is the consciousness, attitudes, and self-assessment of the Georgian population regarding the circular economy.

STAGE I: SYSTEMATIC REVIEW OF LITERATURE

A systematic review of existing scientific literature preceded empirical research. This process included three main areas: 1) studying the fundamental theories of the circular economy and

its conceptual connection with sustainable development; 2) Discuss the international experience and comparative analysis of the introduction of circular economy, focusing on barriers and success factors in different contexts such as the EU and Latin America; and 3) Analysis of existing policy documents and academic studies related to environmental management, waste and economic strategy in Georgia.

STAGE II: DESIGN AND TOOLS OF QUANTITATIVE RESEARCH

Data Collection Tool: The empirical research core consisted of a structured questionnaire comprising 66 questions, developed using the Google Forms Platform.

Questionnaire Content and Assessment System: The tool aimed to collect data in several main areas: demographic characteristics, awareness of the circular economy, and behavioral practices. An innovative evaluation system was used to quantify behavior measurement. Waste management questions were assigned +1 point (e.g., processing, repair) in line with the principles of the circular economy, and linear behaviors (e.g., placing all kinds of waste in landfills) were assigned -1 point. This system has enabled the calculation of aggregated behavioral points for each respondent across various contexts (family, job, and electronic waste), which in turn contributed to a robust quantitative analysis.

Opportunity for indirect measurement: The questionnaire also allowed indirect analysis. For example, by combining data on the number of family members, proxy indicators can be created based on resource intensity, which adds extra depth to the database.

SELECTION STRATEGY AND DATA COLLECTION

Sampling Method: Non-probability convenience Sampling was used for data collection.

Procedure: The questionnaire was circulated through online channels, mostly social and professional networks Facebook and LinkedIn. To improve the research, a paid add on Facebook was placed alongside the questionnaire, resulting in 68 798 people seeing the questionnaire, and the study link was clicked 2 083 times.

Ethical Protocol: The anonymity of respondents and the confidentiality of data were strictly protected throughout the research process. No personal identifiable information was collected, and participants were informed that data would be used only for scientific research purposes.

DATA ANALYSIS AND THE CREDIBILITY OF THE INSTRUMENT

Analysis: The collected data were processed and analyzed by SPSS (Statistical Package for the Social Sciences) software. The analysis primarily included descriptive statistics (frequencies and percentages) to compile the selection profile and summarize the basic results, presented in tables and diagrams.

Reliability: The internal consistency of the 66-point research instrument was checked by calculating the Cronbach's alpha coefficient. The obtained indicator, $\alpha = 0,831$ (with standardized data, $\alpha = 0,848$), significantly exceeds the standard limit of 0,70. This result confirms that the questionnaire used is a highly reliable and consistent tool for measuring the constructs of interest to the research.

It is necessary to note the methodological restriction of the research that is related to the unintended selection method. This method has led to the formation of a selection that is distinguished by a particularly high level of education (more than 63% of respondents hold a master's or doctor's degree) and high digital literacy. Consequently, the study's results cannot be generalized to the entire population of Georgia, particularly among rural, less educated, or digitally inactive groups.

While the non-random sample limits the generalizability of the findings across the entire Georgian population, it provides a unique “best-case scenario” analysis. The prevalence of a significant value-action gap within this highly educated and digitally literate cohort – arguably the segment of the population most likely to adopt pro-circular behaviours – suggests that the barriers to CE adoption in Georgia are deeply structural and cultural, rather than purely informational. If circular principles are unsuccessful in the most favorable part of society, this means that the challenge is much larger and difficult for the wider population. Thus, the methodological restriction is transformed into an analytical strength of the research.

SUSTAINABLE DEVELOPMENT AND CIRCULAR ECONOMY: SIMILARITIES AND DIFFERENCES

Today, the global population faces critical challenges. These challenges include reducing the use of natural resources, addressing climate change, mitigating environmental degradation, and addressing social inequality, among others. When discussing scientific and political topics to alleviate these challenges, the concepts of sustainable development and circular economy are becoming increasingly relevant. These two concepts are formed in different contexts and cover themes, but they both aim to create a fair and acceptable system for the planet.

Sustainable development is a comprehensive, holistic framework that was widely recognized in the UN World Commission on Environment and Development’s important report “Our Common Future” [17]. This report explained sustainable development as “a development that meets the needs of today’s generation so as not to violate the possibility of future generations, to satisfy their needs”. This explanation laid the foundation for a modern understanding of sustainability, which encompasses three fundamental, interconnected, and interdependent aspects of development: economic, social, and environmental dimensions. The economic dimension implies a stable and inclusive economic growth. The social dimension focuses on the elimination of poverty, the promotion of equality, and access to healthcare and education. The environmental dimension aims to maintain natural capital and prevent environmental degradation. Sustainable development is a long-term vision and a normative goal reflected in the global political agenda, as evident in the 17 Sustainable Development Goals [18]. These goals encompass a diverse range of challenges that underscore the importance of integrating various areas of development.

The circular economy, as an alternative economic model, has emerged in response to the deficiencies of the “pick-up-prepare” model, which is based on cheaper and more affordable raw materials but produces large amounts of waste. The primary objective of a circular economy is to maximize the value of resources and products within the economy for as long as possible, thereby preventing waste and pollution and restoring natural systems [19]. Although there are many different explanations of the circular economy, most agree that it implies a cycle of products, components, and materials that can be achieved through reuse, repair, renewal, restoration, and high-quality processing [20]. The circular economy focuses on systematic changes within the economy, emphasizing the effective management of resources and creating new business models based on “Product as a Service”, shared platforms, and other innovative models.

