Circular Economy: Drivers and Barriers to Development – Experience from Other Countries to Vietnam

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Abstract. As resource use is increasing globally, natural resources are nowadays more constraint and expensive, the extraction and usage of resources have a remarkable impact on the environment. The efficient use of resources is at the heart of current policies across countries. All policies recognize the need to improve and enhance human welfare, along with the resource efficiency and environmental protection. Many countries have approached and applied the circular economy model to promote resource efficiency and sustainable development. Vietnam is currently working on establishing a legal framework for the application of circular economy models to production, business activities and daily life. Circular economy is being studied and integrated into economic development policies and strategies at all levels. By the desk research, this paper is aimed to synthesize the drives and barriers of circular economy development. The main findings indicate that (i) the barriers are more than drivers; (ii) government policies, macroeconomics, information and consumers are main important drivers to promote circular production in business; (iv) some successful circular models in Vietnam relate to agricultural fields and (iv) the experience of other countries is meaningful for Vietnam in developing circular economy models and sustainable development.

Keywords: Circular economy · linear economy · barriers · drivers · sustainability

1 Introduction

Resource usage is steadily increasing on a global level. According to estimates by the United Nations Environment Program (UNEP), the number of materials extracted and utilized – including natural resources such as fossil fuels minerals, biomass etc. – increased eightfold over the course of the 20th century, and by 2015 has exceeded 80 billion tons. Forecasts have shown that a growing population, together with an increase in the middle-income group and the relatively wealthy could push the extraction of raw materials to 183 billion tons per year by 2050 [24]. According to EU reports, since 2011 each person in the EU consumes 16 tons of raw materials annually, of which six tons are wasted and half go to landfill. On average, Europeans are consuming resources at twice the rate at which the planet can regenerate them [4].

P. Tra Lam and P. Quang Huy (Eds.): ICECH 2022, AEBMR 238, pp. 320–341, 2023.
https://doi.org/10.2991/978-94-6463-150-0_22

The extraction and usage of resources have serious impacts on an environment. According to the Food and Agriculture Organization of the United Nations (FAO), since 2011 approximately 25% of the land areas become poorer quality or rapidly degraded [10].

Resource efficiency is at the heart of policies today. Improving the efficiency of resource use is also the sustainable development goal of many countries. When the EU economy reduces its total material demand by 17% to 24%, it can boost GDP by 3.3% and create 1.4 to 2.8 million jobs [12]. As consuming resources more efficiently, EU operating profits can be in the range of €245-604 billion per year, representing between 3% and 8% of annual revenue. This achievement would result in a 2 to 4% reduction in total annual greenhouse gas emissions in the EU [1]. Currently, the EU is "Towards a circular economy: a zero waste program for Europe" [8] providing concrete examples of the impact of a circular economy.

The current economic model, which dates back to the Industrial Revolution, must change in order to utilise resources more effectively. The traditional model is based on the "take, make, consume, dispose" linear approach. This model is dependent on inexpensive, swiftly depleting, and useless resources. A circular economy reduces waste while preserving the value of goods, raw materials, and resources for as long as possible.

2 Circular Economy (CE) – A Multifaceted Approach

2.1 A Brief History of Circular Economy Concept

The term 'circular economy' has just been around for a few decades. However, the concept dates back many centuries. This is a concept with many different approaches and expressions, which is continuing to be developed with many potential prospects. Ideas about the material circulation have appeared since the 18th century. In the 60s of the twentieth century, Boulding compared our earth to a spacecraft in space and made the point that a circular economy must be developed to ensure the long-term survival of humans on the planet earth [15]. Thus, the "circular economy" also emerges from the background of "scarce resources", exploiting and using scarce resources in the most effective way.

The "circular economy" is actually an idea that has been widely practiced and popularized in the past in the form of prudent and efficient resource handling. In agriculture, the farmer worked in a closed regeneration system, using all the remaining substances in the waste stream (in Vietnam it is the VAC model). For producers and consumers, the reuse and recycling of products has become popular because all kinds of materials have certain values (recycled products, environmentally friendly products, green products, etc.)

The Industrial Revolution altered the relationship between individuals and matter, marking the beginning of linear thinking or the linear economy. After the Second World War (WWII), the linear economy began to prevail [17]. This development is a negative sit that worries experts.

Circular economy is a 'dynamic' concept, now widely accepted since it calls for consideration of the environment, the economy and the welfare of society. Cyclicity plans a strategy to address the current linear model based on constant growth and increase

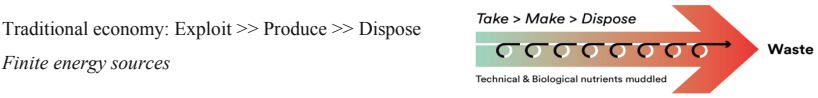


Fig. 1. Linear economy

in extraction and use of resources, leading to environmental deterioration and excessive consumption of natural resources (Fig. 1).

There are many different approaches and expressions about the circular economy. According to Julian Kirchherr et al. (2017), there were about 114 different concepts of the circular economy [14].

CE concept by the Ellen MacArthur Foundation (2012): "CE is a restorative and regenerative system through proactive planning and design. EC replaces the concept of 'end of life' of materials with the concept of restoration, shifting towards the use of renewable energy, eliminating the use of harmful chemicals that cause harm to reuse activity and reducing waste through the design of materials, products, engineering systems and business models within its scope" [5].

