



# Knowledge-based circular economics model for sustainable competitiveness: framework development and analysis

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## Abstract

Given the numerous changes in global consumption and production models that have occurred in recent years, promoting the development of a circular economy and a knowledge economy would appear to be an appropriate shift for sustainable development and competitiveness, yet no previous studies have integrated their adoption for sustainable competitiveness from the business aspects. This study aims to integrate knowledge-based circular economics adoption for sustainable competitiveness. The research conducts a comprehensive literature review and a critical analysis of secondary data from a real-world case. The main results are a framework development of knowledge-based circular economics and a critical analysis of a modified model toward sustainable competitiveness, that addresses the above gap and derives the originality and novelty of the paper. Future research is proposed in which statistical software, such as SPSS and SmartPLS-SEM, would be applied to validate hypotheses.

**Keywords** Circular economy · Competitiveness · Knowledge-based economy · Sustainability · Sustainable competitiveness

## 1 Introduction

The global ecosystem is deteriorating at an alarming rate, becoming increasingly impoverished due to salinization, and rising sea levels (Fischer et al., 2018). Moreover, reared intensification to meet human consumption driven by population explosion increases waste and simultaneously reduces biodiversity (Geissdoerfer et al., 2017; Govindan & Hasanagic, 2018). The CEO of Vinamilk Group, Madam Mai Kieu Lien, has stated: ‘Sustainable development is no longer a choice, but a mandatory way for all businesses to survive and develop’ (Vinamilk, 2020). The notions behind the circular economy (CE) and knowledge economy (KE) have immense potential for the future of humans (Hazen et al., 2020) and

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influence the growth of competitiveness, which improves sustainability (Širá et al., 2020). For example, the traditional economic model involves the extraction of natural resources, production, consumption, and disposal of subsequent waste, while the CE model comprises restorative and regenerative systems (Hussain & Malik, 2020). Consequently, it is viewed as a solution that could help countries develop economically but also be socially and environmentally conscious (Ddiba et al., 2022). Knowledge of how to maximize production factors with minimal waste and maximal recycling of used sources is becoming a competitive advantage today by closing material and product loops for improved environmental performance (Zink & Geyer, 2017; de Abreu & Ceglia, 2018; Castro et al., 2022).

Many scholars have investigated either KE or CE separately to encourage sustainable development in developed and developing countries (Ddiba et al., 2022; Popescu et al., 2017). However, the KE and CE bodies of knowledge are complicated, as they are based on the abstract concepts of knowledge and other related issues (Milton & Lambe, 2020). For example, even though the acknowledged advantages of CE, rebound effects can prevent the desired results from materializing, should be considered (Castro et al., 2022; Warming-ton-Lundström & Laurenti, 2020; Zink & Geyer, 2017). CE rebound (CER) resulted from companies thinking about low-cost and recyclable production inputs and technologies, i.e., CER happens when CE activities that have lower per-unit-production impacts, also lead to higher levels of production and consumption, therefore, diminishing their benefits due to environmental impact. On practical side, companies through different stages of the life cycle in an environment with a KE must contend with numerous additional requirements and challenges (Vinamilk, 2019; Robert-Jan Van Ogtrop et al., 2021). Even more so if such establishments are concurrently adopting a CE to promote elements of sustainable development and competitiveness through strengthening the association between environment, society, and governance disclosure and firm competitiveness, as well as avoiding CER (Rabaya & Saleh, 2022). Another example, Vietnam has established centralized legal frameworks to promote CE since 2016. A National Action Program for Sustainable Production and Consumption in 2020 with a vision for 2030 encouraged the CE application and was approved; however, the actual implementation remains very limited and lacks merit (Luu, 2021; Luu et al., 2023).

Several previous studies integrated KE and CE into sustainable development. For example, Zwiers et al. (2020) studied how the CE contributes to sustainable development through a knowledge-based approach. Zhang et al. (2021) looked at the relationship between the concepts of organizational sustainability and total quality management, as well as the mediating role of knowledge management. However, no studies have yet proposed a combination of KE and CE for sustainable competitiveness (SC) within the context of a business perspective. There is a lack of understanding about integration, named knowledge-based-circular economics (KCE) contributes to sustainable competitiveness. Taking this into account, the following research questions and associated objectives were developed.

*RQ1* Which crucial concepts could be adopted for SC?

*RO1* To develop a conceptual framework of KCE for SC.

*RQ2* How does company create SC?

*RO2* To examine a real-world case to illustrate the adoption of a KCE model in their business.

This study addresses the above research gap by elucidating the relationship between KE and CE and exploring their integrated adoption for sustainable competitiveness. This is

achieved through a comprehensive literature review and the adoption of a practical KCE model within the MVN, since its name that would allow for the identification of the company has been made anonymous. The development of the proposed KCE framework for sustainable competitiveness context, as well as this context-specific critical analysis of the modified KCE model in the MVN value chain, is what give the paper its originality and novelty. In detail, this research aims to characterize the theoretical concepts of knowledge, knowledge management (KM), KE, CE, especially understanding sustainable competitiveness from concepts of sustainability and competitiveness, and then conceptualize and analyze the impacts of KCE models for the growth of companies or countries in the context of sustainable competitiveness.

