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Innovative circular business model as a tool for applying rational consumption of the natural resource landscape

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Economic growth within the traditional linear production model increases environmental pressure, depleting resources, and raising pollution levels. In contrast, the circular economy promotes closed production cycles, ensuring the repeated use of extracted resources. However, transitioning to this model requires active innovation adoption. Despite its rising popularity, circular economy concepts remain underdeveloped scientifically, lacking formulated models that comprehensively address implementation in both public and private sectors. This study aims to theoretically and practically substantiate the development of an innovative circular business model as a tool for rational natural resource consumption. Achieving this requires a multidisciplinary approach, integrating business models, technological innovations, and stakeholder collaboration. The paper formulates theoretical base for the natural resource landscape and proposes a model for implementation the circular economy in private and public sectors. The research also highlights barriers of implementation circular economy models.

JEL classification: Q01, Q55, Q56

KEYWORDS

innovative circular business model, circular economy, natural resource landscape, ecodesign, sustainable development

Introduction

The current stage of human development is characterized by the growing contradictions between human society and the environment. The global economic crisis has created many local, regional, and global environmental problems related to the irrational use of Natural Resources. Humanity is faced with the task of satisfying its vital needs in combination with preserving a favorable natural landscape for the benefit of present and future generations. Today, the world economy is characterized by a linear model of resource consumption. The implementation of the linear model (“extract, produce, dispose”) has led to environmental pollution, increased greenhouse gas emissions, the organization of unauthorized landfills and the irrational use of available natural and energy resources. The growing shortage of resources and the deteriorating environmental situation have prompted the international community to rethink the traditional model of the economy. Recently, more attention has been paid to the concept of a circular economy, which is characterized by a renewable and closed nature of resource consumption. The circular economy focuses on reducing waste and primary raw material consumption through the search for efficient and renewable energy sources and

innovative technologies for processing resources and waste. The development of the circular economy is now progressing in many countries of the world in order to counter global environmental threats. An important circuit within the circular economy is the concept of a low-carbon economy, which provides for the rational use of resources; reduction of greenhouse gas emissions; social responsibility of business and its focus on greening production.

There are also three mechanisms that are aimed at reducing the consumption of materials and, as a result, reducing the associated negative impact on the environment: (1) closing the turnover of resources replacing primary resources with secondary raw materials (recycled waste) or used, repaired, restored products; (2) slowing down the turnover of resources—reducing the consumption of primary resources by extending the service life of existing products (maintainability and recyclability, the ability to disassemble and remove components suitable for subsequent service, etc.); (3) narrowing of resource flows reducing the specific consumption of primary resources, economic use of available resources and assets, introduction of innovative production technologies, etc.; at the same time, narrowing the flow of resources does not imply a closed turnover.

The issues of developing new and adapting existing business models for working in a circular economy in order to apply rational consumption of the natural resource landscape are relevant both from a theoretical and methodological point of view, and the formulation of their solutions forms the basis of this work.

The paper is structured as follows. The second section is dedicated to a literature review. The third section overview of used materials and methods. The fourth section, Results and Discussion, consist of key definitions section, which describes the main theoretical part, and analysis, which is dedicated to formulating and describing the proposed model. Finally, the last section concludes the paper, also proposing further developments considering investigations of potential root causes and guidelines presented in the Results and Discussion section.

Literature review

In recent years, circular models have attracted the attention of an increasing number of researchers in the field of Management, Innovation Management, Entrepreneurship economics, industrial ecology, and other related scientific areas. The concept of “circular economy” was first proposed by D. W. Pierce and R. K. Turner in 1990. Circular economy emerged at the intersection of two sciences: ecology and economics, which is why the first works on the development of this concept had an ecological bias. According to A. Murray’s definition, a circular economy is an economic model in which both the results and the actual processes of resource supply and production are planned and organized in such a way as to maximize the wellbeing of people and the efficiency of functioning of ecosystems (Murray, 2015). Circular economy is one of the tools for solving environmental problems and ensuring a stable ecological future (Bocken et al., 2021).

To date, there are more than a dozen visualizations of the circular economy model, and they all have a similar structure. The most common and complete model is based on the developments of The Ellen MacArthur Foundation, whose activities are aimed

at creating a new positive future within the circular economy. Thanks to the results of these activities, a theoretical foundation for applying the circular economy in states has emerged (Ellen Macarthur Foundation, n.d.).

Based on the reviewed literature and researches, we can target several gaps in circular business model topic, which can be filled by the results of this paper:

- Studies are tend to focus on individual aspects of circular economy, so lacking a comprehensive framework that connects these perspectives to facilitate a cohesive transition to a circular model (Homrich et al., 2017);
- Even though, the adoption of circular business model varies across industries, there is still a need of creation a base model, which can be applied with minor additions in different cases (Donner et al., 2022);
- There is still a gap for defining natural resource potential of a landscape in terms of circular economy model, to move away from considering it as the maximum reserve of resources to the reserve that is used without destroying the landscape structure (Jesus, 2018).