There is a close connection between sustainable development and a circular economy. Both concepts acknowledge the detrimental and final effects of human activity on the environment, which necessitate the need to transform existing systems. The circular economy is often regarded as one of the primary means of sustainable development [21], particularly in its environmental and economic dimensions. The implementation of the principles of the circular economy directly promotes the achievement of Sustainable Development Goals, such as sustainable production and consumption (SDG 12) [14], as well as the effective use of resources and waste reduction. In addition, the circular economy promotes innovation, creates

new business opportunities and jobs, thereby potentially promoting economic growth and social well-being, which is related to other purposes of sustainable development [17].

Despite these similarities, it is essential to acknowledge conceptual differences, particularly in terms of scale and focus. Sustainable development is a global vision and a set of goals that encompass the social, economic, and environmental aspects in a balanced manner. This is an ambitious agenda for the whole community. The circular economy, although important for sustainability, is mainly focused on the economic system, resource management, and material flows. Its main purpose is to create an economy that does not produce waste and maximally uses resources. In other words, sustainable development is “what” we want to achieve (a sustainable and fair society), and the circular economy is “how” we can achieve it by reorganizing the economic system. The circular economy is a powerful tool for reducing environmental pressure and increasing the effectiveness of resources. However, it is not enough to ensure social justice and equality, which are integral to sustainable development. Therefore, the circular economy does not alter sustainable development; rather, it supports it, offering a concept that involves practical ways and models to enhance the economic and environmental dimensions of sustainability within a fundamentally different economic system. The integrated approach to these two concepts is essential for effectively overcoming global challenges and creating a truly sustainable future.

CHALLENGES AND EXPERIENCES IN IMPLEMENTING CIRCULAR ECONOMY BUSINESS MODELS IN DIFFERENT COUNTRIES

The CE is increasingly recognized as a new economic paradigm that aims to promote sustainable development by improving economic, environmental, and social outcomes [22]. It radically changes the traditional, linear economic model based on the extraction of resources, production of products, and subsequent destruction of them [13, 23]. In contrast, the main idea of a circular economy is to plan products, consumption, and delivery chains so that their components can be reused and incorporated into circular cycles, which involves refurbishing and reprocessing products and services [13, 14]. This approach is based on the principles of strong sustainability and aims to maintain critically significant natural capital while overcoming environmental problems, such as resource scarcity and inadequate waste management. The principles of CE are implemented at different levels: at the micro-level (individual companies and consumers), at the meso level (cooperation between companies, such as industrial symbiosis), and at the macro level (spending policies across the economy or region) [24, 25].

Although already in existing research, great attention is paid to the use of circular economic principles in specific companies or business models, there is still a gap in knowledge of how these principles are implemented on a macroeconomic scale, especially in the process of transforming the whole economies and experiences of different countries [13].

Going to the business models of a circular economy is a complex and contextual process. It is influenced by many national and regional factors-economic structure, regulatory environment, technological capabilities, and socio-cultural features [26, 27]. Both developed and developing regions, for example, Europe and Latin America, face different obstacles and have different motivators and abilities in the pursuit of circulation [17]. For example, in the European context, indicators such as the Circular Materials Use (CMU) and its connection with macroeconomic indicators and environmental policy instruments such as environmental taxes [13] are considered. In the case of Latin America, social inequality, the role of the informal sector, and the fluctuations in the political environment significantly affect the introduction of the CE [18].

Understanding these different challenges and experiences is crucial for developing effective strategies and policies that contribute to the global advancement of circular economy business models. It is in this section that the complexity is discussed, with examples of practical experience in different countries to highlight the successes and challenges that accompany the transition to a circular economy.

Despite regional differences, the transition to CE business models faces similar challenges in many countries worldwide, which hinder their implementation. These challenges apply to regulatory, financial, technological, socio-cultural, and market characteristics.

One of the main obstacles is in the regulated space. The policies of the circular economy are still relatively new, often non-specific, and do not contain clear technical standards, which creates a space of uncertainty and impedes effective implementation [13, 18]. Even where the relevant legislation applies (for example, expanded manufacturer's responsibility law), its low-level enforcement, weak monitoring, and inappropriate adjustment of local contexts (for example, an active informal processing sector in Latin America) create significant barriers. The high level of bureaucracy, the lack of coordination between institutions, and the drop in policy (especially at the local level) exacerbate these difficulties [13]. At the same time, the restrictions on global institutional governance are complicated by solving global environmental problems with local CE solutions [28].

Financial restrictions are one of the most common obstacles [18]. Both public and private funding are often considered insufficient, or they focus only on specific groups (for example, startups or entrepreneurs) [18]. Especially for small and medium-sized enterprises and civil sector organizations, it is challenging to attract investment, partly due to banks' limited understanding of CE's risks and capabilities. In many countries, the basic needs – such as healthcare and education – are prioritized over investments in circular economies, especially in areas with high poverty levels [18]. Additionally, macroeconomic instability – such as high-profile bank loans – restricts lending and impedes investments in CE technology and infrastructure [29].

The scarcity of physical and technological infrastructure is another important obstacle. The lack of modern waste management means (such as processing plants or modern landfills) outside the capital is particularly problematic, which creates regional inequality in terms of circular capabilities. Finding suitable places for new facilities may be challenging due to geographical, regulatory, or public resistance. Despite technological advances, the practical use of these technologies often remains a challenge, especially for small enterprises. The attitude of foreign technologies and the patent barriers also significantly impedes access [18]. In addition, the limit of the fundamental laws of physics limits the possibility of complete processing of materials [19].

At the socio-cultural level, obstacles include a superficial understanding of CE principles, often limited to individual citizens, particularly in the area of processing. A culture of single-use and inexpensive products, rooted in global capitalism, hinders the adoption of practices such as repairs, secondary use, and sharing. Consumers' choices are often determined by a valuable factor, especially in the case of economically vulnerable groups, which limits the requirement for products that may be high in cost, but are circular. Changes to change are also evident from both users and manufacturers who are accustomed to traditional, linear models [18]. The lack of knowledge and professional skills on the concepts of circular economy complicates the decision-making process in different sectors [13].