Section 2 develops the literature review and provides theoretical background and framework. Section 3 proposes a conceptual framework of KCE for SC, hypotheses development, and variable measurement. Section 4 analyzes secondary data of the MVN case to illustrate how KCE has altered the sustainable competitiveness of the company. Discussion is placed in Sect. 5. Section 6 concludes the research with theoretical and practical implications, as well as highlights limitations that could inform future endeavors.

## 2 Materials and methods

### 2.1 Conceptual research methodology

The conceptual design of the study is devised as a mixed approach consisting of three phases (Appendix A1). A qualitative study is used in the first phase to explore a comprehensive literature review of KE and CE for SC that formed a foundation for the second phase in which a conceptual framework for the adoption of KCE for SC, as well as hypotheses and variables, is developed. In the third phase, the quantitative method of critical analysis in secondary data from the MVN is used to understand a modified model of KCE adoption into their value chain. It also outlines a future agenda using statistical software such as SPSS and SmartPLS-SEM to validate the research model.

### 2.2 Literature review procedure

To develop literature review, we search published papers from the Web of Science and Scopus database with keyword string as (“Circular Economy” OR “Knowledge Economy” OR “Knowledge-based Economy”) AND (“Sustainability” OR “Sustainable Development” OR “Competitiveness” OR “Sustainable Competitiveness”), and others from the Google Scholar to download high-quality articles published in 2017–2023 belongs Q1/Q2 journals, such as the Journal of Cleaner Production; Resources, Conservation & Recycling; Environment, Development and Sustainability; and Journal of Knowledge Management.

The keyword search led to a set of 327 articles, of which 159 of them are duplicated, and in other areas and languages were removed. The screening process is continued to be considered in publication years (2017–2023) and Q1/Q2 journals that selected out 96 papers are reviewed on the title and abstract and 50 papers are accepted. Besides, a set of 11 papers has been searched from cross-references. So far, a total of 61 papers have been selected and analyzed for this literacy (Appendix A2).

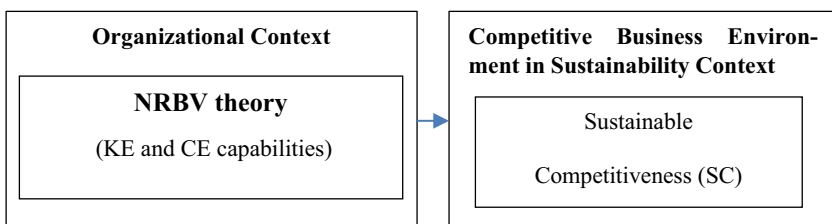
## 2.3 Theoretical background

This study adopts the natural resource-based view (NRBV) (Hart, 1995) as its theoretical lens, focusing on organizational resources and capabilities to integrate operations in a competitive business environment incorporating a sustainability perspective, referred to as sustainable competitiveness, drawing insights from Doyle and Perez-Alaniz (2017), Širá et al. (2020), Zhang et al. (2021), and Luu et al. (2023). The NRBV theory guides the exploration of the relationship between organizational resources and capabilities (i.e., CE and KE) and sustainable competitiveness, gaining long-term sustainable development and a competitive advantage. In this light, the theoretical framework is developed in Fig. 1.

### 2.3.1 Circular economy

CE originated from industrial ecology, a concept devised in the 1970s (Ellen MacArthur Foundation, 2013). Indeed, the definition of a CE in a work by Kenneth Boulding concerned the use of limited resources and related capacity for regeneration. Other similar analyses reported on resource utilization, economic values, and system consideration (Whalen & Whalen, 2018). Several authors determined what factors are crucial to the perspectives of techno-optimism and ecomodernism (Lowe & Genovese, 2022). Most companies discussed basic assumptions about social and economic structures as they pertain to CEs, with strong connections to system-conditioned prerequisites. CE is often mentioned along with the issue of global entrepreneurship, corresponding to the limited number of resources available for production. The paradigm is related to the need to achieve optimal performance of a company while also raising the standard of life. No comprehensive examination has been conducted to date on a CE definition as highlighted by Kirchherr et al. (2017). Diverse definitions exist, depicting CE as a versatile concept (Kirchherr et al., 2023). Notably, Figge et al. (2023) establish four criteria for a good CE definition: (a) Address the closure of resource loops; (b) Emphasize optimizing, not just minimizing, resource flows; (c) Consider at least two levels; and (d) Differentiate between the CE as an ideal type and a realistic, imperfect CE that achieves sustainability in conjunction with other approaches.

The resources, a company can draw on, are limited in scope, and being flexible in the choice of which inputs and processed ones are applied enables effective and efficient process flows and eliminates waste. The maximum utilization of available resources is the main goal of a CE (Zink & Geyer, 2017). The efforts made by a company to devise



**Fig. 1** A theoretical framework (source: own processing)

a relevant system-oriented concept within a project to implement CEs demand that particular attention is paid to barriers such as technology, the cultural environment, the consumption of resources, product definitions, and the needs of customers (Grafstrom & Aasma, 2021).