According to the review there is a need for formulating a basic framework for circular economy model implementation, which considers natural resource potential of a landscape reserve that is used without destroying the landscape structure (Gavkalova et al., 2024).

Materials and methods

The theoretical and methodological basis of the research was the works of domestic and foreign scientists devoted to the issues of Sustainable Development, Environmental Management, ecological and economic efficiency, the formation of principles of circular economy, closed supply chains and remanufacturing, as well as works that reveal the essence and features of the application of rational consumption of the natural resource landscape.

In order to develop the conceptual position of innovations in the circular business model, the theory of higher effects, a modern version of the concept of sustainable development, as well as modern institutional and economic and legal analysis were used as a tool for applying rational consumption of the natural resource landscape. For an in-depth analysis of new market segments of the economy, focused on the principles of assessing the natural resource landscape, methods, and approaches of the economy of industry markets, a number of methods of strategic analysis, including the analysis of the strategy of the circular business model, are used.

In the course of the study, general scientific and special research methods were used: analysis and synthesis of economic processes and phenomena, generalization of theoretical and practical material, cause-and-effect analysis, modeling, basic provisions of economic and comparative analysis, forecasting of socio-economic processes. Traditional information processing methods were used to build and evaluate the model, which is based on innovations in the circular business model as a tool for applying rational consumption of the natural resource landscape. The research is

TABLE 1 Characteristics of the landscape concept group.

Type of concept		Concept name	Description
Landscape	Concepts that characterize the internal structure of the landscape	Elements	The simplest components of landscape components, which combine to make up a variety of real-world objects.
		Components	The main components of the landscape, which are represented by fragments of individual geospheres: lithosphere, hydrosphere, atmosphere, biosphere, etc. distinguish between natural and anthropogenic components.
		Connections	Relationships between landscape objects in which changes in water bodies lead to changes in others.
		Integrity	Internal unity of the landscape, its autonomy and a certain independence from the environment. It is determined by the landscape structure.
		Structure	The structure and internal form of landscape organization, which acts as a unity of stable relationships between its components. Landscape structure is the main concept of his theory, which is closely related to the ideas about the stability of the landscape to external influences.
	Concepts that characterize the features of landscape functioning	Sustainability	The ability of a landscape to maintain its structure and the nature of its functioning and environmental conditions.
		Functioning	A stable sequence of constantly operating processes of energy, matter, and information transfer in landscapes, which ensures the preservation of the landscape state characteristic of a long period of time.
		Equilibrium	A state of rest under the action of equal, oppositely directed forces. In natural landscapes, it is provided by the processes of self-regulation and self-organization.
		Self-regulation	The ability of landscapes to maintain at a certain level typical States, modes of operation, and relationships between components.
		Management	Activities to regulate the modes of functioning of landscapes during their economic development and in the process of performing their specified socio-economic functions.

based on legislative and regulatory acts of public authorities, projects, initiatives, directives, and regulations in the field of EU legislation.

Results and discussion

Key definitions

Natural landscape—is a homogeneous natural-territorial complex, the main properties of which are: genetic uniformity and individuality, the same type of geological and geomorphological basis, a natural combination of smaller natural-territorial complexes inherent in it and its special physiognomic features that distinguish it from neighboring landscapes. There are two groups of concepts that characterize the landscape, namely: concepts related to its internal structure and concepts related to the features of its functioning (Table 1).

Scientists consider the landscape as a basic unit of geographical (spatial) analysis of any territory, emphasizing the complex, systematic structure of the landscape. Landscape management includes: selecting the functions performed by the landscape; selecting the landscape to meet certain needs of society; changing the functions performed by the landscape; determining the spatial and temporal requirements of society for the landscape, based on its capabilities. From the point of view of socio-economic development of the territory, natural landscapes are multifunctional natural formations suitable for performing various types of activities. At the same time, the same landscape can

perform several functions simultaneously or in any sequence. Often, the ability of a given landscape to perform functions depends on the nature of the functions. The choice of socio-economic functions performed by the landscape should correspond to its natural resource potential.

According to the modern concept of nature Management, the main functions assigned to the landscape are: resource-reproducing functions, medium-reproducing functions, and environmental functions. Resource-reproducing functions of the landscape are designed to continuously provide human economic activity with the necessary natural resources. Among the reproducing functions are associated with the participation of the landscape in the reproduction of the main physiological and socio-psychological factors of people's lives. Environmental functions are aimed at regulating the activity of the landscape and during its function's resources—and the production environment.