The United Nations Industrial Development Organization (UNIDO, 2017) considers that "CE is a way to create value, and moving towards the ultimate goal of prosperity, which works by extending product life cycles through improving design and maintenance, moving waste from the end of the supply chain back to the beginning, and so on, thereby using resources more efficiently by using them multiple times, not just once" [25].

Geissdoerfer et al. (2017) gave a specific view of CE, "a system in which inputs and wastes, emissions, and energy losses are minimized through slowing down, narrowing, and closing the motions of materials and energy. This can be achieved through long-term design, maintenance, repair, reuse, remanufacturing, renewal and recycling." [11].

The concept of a circular economy covers the most general meanings: 'a renewable, circular, closed system in which resource inputs and waste, emissions and energy leaks are minimized, while redesigning and reusing the preferred products' (Fig. 2).

In a narrow perspective, circular economy mainly focuses on the waste problem, whereby waste recycling will help reduce dependence on resources, and at the same time reduce environmental pollution to ensure long-term sustainable development of the whole economy.

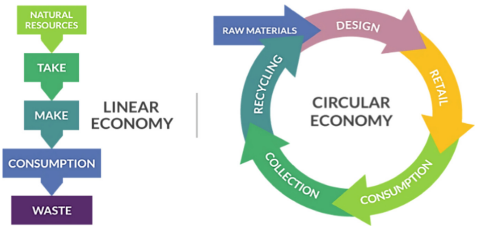


Fig. 2. Linear economy and circular economy

The circular economy, in a broader perspective, is not only about waste issue but also includes the entire operation of the economy from input material selection, production, consumption, to consumption of secondary raw materials. This perspective approaches the circular economy according to 4 stages of the product life cycle (ERP, 2017), including:

1) Production, especially focus on the design stage
2) Consumption
3) Waste Management
4) Secondary Raw Materials.

In Vietnam, Circular Economy is clearly stated in Article 142 of the Law on Environmental Protection, No. 72/2020/QH14, approved by the XIV National Assembly, 10th session on November 17, 2020, effective from January 1, 2022.

> *"Circular economy is an economic model in which design, production, consumption and service activities are aimed at reducing the extraction of raw materials, prolonging the product life cycle, limiting waste generation and minimize the negative impact on the environment".*

Circular economy is not only the reuse of waste, or considering waste as a resource, but is the connection between economic activities in a pre-calculated manner, thus forming cycles in the economy. The circular economy can keep the material flow in use as long as possible, restore and regenerate products and materials at the end of each production or consumption cycle [20]. On the other hand, the process of building a circular economy requires technology and innovation to effectively reuse resources, which is not only beneficial for the environment but also for the competitiveness of enterprises [18].

2.2 The Nature of Circular Economy

CE is a restorative and regenerative economic system by changing the way goods and services are designed, produced, and consumed. Thereby, prolonging the life of materials, transferring waste from the end of the production or consumption cycle return to the beginning point, minimizing negative impacts on the environment. CE is not a uniform model for the economy but it is many different models built under the same philosophy, which is the philosophy of Regeneration and Restoration. CE has 3 basic principles, including:

Preserve and develop natural resources through control, in order to use resources and regenerate natural system, especially accelerating the use of renewable energy.
Maximize the benefits of resources by circulating products and materials as much as possible in technical and biological cycles.

Improve the overall performance of the system by minimizing negative externalities, through waste design, pollution design from the beginning of the production process.

The driving force behind the shift to a circular economy can be understood as the iterative processes of creating new systems and upending long-established ways of thinking, acting, and organizing. This change leads to increasing pressures for the establishment of a 'new system', in which the non-transformable elements of the old system are dismantled and gradually removed.

The transition to a circular economy frequently results in initiatives that preserve the value of products, raw materials and resources for as much time as possible. Manufacturers use new "circular" business models to accomplish this, focusing on maintained ownership. Examples include leasing operations, renting or selling services rather than commodities, or dividing cost and benefit proportionally among partners.

When it comes to circularity, it is important to make a clear distinction between two physical cycles: the biological cycle and the technical cycle [5]. Biological cycles are based on biologically based biodegradable raw materials that, with proper management, can be sustainably reintroduced to the biosphere, either directly or through a series of subsequent uses. Technical cycles include man-made materials, such as metals, polymers, and synthetic compounds. These materials are made from limited, non-renewable resources that cannot be regenerated naturally at the same rate as when they have been depleted. For materials' values to be preserved and unaltered, they must be constantly circulated through the system (Fig. 3).

This suggests that the industry must maximize profits by reusing components and products instead of the outdated strategy that reduces the cost of recycling and disposing of commodities. By using "design for re-design" strategies and maximizing the possibility of product reuse and material recovery, such outcome can be accomplished.

For a simple and straightforward understanding of the nature of circular economy, Jacqueline Cramer (2020) developed a tool called the circularity ladder of 10 R's. This ladder describes and reflects the ambition level of circular strategies. The 10 R's scale raises awareness of circular economy, which not only require recycled waste, but strategies that are higher up on the scale must have lower environmental impact [13].