In terms of the market, the main challenge is the dominance and competition of linear economics with imported, cheap, and short-lived products, which impedes local circular initiatives. The lack of reliable, standardized public data and indicators needed to measure progress, identify opportunities, evaluate influence, and make informed decisions [13]. This

lack of information is accompanied by low customer awareness and a lack of motivation among businesses, creating a “blind circle” that impedes the expansion of successful projects and the adoption of solutions. There is also often a gap between academic research and its practical application [18].

Despite the common challenges, the process of introducing circular economy business models is significantly determined by specific regional and national contexts. Consider the examples of Europe and Latin America (especially Chile) that show these differences well.

In Europe, great attention is paid to the introduction of the circular economy and the analysis of the relationship between macroeconomic indicators. CMU is often utilized for this purpose. Studies in many European countries have shown a long-term positive correlation between real per capita income and the CMU, indicating that economic growth and circulation can be coherent, even in the short-term dynamics [13, 18]. Also, environmental taxes and national costs (Gerd) are positively associated with the growth of circulation, which views them as policy instruments. The increase in value in the industry is also beneficial in the long run, as indicated by the circular economy indicators [13].

However, progress on the continent as a whole is not homogeneous. For example, CMU's figures in Southern Europe are significantly behind those of Northern European countries. European policy attaches great importance to the preservation and seizure of resources, and the collection of waste and the return of resources to the economy is considered a critical mechanism for the use of circular materials [13].

The transition to a circular economy in Latin America, and particularly in Chile, is set within a distinct socio-economic context, where the role of social inequality and the informal sector, especially informal waste collectors, is particularly pronounced [18].

Chile has taken significant steps in policy formation, including the “Roadmap for a Circular Chile by 2040” the Law of Extended Producer Responsibility (EPR), and plastic regulations [30]. However, the effective implementation of adaptation policies remains a challenge in local reality – for example, how EPR frameworks affect already established informal processors, and how they ensure consistent enforcement of these regulations in the wake of political changes at the regional and municipal levels [18].

The main driving factors of a circular economy in Chile include international pressure, such as the obligations of the Paris Agreement and the OECD, as well as the requirements of export markets. Additionally, environmental concerns (water deficits, pollution), interest in young people in sustainable development, the use of traditional knowledge, and the promotion of local entrepreneurship [18].

As the analysis reveals, the direction of introducing a circular economy in developed and developing countries varies. Consequently, when discussing the challenges of model implementation in Georgia, it is essential to consider the country's current stage of development.

PROBLEMS OF IMPLEMENTING CIRCULAR ECONOMY BUSINESS MODELS AND CHANGING CONSUMER BEHAVIOR IN GEORGIA

Georgia, in the wake of global environmental challenges and the European integration process, is actively working to integrate its national policy with the principles of the circular economy and the relevant legislative framework. This process is based on several strategic documents and legislative acts.

The fundamental policy document is the National Waste Management Strategy (2016-2030), along with its action plans (2016-2020 and 2022-2026), which aim to harmonize the EU standards of the waste management system. The strategy is based on the waste hierarchy, the

“pollutant pays” principle of the manufacturer’s expanded responsibility (MMP), which promotes the prevention, processing, and reuse of waste generation [31].

In addition, the waste sector in Georgia’s 2030 Climate Change Strategy is discussed in the context of climate change, aiming to reduce greenhouse gas emissions from landfills and encourage waste as an alternative source of energy [32]. Currently, with the support of the United Nations Development Program (UNDP) and the Swedish government, the national circular economy strategy is being developed.

At the legislative level, the process is regulated by two main acts. The Law of Georgia “Waste Management Code” is a framework law that provides a legal basis for preventing waste generation and ensuring the safe management of waste in the environment. The Code reinforces important principles for a circular economy, such as the “polluting” principle and the extended manufacturer’s obligation, which applies to specific waste categories (including packaging, oils, tires, electronic devices, etc.). For its part, the Law of Georgia on Environmental Protection establishes the fundamental principles that echo the concept of a circular economy, including: the principles of sustainability, waste minimization, processing, and restoration [34].

To support this framework, the country aligns with the national level of the UN Sustainable Development Goals. It establishes specific technical regulations that govern the management of various types of waste [35].

Along with the formation of the legislative framework for implementing the principles of a circular economy in Georgia, pioneer companies have already emerged in the business sector that are practicing circular business models. These companies operate in various sectors and employ different models of circulation, thereby fostering a culture of sustainable production and consumption within the country.

A successful example of a circular delivery chain model is the Georgian brand of linen, “Sheidish”. The company creates 90% of its products from residual materials of OETX-certified sewing, which significantly reduces its demand for primary resources. Production is performed locally by hand, which reduces emissions associated with transportation. In addition, Sheid uses 100% friendly packaging, which is provided by the Georgian Green Gift Company and is produced from processed paper [36].

The digital trading platform “Faber” works on the product life cycle extension model. It unites more than 80 000 customers who can buy and sell clothing, accessories, and hair care. The platform, by promoting a culture of secondary consumption, directly opposes the linear model in the fashion industry and encourages the long-term use of products.

A prominent example of the introduction of circular and sustainable practices in the winemaking sector is “Chateau Zegaani”, which combines respect for historical heritage and harmonious activities with nature. The company adheres to the principles of organic winemaking, which entails a refusal to use synthetic fertilizers and chemicals. They use minimal intervention policies in the vineyard. Grape picking, minimizing waste, and devotion to natural cycles transform Chateau Zegan into a business that seeks to close the production cycle, reduce environmental impact, and create products with complete respect for the ecosystem [2].