The natural resource potential of a landscape is a measure of the possible performance of these functions. Having determined the natural resource potential of the landscape, it is possible to assess its ability to meet the socio-economic needs of society. At the same time, the natural resource potential of the landscape should not be understood as the maximum reserve of resources, but only the reserve that is used without destroying the structure of the landscape and violating its ability to self-regulate and self-repair. Many authors, including D. D'Amato, C. Achilles, and D. Bochtis, describing the “potential of the landscape,” understand it as the possibility of its participation in meeting the various needs of society (Achillas and Bochtis, 2020). The potential of a landscape, in their opinion, depends on its natural properties, direction, and

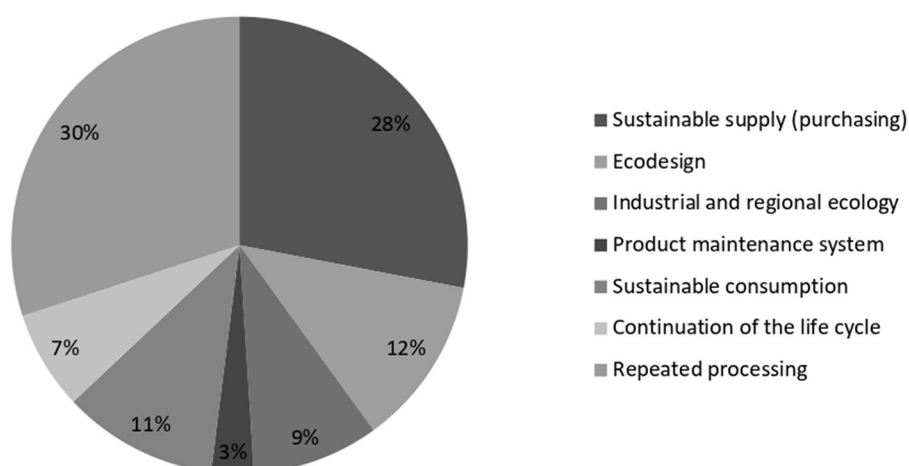


FIGURE 1
Application of the principles of circularity. Source: created by the author.

forms of use. The natural resource potential of the landscape is an integral unity of potentials: biotic productivity, water, mineral resources, construction, recreational, self-purification.

Accordingly, the most common bioeconomic activity in this case is waste collection and processing of various biomass resources into new products. Some companies additionally offer consulting or training. The French Agency for the Environment and Energy Management (ADEME) has proposed its own approach to systematize different fields of activity according to the principles of circularity, dividing them into seven interconnected directions. The studied cases apply one or more principles of circularity in their production activities (Figure 1), and the top three of them, which in sum cover 70% of the studied case, need to be reviewed separately:

- Repeated processing is the practice of reusing, refurbishing, remanufacturing, or recycling materials and components to extend their lifecycle and minimize waste. It ensures that resources remain within the production cycle for as long as possible, reducing reliance on virgin materials and lowering environmental impact;
- Sustainable supply involves sourcing raw materials, components, and services from suppliers that follow environmentally and socially responsible practices. It emphasizes ethical sourcing, responsible resource management, and minimizing the environmental footprint throughout the supply chain;
- Eco-design is an approach to product development that considers environmental impacts at every stage of a product's lifecycle, from raw material extraction to production, use, and end-of-life disposal. The goal is to minimize resource use, energy consumption, and waste generation while maximizing durability and recyclability.

The value proposition of a business model outlines the core products and/or services that an organization offers to its clients (B2B) or consumers (B2C).

Most initiatives focus on transforming biomass into biofuel, biogas, bioenergy, or thermal energy (14 business models), with a similar number focusing on the production of compost or biofertilizers (14). Many businesses create added value through their business models by developing new food products or ingredients, animal feed, beverages, soups, juices, cookies, beer, or powdered milk (D'Adamo, 2022; De Vries et al., 2022).

Less common are models that valorize byproducts into biomaterials for various uses, such as the production of eco-leather, roofing materials, or edible tableware.

We have grouped the favorable factors and obstacles mentioned by companies in the business cases according to five existing categories of factors identified in previous studies of European and international circular business models analyzing waste, byproducts, and losses in the agri-food sector:

- Economic-financial and marketing factors;
- Technical and logistical factors;
- Organizational and spatial factors;
- Institutional and legislative factors;
- Environmental-social and cultural factors.

These factors are grouped and presented in Table 2 with appropriate barriers formulated for each type of them.

The water potential is manifested in the ability of the landscape to use the resulting water not only as vegetation, but also to form a relatively closed water cycle that is suitable for human needs. The mineral resource potential of the landscape is considered to be individual substances, building materials, minerals, and energy carriers accumulated during geological periods, which are used for society.

Such resources in the course of geological cycles can be renewable (forests) and non-renewable (incommensurable with the stages of development of human society and the rate of their expenditure).

Construction potential implies the presence in the landscape of appropriate natural conditions (stable soils, running waters,

TABLE 2 Facilitating factors and barriers of business modeling in the bioeconomy.