### 2.3.2 Knowledge, knowledge management, and knowledge economy

Over 100 published knowledge definitions exist (Dalkir, 2017). Fundamentally, knowledge is human understanding derived from perception, learning, and observation. It is intangible, intricate, and surpasses the complexity of data or information. As an organizational resource among people, knowledge joins the ranks of tangible assets managed for centuries, including money, manpower, materials, and machinery. Recent focus extends to intangible assets such as information, reputation, intellectual capital, customer relationships, diversity, talent, safety, sustainability, and newly, knowledge (Milton & Lambe, 2020).

The dilemma posed is how to manage knowledge with efficiency and effectiveness. The same basic notion has been given various names over time, e.g., an intellectual asset, cognitive science, or an organizational perspective. Dalkir (2017) defined KM as the intentional and methodical coordination of an organization of its staff, technology, processes, and organizational structure to generate value through reuse and innovation. This is achieved by encouraging the creation, sharing, and use of information, as well as the transmission of important lessons learned, and best practices into corporate memory to support ongoing organizational learning. There, four factors are stated as enabling the flow and storage of knowledge, referred to 'knowledge enablers': peoples, processes, technology, and governance (Milton & Lambe, 2020). Most practitioners and professionals agree that KM comprises two primary forms of knowledge—tacit and explicit, as well as a framework for discerning the values of knowledge assets and a process for managing such assets that constitute an added value for the organization. KM represents the most recent management tool to deal with intangible elements. The ability to manage knowledge has gained importance within the confines of a KE, while the creation and dissemination of knowledge are increasingly important factors in achieving business competitiveness.

The knowledge economy (KE) was a concept originally pioneered in the early 1960s by Drucker (1964). His comprehensive paper on modern management advocates the role of a so-called 'knowledge worker,' additionally predicting that blue-collar workers would ultimately be laid off in response to rapid advancement in science and technology, especially information technology. Over the past five decades, numerous articles have been written providing definitions and explanations of the mechanism of this economy (Atiku, 2020; Zhang et al., 2021; Zwiers et al., 2020). The knowledge-based economy is more than just a novel theoretical notion since it also represents a new age that differs significantly from agrarian and industrial societies. Several definitions have been proposed and fine-tuned over the years by international organizations (World Bank, 1999; APEC, 2000). Typically, the Organization for Economic Cooperation and Development (OECD, 2001) stated it succinctly as an economy based directly on the creation, distribution, and application of knowledge and information. It has already exerted an impact on and caused a change in all areas of economic and social life, and its influence is spreading. Every successful economy must continuously improve and pay great attention to key areas. Such an endeavor ensures sustainability and boosts the position of the country in a competitive environment. Since it facilitates effective decision-making in an organization, the KE has become increasingly vital to firms seeking to improve their bottom line and market share. As competition in

the market increases, the ability to discern issues from a distance and adapt quickly to new information and advances constitutes one of the finest ways to conduct business smartly and flexibly.

### 2.3.3 Sustainability and competitiveness

Since the 1980s, the discussion on sustainability or sustainable development gained prominence in the literature (Popescu et al., 2017). Sustainable development is crucial for generating new value and fostering innovation, simultaneously contributing significantly to the economic advancement of individuals and society. It enhances the interdependencies of economics, society, and environment (Korhonen et al., 2018a, 2018b). Recently, culture has garnered increasing attention as the fourth dimension of sustainable development, joining the ranks of environmental, social, and economic dimensions (Lazar & Chithra, 2022).

In the literature, the term competitiveness takes on distinct meanings when applied to an individual firm, a specific sector, or an economic activity within a country (Balkyte & Tvaronavičiene, 2010). For example, the ability to sell goods and services is the outcome of competitiveness. Aiginger, Bärenthaler-Sieber, and Vogel (2013) outlined several aspects of competitiveness, defined as price, quality, and outcome. According to the definition, the outcome is measured by three pillars, including income-related outcome (e.g., GDP), societal outcome (e.g., poverty risk), and ecological outcome (environmental matters). Competitiveness, knowledge, and R&D (research and development) are priorities for every nation on Earth today.

## 3 Framework and hypotheses development

In light of the theoretical framework and background, the study continues to investigate on three main constructs of KE, CE, and SC, and other factors with sketched variables to develop the research conceptual framework and associated hypotheses.

### 3.1 CE, and KE

Research on CE has revealed that it plays an essential role in the global sustainability of corporations and policy-making bodies (Korhonen et al., 2018a, 2018b). Geissdoerfer et al. (2017) had previously and thoroughly elaborated on CE. Several studies have investigated sustainability and CE adoption in a variety of supply chain and manufacturing efforts in the industrial and agricultural spheres (Khan et al., 2021; Kumar et al., 2021; Yadav et al., 2020). Furthermore, Hussain and Malik (2020) discussed a combination of process facilitators and a compelling organizational narrative that enables firms to adopt CE practices for a transition to circular supply chains. Sharma et al. (2020) found that machine learning could assist agricultural supply chains sustainability. Implementing the CE concept has the potential to promote sustainability in an enterprise. In terms of the relationship between CE and sustainability, several studies have been reported (Geissdoerfer et al., 2017; Korhonen et al., 2018a, 2018b). The fundamental distinction between CE and sustainability is that the latter emphasizes equal factors in economic, social, and environmental objectives, while CE as a business-centric approach focuses on economic concerns that benefit the environment and society.