Therefore, the highest priority must be placed on rejection of use, followed by reduction in use, meaning a decrease in the material used for each product. Next, product consideration from a circular perspective should be prioritized, in addition to options such as reuse, repair, refurbish, remanufacture, and relocate products. Following is the recycling of materials and resources. In the end, any leftover waste that is unable to be

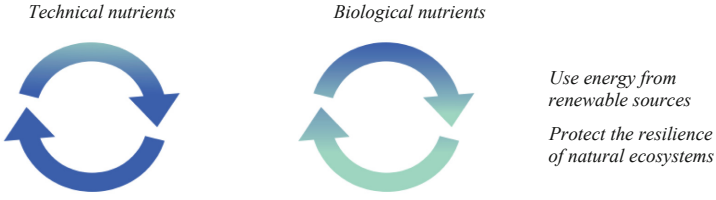


Fig. 3. The two material cycles

Table 1. Level of circularity: 10 R's

Circular economy High Low Linear economy	Smarter product use and manufacture (R1 – R3) Extended lifespan of product and its parts (R4 – R8) Useful application of materials (R9 – R10)	Order of priority High to Low 1. Refuse: Prevent raw materials' use 2. Reduce: Decrease raw materials' use 3. Redesign: Reshape product with a view to circularity principles 4. Reuse: Use product again (as second hand) 5. Repair: Maintain and repair product 6. Refurbish: Revive product 7. Remanufacture: Make new from secondhand product 8. Re-purpose: Reuse product but with other function 9. Recycle: Salvage material streams with highest possible value 10. Recover: Incinerate with energy recovery

Source: [13]

recovered should be burned for power generation, even though this is not included in a circular economy (Table 1).

Linear transformation into circular products means not only technical innovation but also a whole new organization of the product chain. Since materials and elements should be reused and recycled, other providers need to be involved as well. During the production phase, the manufacturing process is required to undergo thorough modification to the design specifications and, after use, a collection, recovery, and/or reuse system is required for the product to have a second life cycle. When the reuse of product is not available, the resources should be recovered at their maximum potential value and given back to the manufacturer to create a new product from the recovered resource. To generate a profitable business, a new financial structure is needed that is economically appealing to all parties involved.

These various steps of redesign, reuse, and recycling cannot be organized by a single company and must be contributed by all stakeholders. This requires the coordination of suppliers, to obtain input materials or components with environmentally friendly and customer-friendly features in the supply chain. Cooperation with organizations like universities, consulting firms, and research institutes is crucial because this also calls for new knowledge and abilities (such ecological design and lifecycle thinking). Furthermore, governments are frequently required to establish the necessary prerequisites. Government can support the promotion of circular products as an initial customer in addition to eliminating economic and regulatory barriers and promoting circular projects through innovation funds and other approaches. Lastly, the adoption of circular products can benefit from the involvement of civil society and corporate clients.

The circular economy, therefore, involves systemic adjustments in neighborhoods, cities, regions and product chains, which means governments, producers and consumers have to adjust. It is a collective process: no organization, individual, or government agency can create change on its own. Preparing the transition system to a circular economy requires alignment and collaboration between various stakeholders. It starts with the frontrunners taking the lead; then, practical activities should be replicated and integrated. This process does not happen on its own but requires a new form of governance known as network governance, in which different stakeholders link and collaborate to make

Fig. 4. 17 Sustainable development goals (SDGs)

changes from system to system - from a linear economy to a more circular economy. In this case, a conversion intermediary is usually necessary to coordinate the process.

2.3 The Differences Between Sustainability and Circular Economy

The two notions are fundamentally global in scope and share concerns about how contemporary industrial production, consumption, and technological advancements may endanger both current and future generations. Both concepts also emphasize the significance of properly combining environmental and social aspects with economic development. These concepts locate changes at their core system level (Fig. 4).

However, sustainability, which is far more comprehensive than a circular economy, encompasses many of the goals outlined in the 17 Sustainable Development Goals [26]. These goals range from poverty alleviation to ensuring responsible consumption and production.

3 Circular Economy Policies and Models in Vietnam

Law on Environmental Protection, No.72/2020/ QH14, approved by *the XIV National Assembly of the Socialist Republic of Vietnam at its 10th session on November 17, 2020*, taking effect from January 1, 2022, clearly stipulating the circular economy, and the competent authority to implement.

Article 142: Circular

1. Circular economy is an economic model in which design, production, consumption and service activities are aimed at reducing the extraction of raw materials, prolonging the product life cycle, limiting waste generation and minimize the negative impact on the environment
2. Ministries, ministerial agencies and provincial People's Committees shall incorporate circular economy immediately at the stage of formulating a development strategy, planning, plan, program or project; managing, reusing and recycling waste.
3. Every business shall establish a management system and take measures to reduce extraction of natural resources, reduce waste and increase waste recycling and reuse from setting up a project and designing a product or commodity to production and distribution.

4. The Government shall elaborate on criteria, roadmap and mechanisms for encouraging the implementation of circular economy in conformity with the national socio-economic conditions.

The Law on Environmental Protection in 2020 has institutionalized several mechanisms and policies to promote the circular economy such as: waste separation at source, collection of waste fees based on volume, recycling and reuse of waste; extended liability of the manufacturer; economic tools and policies such as natural resources tax, environmental protection fee; green procurement, green credit, green bonds, carbon market development, environmental industry development, environmental services.