Group of factors	Favorable factors	Barriers
Organizational and spatial	<ul style="list-style-type: none"> - Geographical proximity and long-term partnership - Collection of waste and by-products in the community - Closeness, reliability, openness, and involvement of interested parties - Collective waste management - Additional skills - Territorial affiliation - Public-private partnership - Cooperation, networks, partnerships - Knowledge of the retail trade network - Land use control - Development of local supply chains without intermediaries 	<ul style="list-style-type: none"> - Lack of personnel in rural areas - Shortage and complicated procedure for allocating land plots in cities - Environmental permits
Ecological, social, cultural	<ul style="list-style-type: none"> - Media communication - Raising awareness of environmental problems - Development of local brands - Support of local communities—knowledge of customer needs - Consumer loyalty - Consumer interest in new products - The trend of valorization of waste and agroecological initiatives 	<ul style="list-style-type: none"> - The need for new skills and competencies - An opportunistic attitude to the topic of waste processing - Perception
Technical and logistical	<ul style="list-style-type: none"> - Scientific and private partnership of companies - Established logistics - Availability and quality of by-products - Public support and training 	<ul style="list-style-type: none"> - Fluctuations in the amount of waste - Competition for surplus food resources - Lack of technology - Logistic and transaction costs - The time required for scientific developments - Time required for composting - Quality requirements - Limited production capacity - Process scaling
Financial, economic, and marketing	<ul style="list-style-type: none"> - Financial support - State funding - Financial capacity - Participation in fairs for promotion 	<ul style="list-style-type: none"> - Lack of funding - Search for potential investors and donors - Marketing - Investment costs - Transition from free to paid service - Market price dependence
Institutional and legislative	<ul style="list-style-type: none"> - Adequate state regulation and support - Public perception - Climate obligations 	<ul style="list-style-type: none"> - Fiscal restrictions - Normative and administrative barriers

Source: compiled by the authors.

favorable climate, etc.) for the construction of housing, roads and road structures, communications, industrial, and other facilities. Recreational potential—a set of natural landscape conditions that positively affect the human body. Allocate recreational resources and recreational landscapes.

Recreational resources are used for recreation, medical treatment, and tourism, and recreational landscapes perform recreational functions (green areas, Forest Parks, Resorts, scenic spots, etc.). The self-cleaning potential determines the ability of the landscape to decompose, remove pollutants and eliminate their harmful effects (Hansen, 2016).

The biotic potential of regulation determines the ability of the landscape to preserve the gene pool and preserve biological diversity, ensuring its sustainability and recovery.

Integral quantitative characterization of the natural resource potential of landscapes of different territories is complicated by the fact that it is impossible to find a common unit of measurement for different types of Natural Resources. A way out of this situation is sought in the transition from natural indicators to points: individual types of resources are evaluated on a general point scale, and then the points obtained are summed up.

Territorial differentiation of Natural Resources is subject to natural laws, each landscape has a specific and natural combination of resources, that is, it has its own natural resource potential. The circular economy is not limited only to solving the problem of efficient processing of resources and waste, it gives an impetus to the development of the country's innovative potential and the search for new approaches to the organization of production and consumption at all stages of the product life cycle.

The principle of consistency characterizes the fact that a systematic approach based on the theory of system analysis of complex organized objects should be used to study objects and phenomena of the real world and present the results obtained.

The principle of subject-object assessment is the main element of evaluation relations, which provide, on the one hand, the mandatory allocation of the subject of assessment, from the position of which it is produced (for example, agricultural or recreational development of the territory), and on the other hand, its object as the environment in which the subject is located. In our case, it's the natural resource landscape (FAO—Food and Agricultural Organization of the United Nations, n.d.).

In the integral assessment of natural landscape lands, the principle of subject-object assessment is implemented by

conducting two complementary types of research: inventory and analytical. The former make it possible to determine the manifestation of the studied factors and processes within the natural landscape, and the latter allow us to assess the suitability of its lands for anthropogenic development. At the same time, analytical research is based on a multi-criteria approach, which ensures that land valuation is laid down.

The principle of taking into account the priority of factors involved in integral evaluation. The integral assessment of natural landscape lands should take into account the degree of influence of each factor on their suitability.

The principle of unity of Integral assessment, which consists in evaluating within the entire studied territory, which should be carried out according to the same indicators (their type and number), which have the same quality metric scales (evaluation gradations).

The principle of taking into account regional features is that the integral assessment of natural landscape lands should be carried out with a focus on the features of the natural conditions of the region within which the territory under study is located.

Save available natural resources through efficient and rational use of raw material reserves, the use of renewable energy sources, creating favorable conditions for environmental restoration and virtualization of services; increasing the level of rational use of resources by involving them in the secondary cycle of consumption (waste processing); reducing anthropogenic impact on the environment—these are the principles underlying the concept of a circular economy, namely the theory of “four R”: Reduce—Reduce—Reuse—Recover at all levels of production and consumption.

Analysis

Concluding the above, [Figure 2](#) presents the conceptual provisions of innovations in the circular business model as a tool for applying rational consumption of the natural resource landscape. The model consist of two main sections: “Natural Resource Landscape” and “Circular Economy.” The first section presents a

mapping of Natural Resource Landscape’s concepts, functions, and potential, which are detailed listed in in Key Definitions part of the paper. The second part of the model presents a mapping of Circular Economy, which practical side is going to be analyzed.