These examples demonstrate the practical and varied applications of circular economy models in the Georgian business landscape, which is a significant indicator of the country’s sustainable development. Additionally, there is the Waste Management Business Association, founded in Georgia, which leading companies in the oil products and automotive industries establish. This association performs the functions of an extended collective organization for managing residual oils, tires, and batteries.

EU Twinning Project's 2022 report "Identification and Setting of Scientific Priorities in Georgia", which is dedicated to the identification and formation of Georgian scientific priorities, is being discussed in the country. According to the report, despite the launch of the Waste Management Code in 2015, the country continues to face significant challenges in establishing an integrated solid waste management system. It is far from the national strategy to achieve the goals that are harmonized with EU standards. The existing legislative framework cannot fully stimulate waste prevention, reuse, recycling, and restoration, as well as the active involvement of the private sector in this process [37].

According to the report, scientific and innovative activities in this field are at an early stage, as evidenced by bibliometric and patent analysis, which indicates that Georgia has no positive specialization in the circular economy. The condition is complicated by the lack of critical regulations, such as the EPR, and the lack of a unified waste management information system necessary to pursue evidence-based policies. In response to these challenges, the report emphasizes the need for specific measures. Potential functional priorities include the development of research infrastructures and academic courses on the circular economy, the establishment of a national waste flows monitoring system, and the harmonization of European legislation and best practices, particularly in the areas of construction and demolition waste [33].

Studies of Georgian authors on the circular economy encompass a range of complex issues, from the current state of the country to the analysis of specific sector models and future challenges. M. Chelidze and d.E. Prasek [38] assesses the level of the Georgian economy's circularity and concludes that it is only 1,3% circular, which creates a 98,7% "circulation deficit". However, according to the same study, there is a high potential, especially in the agribusiness sector. L. Tabatadze [39] discusses the evolution of the concept of circular economy, its relation to sustainable development and the green economy, and determines the preconditions necessary for its introduction in Georgia, such as the development of the legislative base and state support. M. Jishkarian et al. [40] analyze the country's legislative framework, including the principle of Waste Management Code and EPR, and link it to energy and economic indicators that influence the transition to a circular model. At the same time, N. Buachidze et al. [41] study the streams of waste management, materials (plastic, paper, hazardous waste), and national processing targets, and K. Rukhaia et al. [42] focus on waste prevention, specifically the opportunities for the introduction of multiple packaging systems and the social dimension of women's participation in the process.

In terms of sectoral analysis, T. Lachkapiani and M. Lomishvili [43] discuss the use of the principles of the closed cycle in agriculture to achieve food safety and economic growth. B. Baiashvili [44], in the example of wine production, shows how waste can be transformed into valuable products (oil, flour). On the ability of clusters to successfully introduce a circular economy, Gagnidze develops views in three directions: first: a circular economy is at the core of the way to achieve sustainable development and sustainability; second: social capital occurring in clusters is one of the best tools for transitioning to a circular economy and for achieving it with less investment than in independent firms; third: the universities in clusters can play a pivotal role in addressing challenges for transitioning to a circular economy [45]. I. Natsvlshvili [46] examines the nuances of sustainable entrepreneurship in the era of digital transformation, analyzing the driving factors and barriers that influence the innovation of circular business models during the integration of digital technology. Finally, B. Baiashvili [47] systematizes general circular business models (e.g., circular delivery chains, product-as-a-service) and demonstrates how they are adapted to specific sectors, such as permaculture in agriculture.

To evaluate the process of introducing circular economy business models, we conducted a survey that creates important analytical opportunities. Research clearly shows that the behavior and awareness of the population in Georgia are important factors for the successful

implementation of the circular economy. In our opinion, the basis for implementing a circular economy should be found in the consciousness and behavior of citizens. Although this process largely depends on both the interests and skills of the private sector, as well as the state's development strategy and decision-makers, at least the starting point of business behavior should be considered. Consequently, the study of human behavior is a major starting point, and this study serves this purpose.

This survey aims to study the level of awareness of the circular economy and its business models in Georgia. The study focuses on the following main issues:

- How much are people informed about the principles of a circular economy?
- What practices do they use in terms of waste management and resources?
- What barriers prevent the introduction of circular economy models in Georgia?

The study's results enable us to understand the public's attitude towards the circular economy and identify the key factors that contribute to or hinder these approaches. The data collected in this study will provide not only academic but also practical recommendations that can be applied by both policymakers and representatives from the business sector.

EMPIRICAL STUDY DESIGN

A quantitative research method was utilised in this survey, which aimed to collect and analyze data to evaluate the awareness of the circular economy in Georgia and its business models.

The primary tool used in the survey was a structured questionnaire created using the Google Forms platform. The questionnaire consisted of many questions, including:

- Closed questions that focused on demographic data, behavioural practices, and level of consciousness.
- Multi-answer questions that allow respondents to share a variety of actions in terms of waste management and the principles of a circular economy.
- Scaled questions that have evaluated public attitudes and perceptions of circular economic business models.

The Non-Probability Sampling Method was used as part of the survey. The questionnaire was spread through online channels (Facebook, LinkedIn). This allowed them to participate in a wide audience. Participants of various ages, genders, and professional backgrounds took part in the study. For better dissemination of the research, an advertisement was placed on the social networking site Facebook. As a result of advertising, 68 798 people viewed the questionnaire on this channel, and 2 083 people clicked on the link to the questionnaire.

All answers were collected through Google Forms. This provided a quick and straightforward analysis of the data. Respondents' anonymity and privacy were protected; Their data has not been collected, and information will be used only for scientific research purposes.