Besides, knowledge management, in the context of CEs, has the ability to react to environmental, economic, and social sustainability (Temesgen et al., 2021). Numerous scholars (Širá et al., 2020; Sundać & Krmpotić, 2011) were involved in the creation of the KE indices. The document subsequently published details the modification of four indices of the KE such as economic incentives (regulatory quality, tariff/nontariff barriers), education & human resources (number of trainings, tertiary level), innovation (number of patents, number of initiatives), and investment indices (R&D expenditure). Furthermore, Song et al. (2022) found that technological innovation, a crucial notion of knowledge, is a buffer between high-tech applications, and green & sustainable transformation. Summarizing the above analysis, it seeks KE prerequisites that enhance the transformative potential of CE adoption in mindset and practices for sustainable development (Zwiers et al., 2020). On this basis, hypotheses of the endogenous constructs of CE and KE with its four selected exogenous factors of economics, education, innovation, and investment indices can be developed in a variety of ways.

**Hypothesis 1** KE positively affects CE adoption statistically.

**Hypothesis 1a** Economic incentive has a positive impact on KE.

**Hypothesis 1b** Education has a positive impact on KE.

**Hypothesis 1c** Innovation has a positive impact on KE.

**Hypothesis 1d** Investment has a positive impact on KE.

### 3.2 Sustainable competitiveness, CE, and KE

From the above discussion on competitiveness and sustainable development, a new concept of sustainable competitiveness has emerged in the interest of researchers (Doyle & Perez-Alaniz, 2017; Popescu et al., 2017; Širá et al., 2020). Consequently, through the adoption of CE within a construct of KE practices, an organization translates tacit knowledge into a clear idea, transitioning from diverse points; for example, it is possible to apply knowledge obtained from customers and shareholders. Companies also benefit from the knowledgeable insights of knowledge workers for training staff and improving processes or the commitment of the management board is also a key to affording sustainable competitiveness. Obviously, managers who care about the performance of their company, as well as officials interested in the well-being of their country, first must introduce policies and tools that promote competitiveness. It is simply not enough to consider issues in the present, but also to look to the future, which is where sustainable competitiveness comes into play, that is, the ability to compete and survive in the long term by adopting CE in the KE context. Hypotheses 2, 3, and 4 were established to examine the impact of KE and CE on SC.

**Hypothesis 2** KE positively affects SC statistically.

**Hypothesis 3** CE positively affects SC statistically.

**Hypothesis 4** CE positively affects interactions between KE and SC.

Sustainable competitiveness is defined as the ability to create a framework (visions, managerial/technological tools, competitive edges) that allows a company, a sphere of business, or a country to maintain or enhance its competitive capability. Measurement of this occurs by the twelve pillars of the Global Competitiveness Index (GCI) stipulated by the World Economic Forum (Balkyte & Tvaronavičiene, 2010; Širá et al., 2020). The aim is to generate revenue under current circumstances and in future expanded environmental and social sustainability (Doyle & Perez-Alaniz, 2017; Popescu et al., 2017; Shaheer H. Zyoud, 2023). Furthermore, this helps nations reach the 17 Sustainable Development Goals (SDGs) adopted by the United Nations in 2015, to achieve them in 2030. Çağlar and Gürler (2022) discussed on how each nation achieves the SDGs and gave critical guidance for doing so. From an economic viewpoint, the impact of the KE and the shift to CE means that companies can achieve sustainable growth and gain a long-term sustainable competitive edge in the manufacturing and service sectors, as well as contribute to the state budget or gross domestic product of the country. Additionally, companies can diversify economic performance such as business growth (revenues/profit), and brand value (Vinamilk, 2022). They also cannot ignore their responsibility to the environment and society.

Environmental and social stabilities, however, are more theoretical than economic sustainability. Even so, organizations have moral programs for social welfare or poverty reduction in place that go beyond their financial and economic well-being in terms of social sustainability (Zhang et al., 2021). This aspect of SC also considers the impact of such efforts made by organizations on protection of health and work ethics. Besides, ecological conditions and the saving of resources are critical to environmental sustainability. The management board's commitment is also key to affording sustainable development (Zhang et al., 2021). Hypotheses based on what has been stated thus far:

**Hypothesis 2a** Competitive capability has a positive impact on SC.

**Hypothesis 2b** Environmental sustainability has a positive impact on SC.

**Hypothesis 2c** Social sustainability has a positive impact on SC.

**Hypothesis 2d** Economic sustainability has a positive impact on SC.

Furthermore, to facilitate the adoption of a CE, scholars have developed various strategic designs including Rs strategies and design principles (Luu et al., 2023; Morsetto, 2020; Patwa et al., 2021). In addition, the research described also covered two other independent factors, including the impacts of policy (regulations, standards) and high-tech applications (number of modern systems; optimal solutions) (Luu et al., 2023; Song et al., 2022). Implementing policies on CE will reduce economic dependence and vulnerability, fostering increased competitiveness. (Abad-Segura et al., 2020). Hypotheses can be constructed on the exogenous factors of CE.