A deeper understanding of the practical side of the circular economy concept is facilitated by the identification of different levels ([Jesus, 2018](#)), and further detailed consideration of business models and strategies applied at each level. With this approach to the study of theoretical foundations and practical ways to implement the principles of circular economics, by analogy with the traditional approach to stratification of the economic system, the following levels can be distinguished: micro-level, medium-level and macro-level ([Table 3](#)).

On micro-level, circular models used by individual manufacturers (economic agents) using the following methods: “clean production,” new business models (providing services instead of selling products), eco-design (advanced functionality, modular design, reuse of parts, restoration), dematerialization (providing services in digital/electronic format). For example, Patagonia Company has embraced the circular economy through business model, which aims at reducing waste, reusing materials, and offering services to extend the life cycle of its products. The company offers a “Worn Wear” program that allows customers to buy used Patagonia products or trade in their old ones for store credit. They also use recycled materials in their products and encourage repair instead of replacement through their repair program. The company is also focused on producing durable products that will last longer, which aligns with circular economy principles. Patagonia’s commitment to circularity is visible through its “Worn Wear” program, which promotes the reuse of their products, and they encourage customers to repair items instead of discarding them.

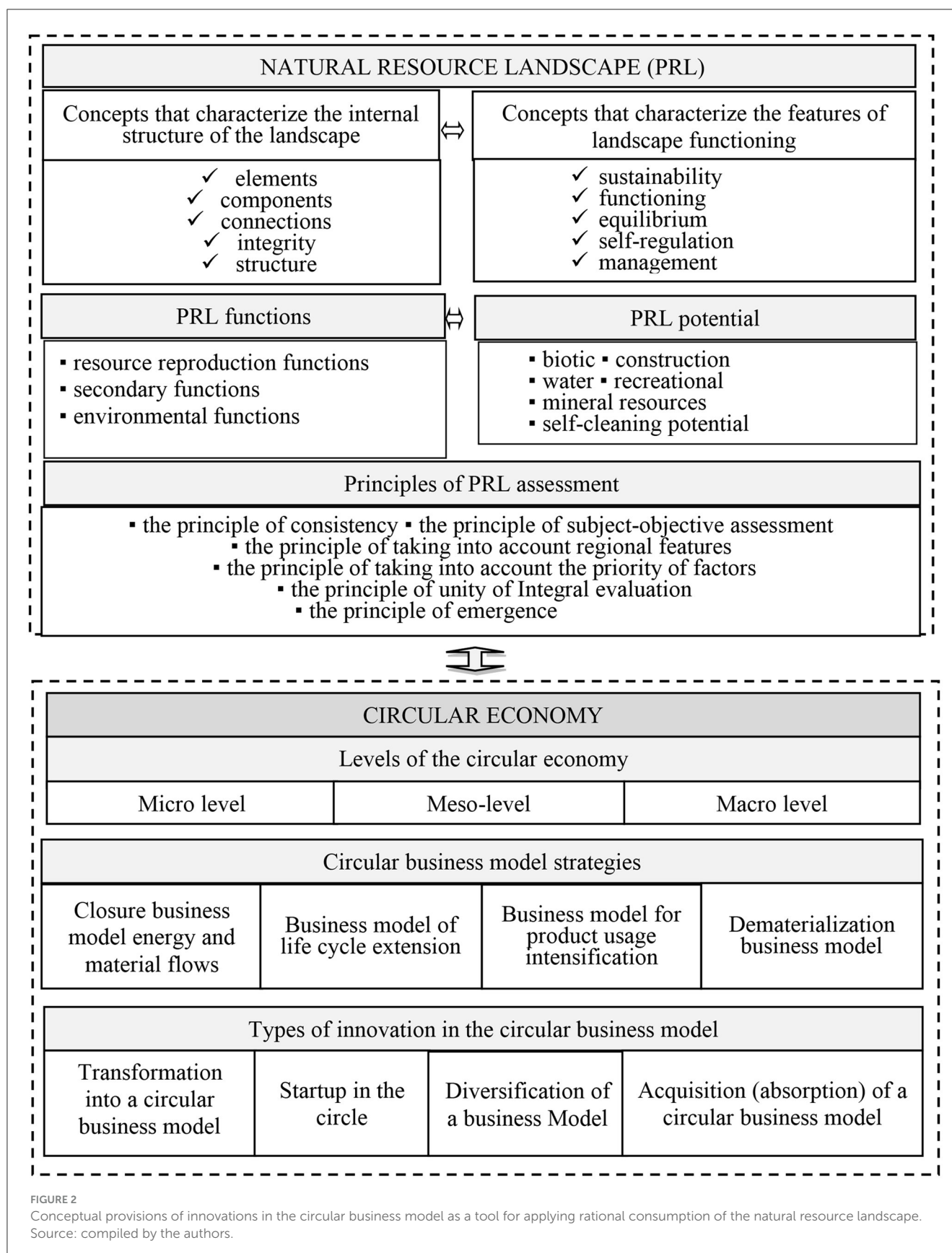
Philips Lighting—Circular Lighting Business Model Philips Lighting (now Signify) has implemented a service-based business model called “Circular Lighting,” which shifts from product ownership to performance-based contracts. Instead of selling light bulbs, Philips provides lighting as a service (LaaS), where customers pay for the light they use rather than purchasing bulbs. This model ensures that Philips retains ownership of lighting products, maintains and upgrades them, and reuses components after their lifecycle, significantly reducing material waste and energy consumption ([Ellen MacArthur Foundation, 2020](#)).