The collected data were processed using SPSS software. The results are presented in the format of diagrams, spreadsheets, and statistical analysis, which will enable us to analyze existing trends and attitudes more effectively.

Six hundred seventeen respondents participated in the survey, of which 612 (99,2%) were included in the data analysis, and five answers (0.8%) were excluded due to incomplete data, Table 1. An analysis of the internal reliability of the tool used to evaluate the high credibility – the Cronbach's Alpha coefficient was 0,831 (with standardized data it was 0,848), indicating that the 66 questionnaires are differentiated by their reliability and can be used effectively for research purposes.

The distribution of respondents by age is shown in Figure 1. As shown in the diagram, the age distribution among the respondents is balanced.

Table 1. Cronbach’s Alpha test results on the circular economy 2025 survey in Georgia.

Case Processing Summary		
Cases	N	percentage, %
Valid	612	99,2
Excluded	5	0,8
Total	617	100,0
Reliability Statistics		
Cronbach’s Alpha	Cronbach’s alpha based on standardized items	N of items
0,831	0,848	66

In particular, 4,3%of the respondents have general education, 3,9%-professional, “Bachelor” was marked by 28,5%, Master by 43,1% and Doctor by 20,3% respondents.

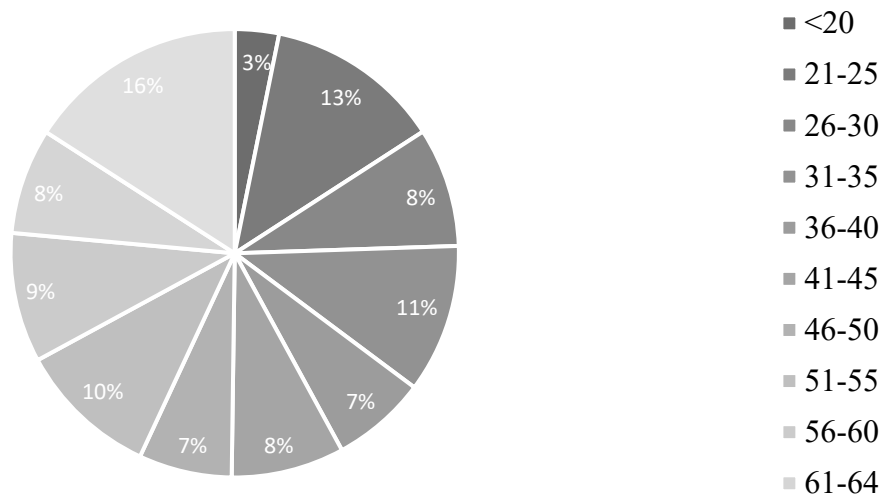


Figure 1. The demographic profile of participants by age in the survey on the circular economy.

7%of respondents’ families consists of 1 member, 11% of 2 members, 47% of 3 or4 members, 26% of 5 or 6 members, and 9%from 7 or more members.

Analysis of the employment status of the respondents reveals that most are employed in the public sector (35,1%) or in the private sector (31,3%), which collectively cover more than two-thirds of the respondents. A small portion (9,6%) works in both sectors simultaneously. The number of self-employed individuals is 8,7%, and only 1,3% of people with their businesses operate following the principles of the circular economy, while 2,0% do not. However, 12%of respondents are not employed at this stage. The data confirms that traditional employment forms are still dominant, while the circular economy-based entrepreneurship still holds a small share.

SURVEY RESULTS

In terms of waste management, we first wondered about the behavior of citizens in their family and work settings. Let’s start with the first question analysis, which is formulated as follows: Please note the actions you are taking with your family’s waste. For a more accurate analysis, each answer was assigned a corresponding score. In cases of positive behavior the respondent was given +1, and in cases of negative behavior, –1 point. Answers included: “I recycle (e.g., in plastic, paper, or metallic collection points)”, “I produce compost”, and “I do not carry out any special action, I usually put everything in the landfill”, among others.

According to the scores, Table 2 provides family behavior data. In table, 5 points point out the maximum point, and the –1 minimum. As shown in the table, many of the frequencies are concentrated at low points.

Table 2. Total scores of behaviors in the family in the survey on the circular economy.

Behavior Score	Frequency	percentage, %	valid percent, %	cumulative percent, %	
Valid	-1,00	163	26,4	26,4	26,4
	0,00	88	14,2	14,2	40,7
	1,00	163	26,4	26,4	67,1
	2,00	106	17,2	17,2	84,3
	3,00	64	10,4	10,4	94,7
	4,00	21	3,4	3,4	98,1
	5,00	12	1,9	1,9	100,0
	Total	617	100,0	100,0	

The second question was asked in the following formulation: What actions do you take regarding the waste generated at work? The results are given in Table 3. For a better analysis of the results, as in the previous question, we also assign points here. Answers were: “I try to minimize paper use”, “I use multiple-use water bottles”, and so on.

Unlike family behavior, frequencies are relatively equally distributed. However, the largest percentage (19,2%) still has the lowest points.

Electronic waste is significant in the process of waste management, as it is rapidly undergoing moral depreciation due to the technological revolution. Consequently, we asked the respondents how they behave with a similar waste. The results are presented in Table 4. The table provides total scores on how the respondents have an attitude towards electronic devices.

Table 3. Total scores of behavior at work in the survey on the circular economy.

Behavior Score	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	-1,00	118	19,2	19,2	19,2
	0,00	71	11,5	11,5	30,7
	1,00	79	12,9	12,9	43,6
	2,00	63	10,3	10,3	53,8
	3,00	90	14,5	14,5	68,4
	4,00	74	12,0	12,0	80,4
	5,00	49	8,0	8,0	88,4
	6,00	40	6,5	6,5	94,9
	7,00	22	3,6	3,6	98,5
	8,00	6	0,9	0,9	99,4
	9,00	4	0,6	0,6	100,0
Total	617	100,0	100,0		

Table 4. Total scores of interacted behavior against the waste of electronic devices in the survey on the circular economy.