Some legal documents related to Circular economy:

- Directive 36/CT-TW dated June 25, 1998 of the Political Bureau on strengthening environmental protection in the period of industrialization and modernization of the country, clearly stated the need to "issue tax and credit policies to support the application of green technologies" and "applying green technologies with low level of waste, low consumption of raw materials and energy".
- Resolution No. 41-NQ/TW dated November 15, 2004 of the Political Bureau stating "Encouraging recycling and the use of recycled products" and "Step by step applying measures to force production and import facilities to recover and process used products".
- Directive 29- CT/TW in 2009, Strategy for Socio-Economic Development 2011–2020, Resolution 24-NQ/TW dated June 3, 2013 on Proactively responding to climate change, strengthening resource management and environmental protection also continue to emphasize and detail the above tasks.
- Resolution No. 27/NQ-CP dated June 12, 2009 of the Government also set out solutions for the development of the environmental industry, guiding the implementation of greener production, application of green and environment-friendly technology, changing the industrial production model towards sustainable, green-oriented industry.
- Law on Environmental Protection 2005 and 2014, 2020 stipulates a number of articles on environmental protection, including extraction, rational and economical use of natural resources, promotion of recycling, reuse and waste reduction.
- Vietnam Sustainable Development Strategy 2011–2020, Environmental Protection Strategy to 2020, vision to 2030.
- Green Growth Strategy, Decree 38/2015/ND-CP, Decision 16/2015/QD-TTg and especially Decision 491/QD-TTg on Adjustment of the National Strategy on Integrated solid waste management in 2018 are typical policies, demonstrating the policy shifts in the direction of a circular economy of Vietnam.

In fact, Vietnam does not have a complete economic model, but in terms of goals and content, there have been business models or methods bearing the expression of this model early. Following table shows the actual manifestations of the applicable solutions to implement the CE in a number of industries and fields in Vietnam (Table 2).

Vietnam has a number of models showing the approach of the circular economy such as collecting and recycling scrap metal, paper, plastic… And in agriculture, there are models of Garden-Pond-Livestock Pen (VAC), Garden-Forest-Pond-Livestock Pen

Table 2. Manifestations of the circular economy by a number of industries or fields in Vietnam

No.	Sector	Example
1	Agriculture	VAC model (garden – bond-barn) Biomass model Dairy cow farming (Vinamilk) Collect agricultural waste such as bark, rice husks Bio-aquatic model (Seafood aquaculture)
2	Extraction	Efficient use of waste, soil circulation, tree planting, water circulation
3	Processing industry and manufacturing	Water circulation, material waste circulation, Secondhand shops
4	Water supply, waste and sewage management and treatment	Collect waste from households.
5	Construction	Circulation of construction waste

Source:[16]

(VRAC), Gas recovery from livestock waste, biogas, cleaner production models in small, medium and micro-scale industrial production, etc.

These models are all aimed at reducing waste through material circulation that is economically beneficial. However, the reuse and recycling of waste is mainly driven by economic forces and job creation. Very few models solve environmental pollution, even these models are the cause of serious environmental pollution, specifically in craft villages that recycle iron, paper, plastic, lead, etc. The main reasons are that the recycling technology in craft villages is old-fashioned and outdated, poor infrastructure, small production scale, limited awareness of people and production facilities of the harmful effects of pollution.

Recently, there have been a number of new models, moving closer towards the Circular Economy, which are ecological industrial park models in Ninh Binh, Can Tho and Da Nang, saving 6.5 million USD/year; "Zero Waste to Nature" idea initiated by VCCI; initiative to recycle Tiger beer caps into iron to build a bridge in Tien Giang (helps recover iron); grass and rice straws to replace plastic straws (helps reduce plastic emissions), HEINEKEN company's CE initiative to reuse beer caps as iron and reduce waste; model of recycling plastic waste as construction materials of the company Upp!; model of processing aquatic by-products (shrimp shells, shrimp heads, etc.); Packaging Recycling Organization Vietnam (Pro Vietnam) consists of 9 companies: Coca-Cola Vietnam, Friesland Campina, La Vie, Nestlé Vietnam, NutiFood, Suntory PepsiCo Vietnam, Tetra Pak Vietnam, TH Group and URC Vietnam, the business community actively responds to the circular economy model with a commitment to fully implement the recycle in Vietnam by 2050 (Table 3).

Vietnam has been trying to build a model, but there has not been a strong spread in the community, the implementation of circular economy has only been implemented by a few FDI enterprises and applied different models for recycling waste and reduce

Table 3. CE models implemented in Vietnam

No.	Implemented CE model	Comment
1	Eco-industrial park	Successfully implemented in some provinces
2	Garden-Pond-Livestock Pen model (VAC), gas recovery from livestock	Successful
3	Clean production model on small and medium scale	Successful
4	Replace plastic straws with grass or rice straws	Not widely implemented
5	Collect waste fees by volume	Unsuccessful
6	Sorting waste in urban areas	Not widely implemented
7	Colelct batteries and electronic devices	Not widely implemented

Source:[20]

non-recyclable waste. The models show that the success only appears in agriculture, but in production, there is still no clarity in the implementation of the concept of economics in 4 stages: (1) production (including design and implementation), (2) Consumption, (3) Waste management, and (4) Transforming waste into resources.

Besides, CE model produce dishes from banana leaves, lotus leaves, bamboo leaves and especially recently, using sea buckthorn leaves (tra leaves) and export to Poland in Nghia Hanh town, Quang Ngai Province. VAC model with closed farm system raising pig, cow, chicken. Pig pens, chicken coops interspersed with barns for raising earthworms, surrounded by orchards, growing vegetables, growing rice, etc. in Pho Yen town, Thai Nguyen province. There are two famous CE models in agriculture are "green CE" at Vinamilk, producing milk products and T51 farm, raising cows and growing crops.