Interface—Closed-Loop Carpet Recycling Interface, a global flooring company, has developed a closed-loop production system known as “Reentry” to recycle used carpet tiles into new products. By integrating recycled materials and bio-based components, Interface minimizes raw material extraction, extends product lifespan, and achieves significant reductions in carbon emissions. This model exemplifies how businesses can align sustainability with profitability by integrating circular economy principles ([Geissdoerfer et al., 2018](#)).

On medium-level, circular models used by cooperatives and individual agent networks: symbiotic dynamism, green supply chains, reverse logistics, extended producer responsibility, urban symbiosis, and eco-settlement. For example, The City of Amsterdam has adopted a “Circular City” program, focusing on reusing resources, reducing waste, and creating sustainable business models. This involves recycling construction materials

TABLE 3 Characteristics of circular economy levels.

Levels	Characteristics
Micro level	Circular models used by individual manufacturers (economic agents) using the following methods: “clean production,” new business models (providing services instead of selling products), eco-design (advanced functionality, modular design, reuse of parts, restoration), dematerialization (providing services in digital/electronic format)
Meso level	Circular models used by cooperatives and individual agent networks: symbiotic dynamism, green supply chains, reverse logistics, extended producer responsibility, urban symbiosis, and eco-settlement
Macro level	Circular strategies applied at the country or regional level: increasing the role of government regulation, developing scientific research aimed at finding opportunities and developing closure economic cycle technologies, resource and waste management



and creating local urban farming projects in cooperation with local businesses.

On macro-level, circular strategies applied at the country or regional level: increasing the role of government regulation, developing scientific research aimed at finding opportunities and developing closure economic cycle technologies, resource and waste management. For example, Sweden aims to create a sustainable waste-to-energy system while minimizing waste sent to landfills. Sweden's government has established a policy that promotes waste sorting and recycling. They have a comprehensive waste management system, and recycling is mandatory in many areas. The country uses the waste that cannot be recycled in a waste-to-energy process to generate power. Public initiatives, such as the introduction of deposit-return schemes for bottles and cans, are widespread. The Swedish recycling system is one of the most successful in the world, with waste being recycled or converted to energy, minimizing landfill usage.

Circular economy is one of the directions of the green economy. A green economy that leads to improved human wellbeing and social equality, significantly reducing environmental risks and environmental deficits. The green economy is achieved through production systems that use labor and natural resources with the smallest "ecological footprint."

Circular economics offers modern approaches to improving the efficiency of resource use, achieving a social effect in the field of consumption of goods due to expanded producer responsibility, as well as reducing the environmental burden. The concept of a circular economy is the practical basis of a green economy and provides for effective models that contribute to the achievement of the goals of sustainable development of society. Business plays a crucial role in the development of the circular economy. Without the transition of enterprises and organizations to circular models, only conscious consumer behavior cannot change the deep processes operating in the economic system. The concept of a circular economy requires the development and implementation of business models that allow you to use as few resources as possible over the longest possible period of time while obtaining maximum value and benefits.

Therefore, businesses and organizations that want to adopt the circular economy model should introduce new types of business models. Innovations in business models are the most important condition for the successful implementation of the main ideas of the circular economy at the organizational level of the enterprise, since they allow you to make changes to the basic logic of business processes, coordinate, and develop incentives from different stakeholders (Schulte, 2013). The issues of developing new and adapting existing business models for working in a circular economy are relevant both from a theoretical and methodological point of view, and in recent years have attracted the attention of an increasing number of researchers in the field of Management, Innovation Management, Entrepreneurship economics, industrial ecology, and other related scientific areas (Economie Circulaire, 2023).