**Hypothesis 3a** Strategic design has a positive impact on CE adoption.

**Hypothesis 3b** Government policy has a positive impact on CE adoption.

**Hypothesis 3c** High-tech application has a positive impact on CE adoption'.



The details of 14 examined constructs and 25 observed variables are summarized in Table 1.

### 3.3 The proposed conceptual framework of KCE for SC

In this study, we propose a combination of circular economy in the context of a knowledge-based economy, named knowledge-based-circular economics (KCE), and examine its adoption for sustainable competitiveness in business aspects. The study constructs a simple path model that defines outer and inner models including exogenous and endogenous constructs and reflective variables. As per above discussion, the model has 14 constructs which includes 3 endogenous constructs of KE, CE, and SC, and its 11 exogenous factors with 25 sketched observed variables (see Table 1).

The conceptual framework is presented in Fig. 2 where the independent impacts of KE are gauged by four pillars of the economy, education, innovation, and investment factors to the intervening construct of CE with three relevant factors (Strategic design, governmental policy, and high-tech applications), and the outcome construct of SC, it defined by four factors of competitive capability, environmental, social, and economic sustainability.

## 4 Critical analysis of the MVN case

### 4.1 A modified KCE model of the MVN value chain

The MVN is the largest dairy company in Vietnam. This section makes a critical analysis of the real-world case of the MVN company, to understand the adoption of a model of knowledge-based circular economics for improving business performance management geared toward sustainable competitiveness from a business perspective. This is because, for modern companies, the issue of sustainability is a fundamental corporate value for a premium circular economy.

By investigating on the Sustainable Development Reports of the MVN in 4 years from 2019 to 2022, the study found that the MVN adopted a model of knowledge-based circular economics into their value chain including resources, research & development (R&D), farming, production, and supply & distribution, illustrated in Fig. 3. In detail, the modified model combines CE and KE capabilities that align with the proposed model in Fig. 2, and the bodies of knowledge defined in the theoretical background emphasize the CE constructs of strategic design (3R1O), high-technology, and government impacts integrated with the KE constructs of economy, education, innovation, and investment in the context of their KM enablers of peoples, processes & product, technology, and governance. Additionally, the modified KCE model also incorporates other associated factors and variables tailored from the current operations of the MVN illustrated in Fig. 3.

The strategic design of 3R1O includes reducing, reusing, recycling, and optimizing activities over their stakeholder's operations (Fig. 4a) emphasizing high-tech applications and a reciprocal impact of government policy on their business (Fig. 4b).

### 4.2 Results of the MVN performance

As a result, the modified KCE model enhances stakeholder contributions to business performance, fostering sustainable competitiveness of the MVN as well as the overall

**Table 1** Constructs and Variables *source* own processing

Endogenous Constructs	Exogenous Constructs	Observed variables	Sources
1. KE (Independent construct)	01. ECO (Economic Incentive) 02. EDU (Education) 03. INN (Innovation) 04. INV (Investment)	01. ECO1: Regulatory quality 02. ECO2: Tariff barriers 03. ECO3: Non-tariff barriers 04. EDU1: Number of trainings 05. EDU2: Tertiary level 06. INN1: Number of patents 07. INN2: Number of initiatives 08. INV1: R&D expenditure	Širá et al., (2020), Song et al., (2022), Zwiers et al., (2020) and Sundać and Krmpotić (2011)
2. SC (Outcome construct)	05. COM (Competitive capability) 06. ENS (Environmental sustainability) 07. SOS (Social sustainability) 08. ECS (Economic sustainability)	09. COM1: Visions 10. COM2: # managerial tools 11. COM3: Competitive edges 12. ENS1: Eco conditions 13. ENS2: Savings of resources 14. SOS1: Social welfare 15. SOS2: Health protection 16. SOS3: Work ethics 17. ECS1: Business growth 18. ECS2: Brand value 19. ECS3: State budget/GDP	Zhang et al., (2021), Širá et al., (2020), Sundać and Krmpotić, (2011), Doyle and Perez-Alaniz, (2017) and Popescu et al. (2017)
3. CE (Intervening construct)	09. STD (Strategic design) 10. GOV (Government policy) 11. HIT (High-tech application)	20. STD1: Rs strategies 21. STD2: Design principles 22. GOV1: Regulations 23. GOV2: Standards 24. HIT1: # of modern systems 25. HIT2: # of optimal solutions	Hussain and Malik, (2020), Hazen et al. (2020), Govindan and Hasanagic, (2018), Saberi et al. (2019), Patwa et al. (2021), Bag and Pretorius (2020), Feizollahi et al. (2021) and Luu et al. (2023)