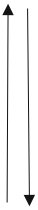
4 Drivers and Barriers to Circular Economy

4.1 Drivers to Circular Economy

The circular economy has many significant benefits: (i) Better quality of living environment compared to the linear economy, ensuring the quality of supply of essential natural resources; (ii) Promote the acquisition of new knowledge and skills; (iii) activating innovation and creating new businesses and jobs.

Recent research on the impact of the circular economy on the labor market estimates that EU GDP will grow by 0.5% in 2030, thus generating approximately 700,000 additional employment. For private firms, the circular economy may open up new and cost-effective market prospects. For example, as resource productivity and competitiveness increase, along with manufacturers' responsibility for their products throughout their lifecycles, consumers can purchase higher quality circular products and services, and suitable for reuse and recycling.

Table 4. Drivers to stimulate businesses to become more resource-efficient

External drivers (increasingly external)		Internal drivers (increasingly internal)
o Consistent policies and measures o Taxes, levies and charges o Regulations o Macro-economics and volatility o Material and commodity prices o Consumer specifications o External support and assistance o Positive customer feedback o Information on benefits of RE		o Sustainability and leadership o Corporate responsibility o Business risk and resilience o Shareholder pressure o Competitiveness o Cost savings and avoided costs o Positive attitudes and cultures

Source: Summarized from [1, 16]

Table 5. Summary of clusters of drivers by Govindan and Hasaganic

Driver cluster	Examples
Policy and economy	Government laws and policies compel firms to act; potential for increased revenues due to increased efficiencies may encourage firms to act.
Health	Public and animal health is compromised by pollution – to the extent that CE can reduce pollution it will have health benefits.
Environmental protection	Environmental damage is caused by consumption of energy and extraction of the Earth's resources. To the extent that CE enables the more efficient use of the Earth's resources it can reduce such damages.
Society	CE is required to support increasing population, and increasing urbanisation, sustainably; CE will create jobs; customers increasing knowledge and demands for sustainable products.
Product development	CE will improve efficiency of material and energy use in the supply chain; longer lasting products will be higher quality and therefore increase their value.

Source: [16]

Drivers to circular economy can be divided into external and internal drivers [1]. External drivers relate to government policies, macroeconomics, customers, market price and information, that businesses cannot control and have to adapt those changes. Internal drivers relate to factors that business can be manage, make a change, or adjust them (Table 4).

Similarly, Paul Ekins et al. (2020) indicate the drivers could be policy and the efficiency of economy, pollution, environment protection, society and product [16].

In short, the drivers relate to the efficiency in resource uses, which are less environment pollutions, less affect to people's health (Table 5).

Drivers to CE of Vietnam

In order to implement the sustainable development goals and international commitments

that Vietnam has made, the approach to model transformation from "linear economy" to "circular economy" should be considered a priority in the new development stage of the country.

After 35 years of renovation, Vietnam has risen to become a growth bright spot in the region and the world with many remarkable achievements such as grows in size, the quality of growth is improved, the material and spiritual life of the people is improved. Economic growth rate of Vietnam is 6,23% in 2020, 2,6% in 2021 and estimated 7,5% in 2022. With the population of nearly 99 million people by 2022, Vietnam will be a large market for goods and consumes a huge materials.

Due to the economic development process, Vietnam is facing many challenges such as resource depletion, pollution, environmental degradation and climate change. Vietnam was ranked 4th in the world in terms of plastic waste, with 1.83 million tons per year. The volume of daily-life solid waste generated is more than 61,000 tons per day, of which up to 71% of the total waste volume (equivalent to 43 thousand tons/day) is treated by burial method [23]. Many resources are currently in serious decline, typically coal. Since 2015, Vietnam has had to import coal. It is forecasted that by 2030, Vietnam may have to import up to 100 million tons of coal per year. In particular, Vietnam is among the most vulnerable countries due to pollution (air pollution, water and solid waste pollution). And it is forecasted that climate change and natural disasters can cause damage up to 11% of Vietnam's GDP by 2030.

Some international agreements have been an important legal basis for mobilizing the whole society to respond to climate change. (i) The Paris Agreement on climate change in November 2016: Vietnam committed to cut carbon emissions by 8% by 2030 compared to the normal development option or 25% with international support. (ii) Climate Change Summit on November 1, 2021 in the United Kingdom (COP26): Vietnam's strong commitment to climate change to net "zero" emission and participate in committed to reducing methane emissions at least 30% by 2030 compared to 2020.

Vietnam is aiming to be carbon neutral by 2050. Therefore, to obtain this goal, Vietnam's renewable energy development strategy to 2030, vision to 2050 in Decision No. 2068/QD-TTg dated November 25, 2015 by the Prime Minister has identified and encouraged the mobilization of all resources to promote the development and use of renewable energy resources. Orientation of Vietnam's national energy development strategy to 2030, with a vision to 2045 in the Resolution No. 55-NQ/TW of the 12th Politburo dated February 11, 2020 emphasizes to "develop synchronously, rationally and diversify types of energy, prioritizing exploitation, exhaustive and efficient use of renewable energy sources, new energy, and clean energy", set the task of "establishing breakthrough mechanisms and policies to encourage and promote the strong development of renewable energy sources in order to maximally replace fossil energy sources.