Among possible barriers for circular model implementation it is important to highlight regulatory constraints, potentially high transition costs, and also consumer resistance and other cultural factors. There is a good example of company Decathlon, which faced with similar barriers during their transition to more

circular business model. They work on encouraging customers to embrace circular practices, such as renting or repairing products, required overcoming ingrained habits of ownership and disposability. Navigating varying regulations across different markets and dealing with limited local infrastructure for recycling and waste management posed significant hurdles, which were passed. Also it was important to balancing the costs associated with implementing circular initiatives while maintaining competitive pricing demanded careful financial planning and analysis. Many countries and regions have lack of coherent policies or legal incentives to encourage businesses to shift toward circularity. The absence of well-defined environmental taxation, subsidies for sustainable innovation, and waste management laws can slow down adoption. For example, Ukraine and some other Eastern European countries face fragmented environmental policies, making it difficult for businesses to transition smoothly. Moreover, shifting from a linear to a circular business model often requires upfront investment in new technologies, infrastructure, and workforce training. Small and medium-sized enterprise, which form a large part of the economy in many countries who are developing, struggle with limited access to financing. Governments and international organizations ("Green New Deal") should play a crucial role in supporting businesses through funding programs and incentives. Also in many markets, especially those where disposable consumption is deeply embedded, customers may be reluctant to accept refurbished, recycled, or rental-based business models. Behavioral changes require awareness campaigns, incentives, and shifts in market perception. For example, IKEA's furniture leasing program faced initial resistance but gained traction through sustainability marketing and consumer engagement strategies.

Most often, the innovation of a circular business model is understood as a new business model of an enterprise, or some modified business model of an enterprise that allows you to make the transition from a linear economy to a circular one. For example, Den Hollander and Bakker (2016) conclude that "circular economics-oriented innovative business models include principles or practices from closed-loop economics as a guide for developing a business model. It aims to improve the efficiency and efficiency of resource use and ultimately block the flow of energy and resources by changing the economic value and interpretation of products."

Analyzing the world experience of introducing innovations in business models, we can distinguish four main ways of forming business models in general and circular business models in particular: (1) startup; (2) diversification of the Business Model; (3) transformation of the business model; (4) acquisition (acquisition) of the business model (Geissdoerfer, 2020).

Startups in the circular economy create new business models that provide opportunities for implementing basic strategies (blocking resource and energy flows, prolongation, intensification, and/or dematerialization of resource cycles) outside the existing company. As a rule, these are new companies with their own brand, employees and resources. At the same time, they can be supported by various innovation infrastructure organizations, such as incubators or accelerators. Diversification of the circular business model involves the development of new business models that allow you to implement circular economy strategies based on an existing enterprise, using its resources and partner network. The parent

organization's current business model continues to operate, and new business models are either integrated into the organization as new businesses or stand out as subsidiaries. Diversification can also involve implementing joint innovation projects with other companies and thus creating a common business model for two or more companies. Transformation of the circular business model involves modifying the existing business model (which can be either regular or circular) and including circular business strategies in it. The acquisition (acquisition) of a circular business model involves conducting mergers and acquisitions of an enterprise that has a circular business model. In this case, the business models of the two enterprises are integrated. As a result, the degree of integration of the business models of absorbed and absorbed enterprises may vary.

Organizations can also combine different strategies to innovate in their business models. For example, a company can support startups through an enterprise business incubation program, followed by the acquisition of successful startups to expand its portfolio of business models. In addition, the company can diversify its portfolio by creating new divisions. A company can also completely abandon its core business for a new portfolio or use an acquisition strategy to transform its core business model (Geissdoerfer, 2020).

It is important to note that all of the four circular business models listed above can be combined even in the same enterprise, as well as in the same ecosystem. Currently, the introduction of the circular economy "Green New Deal" ("Green New Deal"), actively promoted by the European Commission, is aimed at strengthening the link between economic and environmental aspects (European Commission, 2019).

An important structural element for the implementation of this strategic agenda is the new action plan for the development of the circular economy. According to this plan, the framework conditions for the implementation of the circular economy are:

1. Eco-Design or environmental design. Eco-design allows you to develop products that are produced with less resources or using recycled and renewable resources, and consist of components that last longer and are easier to maintain, repair, upgrade, and undergo recycling. Eco-design can reduce production costs. If products are designed for a longer service life, their value remains in society much longer. From an environmental point of view, eco-design can help untie the economic growth of resource consumption. Even though, there are could be blockers during this implementation. For example, company Decathlon faced with necessity of balancing product durability, performance, and affordability while adhering to eco-design standards required significant research and development investments (Salvador et al., 2022, 2021).
2. Extend the service life of products and reuse products and components. The EU's seventh Environmental Action Programmed calls for measures related to durability, suitability for repair, reuse and recycling, recyclable content and product life cycle. The 2008 Waste Framework Directive established a five-step waste hierarchy to consider efficient multi-stage waste management technologies. On this step, company Decathlon worked on established repair workshops within its stores,

offering customers services to extend the lifespan of their products. They faced with ensuring the availability of skilled technicians and maintaining an inventory of spare parts across various locations posed logistical challenges (Micheaux and Aggeri, 2016).

3. State support for reuse practices. Reuse initiatives are often supported by specific policy measures such as the establishment of local and regional reuse networks, the development of mandatory quality standards and the definition of warranty obligations, and so on. For example, Decathlon introduced buy-back schemes, allowing customers to return used equipment in exchange for store credit. These products were then refurbished and resold. For the company, it was challengeable to assessing the condition of returned items, standardizing refurbishment processes, and determining appropriate resale pricing required the development of new operational protocols. Good practice for this condition could be establishing of product rental services. Decathlon piloted rental options for various sports equipment, enabling customers to rent products instead of purchasing them outright. However, managing inventory availability, addressing potential product damage, and developing a user-friendly rental system were key obstacles (Pieroni et al., 2019).