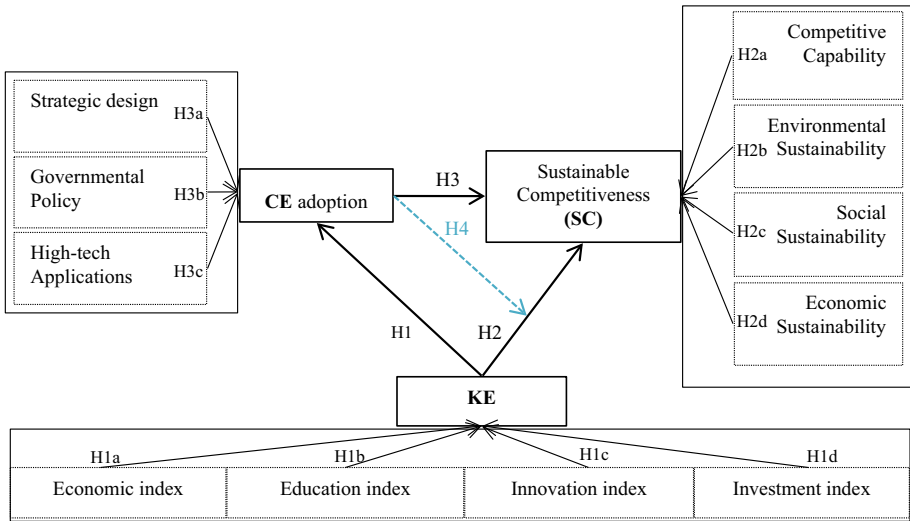


Fig. 2 A proposed model of KCE for SC. KE= independent construct, SC= outcome construct, CE= intervening construct *source own processing*)

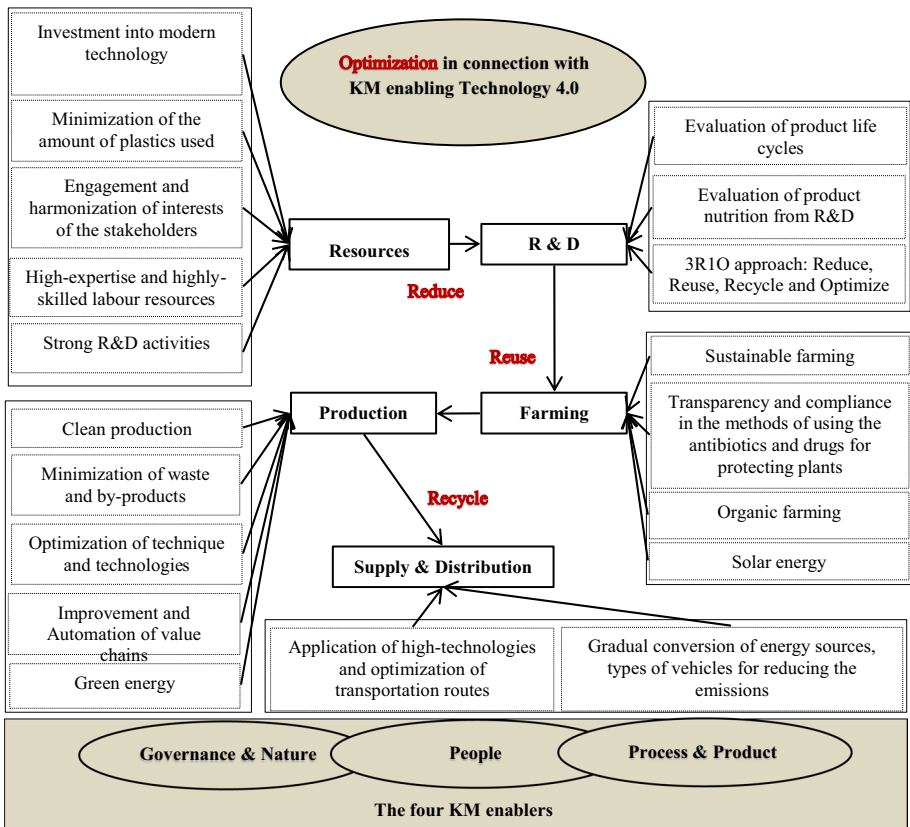


Fig. 3 A modified KCE model *source own processing based on the Report, 2019*



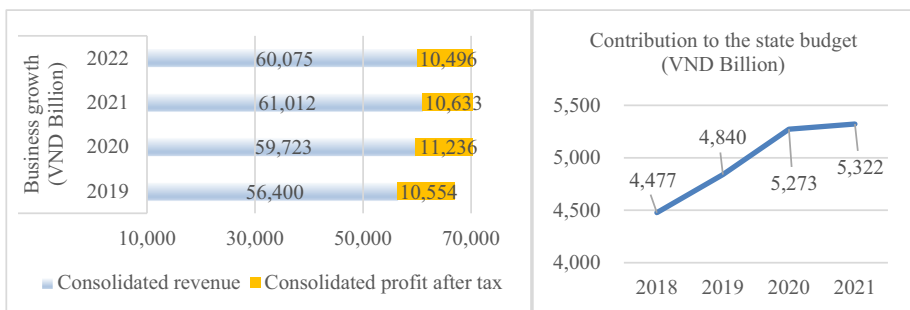
**Fig. 4** (source: own processing based on the Report, 2019; 2020)

growth of Vietnam by improving economic, social, environmental performance, and competitive capability of the MVN enhancing competitiveness and sustainable development, as well as raising the profile of Vietnamese brands internationally.