Behavior Score	Frequency	Percent	Valid Percent	Cumulative Percent	
Valid	-2,00	2	0,4	0,4	0,4
	-1,00	58	9,5	9,5	9,8
	0,00	76	12,2	12,2	22,1
	1,00	294	47,6	47,6	69,7
	2,00	124	20,0	20,0	89,7
	3,00	51	8,3	8,3	98,0
	4,00	9	1,5	1,5	99,5
	5,00	3	0,5	0,5	100,0
	Total	617	100,0	100,0	

The total scores of the analyzed are presented together in Figure 2. This approach enables us to analyze the behavior of respondents visually. Visual analysis reveals that the most common range of points is from -1 to 3, indicating that waste behavior is predominantly neutral or negative. Points 6 to 9 are rarely found, suggesting that high consciousness and responsibility for waste management are relatively rare. Additionally, it is noticeable that there is a relatively better situation regarding waste. This result shows that people at work become more responsible.



Figure 2. The percentage distribution of total scores towards waste in the survey on the circular economy.

Regarding the level of awareness among respondents, the situation has improved, but the public still lacks sufficient information about the circular economy. It is noteworthy that we have conducted research on awareness twice in recent years, and there is a clear improvement. Such a positive development gives us hope that the behavior of society’s members will change for the better in the future.

CONCLUSION

The present study, which aimed to identify the challenges of introducing circular economy models in Georgia, reveals a critical discrepancy between the country’s sustainable development needs and the current public readiness. At the center of analysis, empirical data indicate that the successful integration of circular economy principles faces significant barriers, primarily related to the low level of public awareness and behavioral inertia.

The quantitative survey analysis conducted as part of the study identified several key findings. First, the population’s behavior in the field of waste management, both in the household and in the work environment, is mostly neutral or negative. The overall distribution of respondents clearly shows that the practice of high responsibility and proactive action (eg, processing, composting) is a rare exception. For the majority of respondents, standard waste management practices still involve placing waste in a single landfill, which is directly contrary to the underlying principles of the circular economy.

Notably, the study revealed two phenomena. The first of them can be characterized as a “paradox of education and behavior”. Although a significant portion of the respondents (63,4%) have a high academic degree (Master’s or Doctor’s), this factor is not directly correlated with pro-circular behavior. This suggests that high formal education automatically fosters a deeper understanding of environmental issues and appropriate actions. This indicates a systemic defect where formal education cannot ensure the development of practical, sustainable habits and the transfer of specific environmental knowledge. This paradox suggests

that studying materials related to a circular economy should be included in the curriculum. It is essential to provide students with proven methods at all stages of education on this issue.

The second important finding is the change in behavior within the work environment. Data show that the same individuals who are passive at home tend to take on relatively more responsibility for waste management in the work environment. This difference is explained not by the sudden growth of personal consciousness, but by the structure of the environment. In the workplace, there is often a minimal yet effective operating system – separated bins, internal policies, and the influence of social observation – which reduces cognitive and physical costs associated with responsible behavior. This fact empirically proves that well-designed systems and “architecture of choice” can stimulate behavior effectively, even when individual motivation is low.

Research findings have deep theoretical and practical implications for Georgia. The transition to a circular economy should not only be regarded as a narrow environmental policy or an improved waste management strategy. It is a fundamental economic and geopolitical imperative that is closely tied to the country’s long-term strategic objectives.

Academic integrity requires an open acknowledgment of research limitations. The main restriction of the present work is related to the selection method. The non-verbal, online survey method, combined with the demographic profile of respondents, in which individuals with higher education dominate, has led to the formation of non-probability selection. Consequently, the study’s results should be generalized to the entire population of Georgia. As noted, the existing data is likely to reflect the “best scenario”, which implies that the real picture of consciousness and behavior in general populations may include even more challenges.

STRATEGIC RECOMMENDATIONS AND FINAL WORDS

Based on the analysis of the research, the strategic guide to switching to a circular economy for Georgia should be based on four interconnected pillars:

- **Strong governance and regulation:** The first and foremost step is to develop a clear, ambitious, and legally compulsory national strategy and action plan. It is necessary to effectively implement the manufacturer’s expanded responsibility principle that obliges the business to take responsibility for the end of the life cycle of its products. This system should be created in light of the integration of the informal sector to ensure socially fair transformation.
- **Further research** is recommended to deepen the process of introducing a circular economy in Georgia. It is necessary to conduct both large-scale quantitative research to evaluate the awareness and behavior of the population, as well as qualitative research (in-depth interviews, focus groups) to determine the causes of their passivity. However, a detailed economic analysis of the potential of industrial symbiosis in leading industries and the role of the informal sector in waste collection is needed to develop an inclusive and socially fair policy and integrate it into a formal system.
- **Creating a supportive infrastructure:** Citizens’ behaviour change is not possible without an appropriate physical infrastructure. The state and municipalities should invest in modern systems for waste separation, collection, sorting, and processing. Available and convenient infrastructure makes pro-circular behavior an “easy choice”.
- **Private sector catalysis:** It is necessary to create a favourable environment for businesses. This includes increasing access to “Green Finance” (preferential credits and grants), the formation of innovative hubs and accelerators that support circular business models, and the introduction of “green public procurement” policies, which will create a stable market for circular products and services.
- **Strengthening and Education of Society:** General information campaigns are insufficient. Systematic integration of circular economy principles and sustainability is required in the

national curriculum, from elementary school to universities. However, it is essential to support public initiatives (e.g., repair cafes, sharing platforms) to become a tangible and positive part of public life.