In 2015, the European Commission adopted a large-scale "package on closed-loop economics" (Homrich et al., 2017). Its main element is the European Union's action plan for the implementation of the closed-loop economy. Currently, the European Union positions itself as one of the leaders in the implementation and promotion of sustainable development concepts in order to reduce the anthropogenic burden on the environment. As part of the 2015 Action Plan, the European Commission adopted a "closed-loop Economic Monitoring System."

In 2017, at the initiative of the European Commission and the European Economic and Social Committee, the European Circular Economy Stakeholder Platform was established. The platform was created to share experience, knowledge, and ideas on the transition from a linear consumption model to a circular one by establishing partnerships, cooperation, and identifying barriers to the transition to a circular economy. In 2020, the European Commission adopted a new action plan in the field of closed-loop economics, which is part of a large-scale program of the "European Green Course" (D'Amato et al., 2017).

In 2021, the European Commission presented the updated EU Industrial Strategy "Europe 2030: the European Union Framework Program for research and technological development" (European Commission). The strategy focuses on the development of industrial ecosystems, and even identifies the importance of starting a low-carbon economy, sustainable production, and consumption, the so-called cyclical economy. The transition to "a cyclical economy" will allow achieving the EU's Sustainable Development Goals. The Europe 2030 Strategy identifies the following priority areas for the development of the circular economy: plastic production; food waste; raw materials; construction and wear; biomass and Bio-Products (Gatto and Re, 2021); Innovation, Investment, and other activities.

The main elements of the circular economy were studied within the framework of environmentally conscious production

and recycling of products, the high importance of which in the late 1990s was noticed by a number of leading experts with an international reputation, including M. Gungor and S. Gupta, which were associated with the formation of the following four interrelated links that have remained relevant to date: ecological product design, returnable Logistics, closed-loop supply chains and remanufacturing, which are an integral part of the theoretical and practical development of the circular economy. The widespread use of secondary use of products is possible due to its ecological design (Eco-design), which is understood as the process of product development with special consideration for its impact on the environment throughout the entire life cycle (Lacoste et al., 2011). In eco-friendly design, products and their elements are developed with an emphasis on waste-free operation not only during the manufacturing process, product use, but also at the end of the life cycle.

Thus, environmental design is aimed at extending the product life cycle and plays an important role in shaping the circular economy. By the environmental design of the product is based on three principles: first, the establishment of requirements for the design of the product for efficient disassembly and disassembly; second, the use of materials and components for reuse, restoration or recycling; and third, the absence of hazardous substances in the product that may interfere with the possibility of reuse or recycling.

Conclusions

Landscape management plays a key role managing environmental issues. From the point of view of socio-economic development, natural landscapes are multifunctional natural formations suitable for supporting various types of activities. A single natural landscape can simultaneously or sequentially perform multiple functions. However, the selection of socio-economic functions assigned to a landscape should align with its natural resource potential.

The natural resource potential of a landscape should not be understood as the maximum reserve of resources, but only the reserve that is used without destroying the landscape structure and violating its ability to self-regulate and self-repair. To select priority and alternative ways of rational use of natural landscapes, an integral assessment of their natural resource potential is essential.

The purpose of such an assessment is to determine the degree of suitability of natural landscapes to meet various social needs. The ability to innovate quickly and successfully, including innovative business models, can create an important competitive advantage for companies in the face of falling profitability from new technologies, increasing complexity of the external environment and falling cost of capital. This is confirmed by the experience of using innovative digital business models by new technology conglomerates. Innovations in the business model not only potentially lead to higher returns than product and technological innovations, but can also become a kind of “renewable” competitive advantage. Innovative business models allow us to achieve a sustainable competitive advantage, as well as progress in the social and environmental spheres.

The paper introduces a model that aligns economic activities with the sustainable use of natural resources, ensuring the longevity of landscape ecosystems while maintaining socio-economic benefits. It also offers a theoretical framework for assessing the natural resource potential of landscapes. The strategic importance of business model innovation in achieving sustainable competitive advantage has been highlighted. It has been achieved by demonstrating how innovative circular business models can lead to increased profitability, long-term resilience, and enhanced corporate responsibility by providing an examples of implementing circular economy model in private and public sectors. The paper also mentioned barriers of implementing circular economy model. The strategies of overcoming these barriers can be reviewed in future researches.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

NG: Conceptualization, Data curation, Formal analysis, Methodology, Resources, Visualization, Writing – original draft. JM: Conceptualization, Formal analysis, Funding acquisition, Methodology, Project administration, Resources, Supervision, Writing – review & editing. NS: Data curation, Investigation, Resources, Validation, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The author(s) declare that no Gen AI was used in the creation of this manuscript.

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