On the economic dimension, Fig. 5 describes the business growth and contribution to the state budget over the years, reflecting the variables of ESC1 and ESC3 in the proposed model, respectively. Although there is a slight decrease in 2022, due to the impact of COVID-19, however, its trends are positively increasing in future. Additionally, the brand value (ESC2) has been increasing gradually over the years achieving 2.8 USD billion in 2022 (Table 2).

On the side of society and community development, the MVN achieved the Top 1 of most attractive employers in 2021—FMCG Industry, organized 647 training courses to develop their people and got 93 numbers of successful initiatives in 2020 (Table 2) with a breakout rate of 258% compared to 26 initiatives of 2019. Obviously, the results are also an examination of the variables of EDU1 and INN2 in KE constructed in the proposed model.

On the side of the environment, in addition to the improvement made in the quality of the materials utilized in production and consumption, there are greater reduction, reuse, and recycling of their resources. For example, the water reused in production (ENS2) increased over the year and reached 5.4% in 2021 (Vinamilk, 2021) although slightly reduced to 5% in 2022, while the average gas consumption was reduced gradually from 2020 to 2022, reached 0.21 kgs per ton of products in 2022, which is a good sound for the ecological conditions (ENS1) (Table 2).



**Fig. 5** Business growth and contribution to the state budget. source: own processing based on the Reports of 2019; 2020; 2021; 2022

**Table 2** Highlights of the MVN performance *Source* own processing based on the Report, 2019; 2020; 2021; 2022

Years	Economic performance			Society & community performance			Environment performance		
	Brand value (USD billion)	Consolidated revenue (VND billion)	Consolidated profit after taxes (VND billion)	Numbers of training courses organized	No. of initiatives	Savings from the initiatives (VND billion)	Average gas consumption (kg)/ton of products	Average emission (kg)/ton of products	Water reused in production (%)
2019	1.6	56,400.0	10,554.0	537.0	26.0	3.00	NA	NA	2.6
2020	2.1	59,723.0	11,236.0	647.0	93.0	6.50	0.26	206.14	5.2
2021	2.4	61,012.0	10,633.0	597.0	69.0	2.44	0.25	240.69	5.4
2022	2.8	60,075.0	10,496.0	584.0	44.0	4.30	0.21	232.95	5.0

Competitive capability is derived from the three above aspects. MVN's enhancement of competitive edges (COM3) demonstrated through numerous awards, including the highest corporate governance scores, the Top 10 manufacturing enterprise in Vietnam, the most potential dairy brand in the world with a brand value of US\$2.8 billion (Brand Finance—UK), and the designation as a sustainability promotion enterprise in Asia, that help the MVN develop more their vision and strategies (COM1) in future (Vinamilk, 2022).

## 5 Discussion

In our research, we seek to address the research gap by developing a hybrid conceptual framework and practicing a critical analysis in a real-world case that adds originality and novelty to the paper and contributes to the academic discourse.

Surprising that the modified model of the MVN is aligned with the light of the proposed conceptual model and thereby emphasizes the importance of knowledge economy and circular economy both in light of conceptualization and practices strengthening the position in a competitive business environment under a sustainability context.

The success of the MVN company is a piece of compelling evidence and illustrates practical benefits for companies and related stakeholders in a competitive environment today by examining their KE and CE capabilities focusing on their people, process & product, technology, and governance & nature. In summary, KE and CE play an essential role in the creation of sustainable and competitive value reflected in effective and efficient organizational performance.

## 6 Conclusion

This study is an attempt to answer the RQ1 of 'Which crucial concepts could be adopted for SC?' by examining the theoretical lens and background from previous studies; the study defines 14 constructs and 25 associated variables for a proposed conceptual framework of a knowledge-based-circular economy for sustainable competitiveness. Additionally, the study investigates a real case in Vietnam to answer the RQ2 of 'How does a company create SC?.' We found that the MVN company successfully adopted a modified model of KCE in their value chain that brings impressive benefits for their business performance in three dimensions of economy, environment, and society for sustainable development in a competitive environment that gear toward and maintain their sustainable competitiveness. In summary, the research could bring theoretical and practical benefits as follows.

### 6.1 Theoretical implications

Knowledge economy, circular economy, and sustainable competitiveness are the main concepts and becoming increasingly significant. The study contributes to developing a comprehensive literature review in sustainability, competitiveness, CE, and KE bodies of knowledge. Numerous concepts, such as sustainable development and competitiveness, named sustainable competitiveness, as well as a knowledge-based economy and circular economy, called knowledge-based-circular economics, continue to attract academic discourse and in practical life. The study contributes a theoretical background and conceptualization of a

hybrid KCE model that benefits academic communities and practitioners in business and research.