The rapid economic development, large population, along with some international agreements to minimize enviromental pollution and climate change will be important legal basis drivers for mobilizing the whole society to transform from "linear economy" to "circular economy".

Table 6. Barriers to businesses becoming more resource-efficient

External barriers (increasingly external)		Internal barriers (increasingly internal)
o Inconsistent policies and messages o Lack of clear pricing signals o Lack of consumer demand o Supply chain constraints o Thresholds in technologies and infrastructure capacity o Physical limitation (e.g location/ space) o External support and assistance	↕	o Incentives to invest o High cost and low ROI o Access to capital o Lack of targets and benchmarks o Business and commercial model o Knowledge and expertise o Competing priorities o Internal capacity and resources o Habitual behavior o Negative attitudes and cultures

Source: Summarized from[1, 16]

4.2 Barriers to Circular Economy

However, the practical application of a circular economy is not simple and easily implemented. Many major barriers still impede the transition. Some of the external and internal barriers can be explained from the individual's perspective. Habitual behavior of the individual may become a strong ele that limits CE practices. However, the individual habit itself is often formed and cultivated (at least initially) by external conditions.

Diaz Lopez et al. (2019) explore the relationship between resource efficiency measures, CE business model, changes and performance barriers in 143 cases [19]. They categorize implementation barriers in Table 6.

Drivers and barriers are classified by Govindan and Hasaganic (2018) in terms of both societal and individual consumer-level factors. Meaningful extensions to this categorization contain the role of 'cultural and social' issues, which may include a company's relationship with other companies, along with people's values and beliefs, such as 'the thrill of newness' or negative perceptions of refurbished or remanufactured products, as a potential obstacle to the uptake of such products. The authors' research further includes more general social objectives among their drivers, such as environmental protection, economic expansion, and job creation [19]. The classification of barriers by Govindan and Hasaganic (2018) are summarized in Tables 7 and Table 8.

The OECD (2019) surveyed 34 cities and regions, and discovered a list of 'obstacles to a circular economy transition' (Fig. 5), which identifies comparable themes with many of identified by other studies presented here. Cultural barriers, regulations and financial challenges are widely cited as obstacles. Information, awareness, and engagement also ranked highly, as did political will and holistic vision (Table 9).

According to Jacqueline Cramer (2020), there are six fundamental barriers to radical change [13]:

1) Institutional (vested interests)
2) Organizational (lack of coordination)
3) Legal (legislation hampers innovation)
4) Economic (focus on current business models; external costs not included in prices)
5) Behavioral (reluctance to change attitude)

Table 7. Main categories of Implementation Barriers for resource efficiency

Barrier type	Definition	Examples
Institutional	Barriers caused by (e.g. political) institutions framing the "rules of the game".	Regulations and laws, fiscal measures, conditions for investment.
Market	Market conditions, economic climate, and value network conditions.	Monopolies, lack of information, subsidies, supplier leverage, relative cost of labour, materials and energy, etc.
Organisational	Firms as social systems influenced by goals, routines, organisational structures, etc.	Company strategy or focus, lack of funds, lack of management systems, etc.
Behavioral	Individuals' values and attitudes within companies.	Lack of attention, lack of perceived control, lack of information, risk averse nature of existing market actors, etc.
Technological	Availability or lack of knowledge, technical artifacts or knowhow.	Lack of equipment or other tools, undeveloped technology from the market, cost of technology, unable to support technology, etc.

Source: [19]

6) Technical (resistance to renew)

These barriers show that the transition to a circular economy is a complex process. It implies a radical transformation of existing patterns of production and consumption, in which new circular businesses are developed and linear businesses are broken down. In fact, it is a revolution comparable to the internet revolution and the current biotech revolution. Perhaps many people still can't envision exactly how the world's energy and matter cycle technologies will appear in 30 years, but they will certainly be different from today. This transformation will require breakthrough innovations, both technical and social, and new business models. Such innovations are still in their infancy and need to be nurtured and developed.

Barriers to CE of Vietnam

At the macro levels such as institutions, policies and regulations, Vietnam has not an adequate legal framework for circular economy development: (i) not have a set of criteria to identify, evaluate, summarize and provide an accurate classification of the development level of the CE; (ii) the implementation of legal documents is still not effective and there is still a long way. There is not a complete set of standards and technical regulations on products, goods and waste to serve as a basis for applying the measures of the eco-economy; (iii) Markets for the environmentally friendly products, recycled products, and market for raw materials, secondary fuel have not been really interested and supported to operate. Clean production, responsible production, clean consumption, and sustainable

consumption are still concepts stated in policy orientations and legal documents but have not been widely applied in practice.

Vietnam lacks of financial resources, that required to make the transition to CE are huge, but the reality is still far from satisfying.