Ultimately, transitioning to a circular economy is not a matter of choice for Georgia, but rather a sustainable, competitive, and sovereign development path in the 21st century. It is a transformation that requires a long-term vision, political will, and the coordinated and deliberate efforts of all sectors of society – governments, businesses, and citizens – to make today’s challenges tomorrow’s opportunities.

REFERENCES

- [1] Bretschger, L. and Smulders S.: *Sustainability and substitution of exhaustible natural resources*.
Journal of Economic Dynamics and Control **36**(4), 536-549, 2012,
<http://dx.doi.org/10.1016/j.jedc.2011.11.003>,
- [2] Boulding, K.: *The Economics of the Coming Spaceship Earth*.
<http://www.ub.edu/prometheus21/articulos/obsprometheus/BOULDING.pdf>, accessed August 2025,
- [3] Abuselidze, G. and Zoidze, G.: *Circular Economy: A Modern Concept of Sustainable Development*.
E3S Web of Conferences **585**, No. 11012, 2024,
<http://dx.doi.org/10.1051/e3sconf/202458511012>,
- [4] Tariq M.; Badir S. and Shakil M.W.: *The role of circular economy in achieving sustainable development goals: evidence from E7 countries*.
Technological and Economic Development of Economy, 1-20, 2025,
<http://dx.doi.org/10.3846/tede.2025.23329>,
- [5] Hernández J.; Bochicchio F. and Jimenez-Garcia A.: *Circular economy in Latin America and the Caribbean: Drivers and barriers for its implementation*.
Sustainable Production and Consumption **51**, 118-136, 2024,
<http://dx.doi.org/10.1016/j.spc.2024.09.006>,
- [6] Malthus, T.R.: *An Essay on the Principle of Population*. 1st edition.
<https://oll.libertyfund.org/titles/malthus-an-essay-on-the-principle-of-population-1798-1st-ed>,
accessed August 2025,
- [7] Lacy, P. and Rutqvist, J.: *Waste to Wealth - The Circular Economy Advantage*.
Palgrave Macmillan, 2015,
<http://dx.doi.org/10.1051/e3sconf/202458511012>,
- [8] Ellen MacArthur Foundation, *Towards the Circular Economy: Economic and business rationale for an accelerated transition*, Isle of Wight.
<https://www.ellenmacarthurfoundation.org/towards-the-circular-economy-vol-1-an-economic-and-business-rationale-for-an>, accessed August 2025,
- [9] Conti D.; Saradhar R. and Marques M.T.: *Circular economy: A brief literature review (2015–2020)*.
Sustainable Operations and Computers **2**, 79-86, 2021
<http://dx.doi.org/10.1016/j.susoc.2021.05.001>,
- [10] The ZeroWIN Project: *Towards Zero Waste in Industrial Networks. Approaches to Zero Waste*.
<https://cordis.europa.eu/project/id/226752/reporting>,
- [11] World Economic Forum, *Towards the Circular Economy: Accelerating the Scale-Up Across Global Supply Chains*.
<https://www.weforum.org/publications/towards-circular-economy-accelerating-scale-across-global-supply-chains>,
- [12] European Parliament: *Circular economy: definition, importance and benefits*.
<https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits>,

- [13] European Commission: Directorate-General for Environment & Cambridge Econometrics & ICF & Trinomics: *Impacts of circular economy policies on the labour market – Final report and annexes*. Publications Office, 2018, <https://data.europa.eu/doi/10.2779/574719>,
- [14] The European Green Deal: *Circular Economy Action Plan*. https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en,
- [15] European Union: *A new Circular Economy Action Plan For a cleaner and more competitive Europe*. https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en,
- [16] Euractiv: *EU pushes new "circular economy" rules for everyday items*. <https://www.euractiv.com/section/circular-economy/news/eu-pushes-new-circular-economy-rules-for-everyday-items>,
- [17] World Commission on Environment and Development: *Our Common Future*. Oxford University Press, 1987,
- [18] United Nations: *Transforming our world: the 2030 Agenda for Sustainable Development*. <https://sdgs.un.org/2030agenda>,
- [19] Brun, G.: *Principles for a sustainable circular economy*. Conservation and Recycling **168**, No. 105330, 2021, <http://dx.doi.org/10.1016/j.spc.2021.02.018>,
- [20] Kirchherr, J.; Reike, D. and Hekkert, M.: *Conceptualizing the circular economy: An analysis of 114 definitions*. Conservation and Recycling **127**, 221-232, 2017, <http://dx.doi.org/10.1016/j.resconrec.2017.09.005>,
- [21] Yemelyanov, U.; Shchebetun, S. and Povarova, A.: *Landscape and circular economy as a mechanism of sustainable development*. <https://pearl.plymouth.ac.uk/cgi/viewcontent.cgi?article=1017&context=professional-research>,
- [22] Hondroyiannis, G.; Sardanou, E.; Nikou, V.; Evangelinos, K. and Nikolaou, I.: *Circular economy and macroeconomic performance: Evidence across 28 European countries*. Ecological Economics **215**, No. 108002, 2024, <http://dx.doi.org/10.1016/j.ecolecon.2023.108002>,
- [23] Murray, A.; Skene, K. and Haynes, K.: *The circular economy: an interdisciplinary exploration of the concept and application in a global context*. Journal of Business Ethics **140**, 369-380, 2017, <http://dx.doi.org/10.1007/s10551-015-2693-2>,
- [24] Geissdoerfer, M.; Savaget, P.; Bocken, N.M.P. and Hultink, E.J.: *The circular economy a new sustainability paradigm?* Journal of Cleaner Production **143**, 757-768, 2017, <http://dx.doi.org/10.1016/j.jclepro.2016.12.048>,
- [25] Saavedra, Y.M.; Iritani, D.R.; Pavan, A.L. and Ometto, A.R.: *Theoretical contribution of industrial ecology to circular economy*. Journal of Cleaner Production **170**, 1514-1522, 2018, <http://dx.doi.org/10.1016/j.jclepro.2017.09.260>,
- [26] Kirchherr, J., et al.: *Barriers to the circular economy: evidence from the European Union (EU)*. Ecological Economics **150**, 264-272, 2018, <http://dx.doi.org/10.1016/j.ecolecon.2018.04.028>,
- [27] Gallego-Schmid, A.; Vasquez-Ibarra, L.; Guerrero, A.B.; Henninger, C.E. and Rebolledo-Leiva, R.: *Isomorphic pressures and spillover effects in the transition towards a circular economy: A stakeholders' perspective in Chile*. Journal of Cleaner Production **486**, No. 144429, 2025, <http://dx.doi.org/10.1016/j.jclepro.2024.144429>,