## 6.2 Practical implications

On the side of the academic communities, our literature review on the link between a knowledge economy and a circular economy for sustainable competitiveness identified key findings and addressed the research gap. The study revealed a scarcity of research linking the knowledge economy and circular economy, particularly in the context of sustainable competitiveness from a business perspective. The absence of integrated studies in this domain highlights the necessity for increased research collaboration to enhance academic discourse.

On the side of the practitioners, our framework development and analysis demonstrated substantial positive effects stemming from the implementation of a knowledge-based circular economy model in enhancing business performance management. This impact is particularly pronounced for enterprises situated in developing countries, where sustainability challenges are heightened. Consequently, researchers need to explore the potential advantages and obstacles associated with the integration of knowledge economy and circular economy principles in these regions. Practitioners, including enterprises, are encouraged to increase their investments in the adoption of knowledge-based-circular economics within their value chain. Furthermore, the reciprocal relationship between government entities and enterprises highlights the pivotal role of the government in formulating and implementing policies and standards that support enterprises. Such governmental initiatives are integral to fostering sustainable development more effectively within the business landscape. Conversely, companies contribute to the state budget and GDP growth.

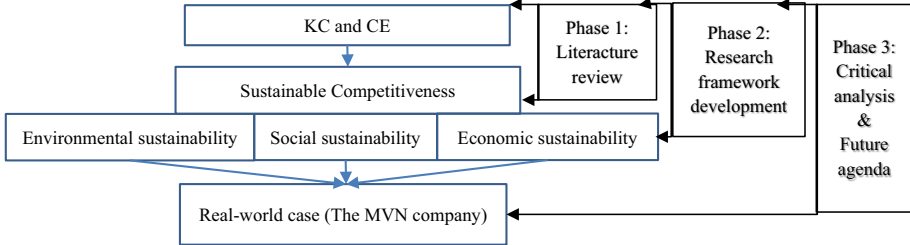
## 6.3 Limitations and directions for future research

This study has certain limitations; however, it is imperative to broaden the focus to encompass diverse companies and industries within a wider business environment. This expansion is crucial for enhancing the development of indicators within a hybrid framework that integrates the knowledge economy and circular economy for sustainable competitiveness. This includes an examination of cultural dimensions, in addition to economic, societal, and environmental factors (Lazar & Chithra, 2022); as well as an investigation of CE rebound effects (Castro et al., 2022).

Additionally, the research comprises empirically a critical analysis of secondary data from company reports. I mean in future research we will use the questionnaire technique and other software such as SPSS and SmartPLS-SEM to evaluate and validate statistically the proposed framework and hypotheses. In detail, the study outlines to use of the explanatory factor analysis (EFA) to refine the variables for measurement model assessment, and the SPSS is considered a good choice (Ong & Puteh, 2017). Then, the study further considers several frequently used validation software such as SmartPLS (PLS-SEM) and AMOS (CB-SEM) for structural assessment and hypotheses testing. Although the results from CB-SEM and PLS-SEM approaches are almost identical, in contrast to PLS-SEM, CB-SEM makes high demands on the data, making SmartPLS the inferential software of choice (Purwanto et al., 2020; Dash & Paul, 2021).

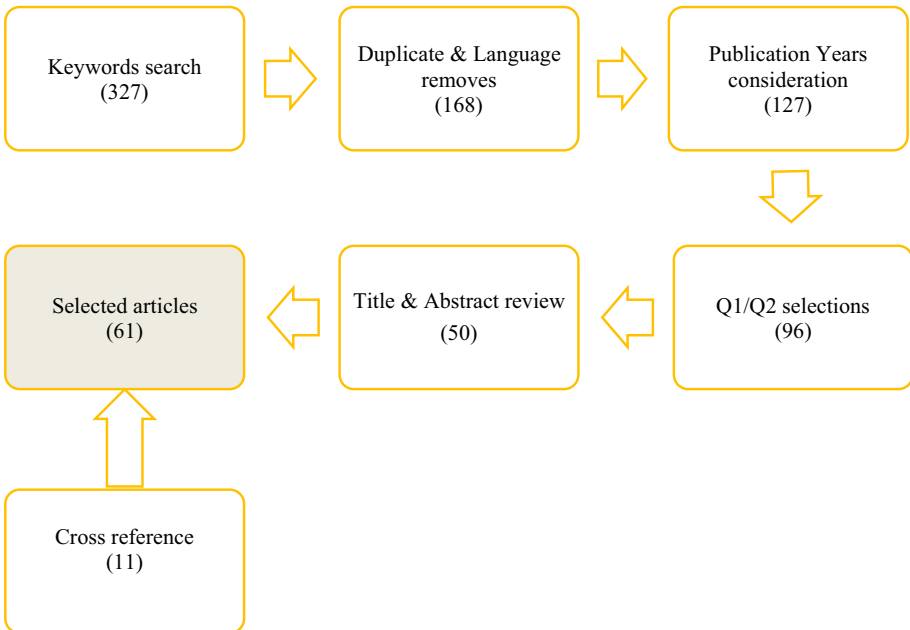
## Appendix 1

### Conceptual design (Source: own processing)



## Appendix 2

### Review procedure (source: own processing)



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## Declarations

**Conflict of interest** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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