Table 8. Summary of clusters of barriers by Govindan and Hasaganic (2018)

Barrier cluster	Examples
Governmental issues	Ineffective, insufficient or unsupportive policies; lack of performance indicators; unclear vision.
Economic issues	Weak incentives, lack of internalisation of external costs; high upfront costs and insufficient short-term benefits prevent investments; resource-efficient options can be more expensive.
Technological issues	Product complexibility inhibits separation of materials making recycling harder; challenges monitoring product quality throughout the lifecycle, and maintaining product quality with recovered or remanufactured materials; lack of accurate information in tracking material composition of products to enable recycling and remanufacturing.
Knowledge and skills issues	Lack of public information and awareness to support participation in reuse/ recycle/ remanufacturing; lack of necessary skills in workforce; consumer awareness about refurbished or remanufactured products – perception that quality is lower.
Managment issues	Lack of interest or leadership on circular economy within firms at management level; higher priority given to other supply chain issues; organisational structure within firms inhibit implementation of CE practices.
Circular economy framework issues	Lack of successful business models; complexity of transnational supply chains, including for waste management; tendency to focus on recycling when other CE practices might be more beneficial.
Cultural and social issues	Lack of good relationships in supply chain; linear technologies and practices deeply rooted; negative customer perceptions of remanufactured products; 'thrill' of newness.
Market issues	Challenges to operating take-bak systems with multiple companies involved, and legal problems for service providers retaining the sold product; lack of standards and variable quality of refurbished products; lack of consumer acceptance of 'service' rather than ownership models; remanufacturing requires experience and knowledge.

Source: [19]

Table 9. Barriers to resource efficiency/circular economy

Barriers that inhibit otherwise financially positive resource efficiency actions	
Barrier	Notes/examples
Lack of information, or imperfect information	Consumers with incomplete information on efficiency of e.g. energy-consuming appliances, are impeded from making what would be a rational economic, as well as resource-efficient, choice.
High upfront costs and financial risk	Some resource-efficient investments might be financially positive in the long run but are not made because the upfront costs cannot be met, or the rate of return is not high enough.
Habits, lack of pre-existing relationships	Some resource efficiency gains can be achieved by maximizing synergies and coordinating materials and supply chains between multiple actors – but pre-existing habits and lack of relationships can inhibit identification of such opportunities.
Barriers because of which resource efficiency actions would not be to the private financial benefit of the actors concerned	
Barrier	Notes / examples
Split incentives	In such cases, the actor who is in the position of being able to make a resource-efficient decision or investment, would not personally stand to benefit financially, even though others would. Examples include landlords not having the incentive to provide energy-efficient properties, in cases where tenants pay the energy bills; or manufacturers not having the incentive to design products amenable to recycling or remanufacturing, because they are not exposed to the costs of waste disposal.
Incomplete pricing of externalities	Even if resource-efficient behavior may be to the larger benefit of society and the environment, by reducing pollution and resource depletion, if such negative impacts do not have a financial price, then resource-efficient behavior may not be in the financial interest of a private actor. If the cost of labor is high relative to the cost of materials, this can also mean that resource-efficient choices are not financially efficient to individual actors.

(*continued*)

Table 9. (*continued*)

Barriers that inhibit otherwise financially positive resource efficiency actions	
Risk perception associated with long-term investments	Investments in new and innovative resource-efficient processes and technologies may not make sense in the short term, assuming that the status quo of current economic structures remains in place; however such investments would be rewarded under a future, fundamentally restructured system. Such investments would then require for their justification some level of faith in the forthcoming evolution of such a broader system, and would be inhibited by the risk perception of such wider changes not coming about.
Secondary barriers: 'managing the transition'	
Barrier	Notes/examples
The potential for 'losers' as a result of CE	Even though CE may deliver economic benefits through savings of material costs, benefits may not be evenly spread. Sectors, regions or countries dependent on extractive industries would stand to lose, as would actors who would be required to make efficiency investments from which they are spared in the status quo, due to split incentives. Such 'losers' may therefore resist the transition, creating a secondary barrier which will also need to be negotiated.
The 'rebound effect'	If CE measures result in cost savings, it is possible that the extra money could be spent by actors on other resource- or energy-intensive products that would negate the original material or energy efficiency savings.

Source: [19]

Vietnam has been shortage of technology and qualified experts in the field of CE. CE requires a team of good experts to handle from the design stage to the final stage of reuse and recycling of waste. Currently, these experts are untrained and have no specialized training. The circular economy is associated with technological innovation and model design Vietnam is a developing country, most of the technology is outdated, and the production scale is small.

CE requires knowledge and cognition from individuals to organization: (i) understanding the true nature of the circular economy from design to implementation at all levels remains a challenge; (ii) awareness and attitude of people and organizations about saving resources and environment-friendly products is still a big challenge; (iii) environmentally friendly behavior of producers and consumers is not yet popular.

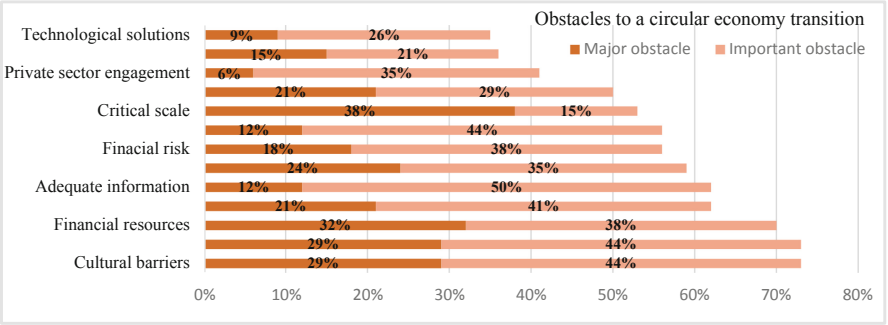


Fig. 5. Obstacles to a circular economy transition in 34 cities and regions [16]

Many enterprises have transformed their business models in the direction of circularity based on regulations and policies on sustainable development such as National strategy for green growth; the National action plan on sustainable production and consumption; Strategy for greener production in industry etc.,