- [28] Korhonen, J.; Honkasalo, A. and Seppälä, J.: *Circular economy: the concept and its limitations*.
Ecological Economics **143**, 37-46, 2018,
<http://dx.doi.org/10.1016/j.ecolecon.2017.06.041>,
- [29] Umoren, A.A.; Nwosu, A.C.; Udoh, E.J. and Akpan, S.B.: *Empirical Analysis of Non-Performing Loans Trend and Growth Rate in Nigerian Banking System*.
International Journal of Finance and Banking Studies **5**(3), 61-73, 2016,
<http://dx.doi.org/10.20525/ijfbs.v5i3.260>,
- [30] Ministerio del Medio Ambiente: *Ley 20.920 establece un marco para la gestión de residuos, la responsabilidad extendida del productor y el fomento al reciclaje*.
<https://www.bcn.cl/leychile/navegar?idNorma=1090894>,
- [31] Government of Georgia: *On Approval of the National Waste Management of Georgia's National Strategy and Waste Management Action Plan for 2016 – 2030*.
<https://matsne.gov.ge/ka/document/view/3242506>,
- [32] MEPA: *Georgia's 2030 climate change strategy*.
<https://mepa.gov.ge/En/PublicInformation/32027>,
- [33] Parliament of Georgia: *Waste Management Code*.
<https://matsne.gov.ge/en/document/view/2676416?publication=19>,
- [34] Parliament of Georgia: *On Environmental Protection*.
<https://matsne.gov.ge/en/document/view/33340?publication=21>,
- [35] Government of Georgia: *On the National Document of Sustainable Development Goals*.
<https://matsne.gov.ge/ka/document/view/4732470?publication=0>,
- [36] CBW: *Sheidish - Tako Natsvlishvili's First Georgian Eco-Friendly Lingerie Brand*.
<https://cbw.ge/startup/sheidish-tako-natsvlishvilis-first-georgian-eco-friendly-lingerie-brand>,
- [37] EU Twinning project: *Identification and setting of scientific priorities in Georgia*.
Synthesis Report v1.2. pp.25-27, 2022,
- [38] Tchelidze, M. and Prasek, D.E.: *Circularity Mapping for Georgia, Forbes Georgia*.
<https://forbes.ge/en/circularity-mapping-for-georgia-by-dr-dariusz-edward-prasek-and-dr-medgar-tchelidze>,
- [39] Tabatadze, L.: *Circular Economy, Problems and Challenges*.
The New Economist **16**(3-4), 16-19, 2021,
- [40] Jishkariani, M.; Ghosh, S.K. and Didbaridze, K.: *Energy and Economic Indicators Influencing Circular Economy in Georgia*.
In: Ghosh, S.K. and Ghosh, S.K., eds.: *Circular Economy: Recent Trends in Global Perspective*.
Springer Nature, Singapore, pp.331-358, 2021,
http://dx.doi.org/10.1007/978-981-16-0913-8_11,
- [41] Buachidze, N.; Dzebisashvili, N.; Gurguliani, I.; Chikviladze, K. and Ghosh, S.K.: *Circular Economy of Georgia*.
In: Ghosh, S.K. and Ghosh, S.K., eds.: *Circular Economy: Recent Trends in Global Perspective*.
Springer Nature, Singapore, pp.359-382, 2021,
http://dx.doi.org/10.1007/978-981-16-0913-8_12,
- [42] Rukhaia, K.; Chitanava, M.; and Pavlenishvili, L.: *Circular Economy in Georgia: Opportunities for reusable packaging systems and women's participation*.
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn, 2024,
- [43] Lachkepani, T. and Lomishvili, M.: *Development of circular economy in agriculture*.
Georgian Scientists **4**(4), 15-20, 2022,
<http://dx.doi.org/10.52340/g.s.2022.04.04.03>,
- [44] Baiashvili, B.: *Implementation of the Circular Economy Model in the Agricultural Sector: The Case of Wine Production*.
- [45] Gagnidze, I.: *Do clusters matter for a circular economy?*
International Journal of Markets and Business Systems **5**(2), 128-145, 2024,
<http://dx.doi.org/10.1504/IJMABS.2024.144446>,

- [46] Natsvlshvili, I.: *Supporting Factors and Barriers to Circular Business Model Innovation in the Era of Digital Transformation*.
In: Geibel, R.C. and Machavariani, S., eds.: *Digital Management and Artificial Intelligence*. Springer Proceedings in Business and Economics. Springer, Cham, pp.165-178, 2024,
http://dx.doi.org/10.1007/978-3-031-88052-0_13,
- [47] Baiashvili, B.: *Transitioning to a Circular Economy: Business Models and Sector-Specific Practices*.
Economics **106**(9-10), 40-44, 2024,
<http://dx.doi.org/10.36962/ECS106/9-10/2024-40>.