However, a survey of 508 enterprises in Vietnam shows that the implementation of circular economy in business in Vietnam is still limited and sporadic, with 51%–66% of enterprises not yet applying it and only 3–5.5% doing so successfully; enterprises' awareness of circular economy and circular business model is inconsistent: nearly 80% of awareness according to common perception; 60–70% of enterprises believe that circular economy and business play an important role. Enterprises' understanding of circular business is limited, only 20–30% clearly understand circular business, and only 3–6% understand it thoroughly 63–71% of businesses claimed that the policy was unclear and 55–65% claimed that the policy framework was seriously deficient. As a result, Vietnam's legal system and policies regarding circular business are unclear and present a significant obstacle. The number of businesses that have implemented circular business model to receive assistance is extremely low. 54% of businesses face difficulties when converting to a circular business model [21].

Other survey has indicated that, challenges when transitioning to a circular economy model include: policy (34%), technological–technical difficulties (43%), and financial difficulties (48%). Another challenge is businesses' lack of information and conversion models suitable for Vietnamese conditions [27].

Many businesses are not motivated to shift to a circular economy model due to a lack of pressure to make the change. There does not appear to be a link in the chain yet where the circular economy model is being applied. The current transformation challenge is that the cooperation between the parties is not close and comprehensive enough. The connections between businesses are still weak, so the cycle chain has not been closed.

According to enterprises' assessments, the following factors pose barriers to the development of circular businesses: the legal framework, economic and social policies; power; technology and the environment; the value chain; the infrastructure; strategy, corporate structure, and social norms.

The main cause is the uneven level of awareness of the circular economy and circular business models in Vietnam; the lack of a complete, coherent, and synchronous legal

framework; and the insufficient capacity and resources of the enterprise. The traditional linear business philosophy continues to be the foundation of business culture, consumer behavior, and legal policies.

5 Conclusion

Different categories have been used to categorize drivers and barriers to Circular Economy. Any particular actor or organization may experience internal barriers and drivers, which are related to internal decisions and processes, or external barriers and drives, which are related to factors outside of their direct control. Internal factors can affect a company's business strategy, priorities, or operational culture as well as an individual's financial preferences or decision to engage in or refrain from repetitive behavior. Meanwhile, the demand, habits, or actions of other entities, such as customers or businesses in the supply chain, are examples of external conditions for any actor or organization. Other examples include pricing policies or incentives set by governments. However, there are apparent connections between these two domains since all internal decisions are made in the context of the external environment.

As a result, some classifications of barriers and drivers put less emphasis on internal-external division and instead take a more in-depth look into barriers and drivers. The following major types of barrier-driver categories tend to reoccur, despite the diversity among the various categories presented: economic, institutional, technological, organizational, knowledge and skills, habits, and culture.

Economic barriers and drivers are often significant. Often the implementation of CE measures might result in immediate cost savings for the parties involved, in which case economics is the motivating factor. However, this is not always the case. CE measures may sometimes be proven to be not cost-effective due to the relative costs of materials and labor or as a result of unpriced external factors; in other instances, they are hampered by split incentives, excessive upfront investment costs, or an insufficiently high return on investment. In these situations, economics acts as a barrier. Non-economic factors may also play a big role, acting as both a driver and a barrier.

Recyclability or remanufacturing may be enabled or prohibited by institutional factors like material management rules. Companies or individuals who wish to engage in the CE have alternatives that may be enabled or limited by technological and infrastructure issues.

The implementation of CE measures by organizations and individuals is significantly influenced by knowledge and organizational practices, and the presence of pre-existing relationships with other actors, which can facilitate industrial symbiotic relationships, can be a key driver, with the absence of such relationships potentially acting as a barrier.

Habits and culture are additional elements that have a big impact on how people and organizations behave. For individuals, a value-based commitment to the CE principles can be crucial to take actions that might initially seem less convenient than the routines established within a "throw-away" culture. In companies, commitment and leadership in building a culture that benefits CE are important.

Barriers show that the transition to a circular economy is a complex process. This transition will require breakthrough innovations, both technical and social, and new

business models. Such innovations are still in their infancy and need to be nurtured and developed. It implies a radical transformation of existing patterns of production and consumption, in which new circular businesses are developed and linear businesses are broken down.

In Vietnam, the barriers overwhelm the drivers to CE. Firstly, understanding the true nature of the circular economy from design to implementation at all levels remains a challenge. Secondly, the circular economy is associated with technological innovation and model design. Vietnam is a developing country, most of the technology is outdated, and the production scale is small. Thirdly, Vietnam does not have an adequate legal framework for circular economy development. This challenge needs to be overcome, otherwise the implementation of circular economic development will only be spontaneous and depend on the movement of the dynamics of market. Fourthly, Vietnam does not have a set of criteria to identify, evaluate, summarize and provide an accurate classification of the development level of the circular economy. To what extent the current economic development has reached to which level of circular economic development in sectors, fields and localities is a big challenge. Fifthly, to realize the circular economy requires a team of good experts to handle from the design stage to the final stage of reuse and recycling of waste. Currently, these experts are untrained and have no specialized training. Sixthly, the circular economy requires sorting and cleaning of waste before reuse and recycling, which is a big challenge for the actual operation of the Vietnamese economy and the sense of garbage classification at the source of the people.

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