

FROM CARBON TO CIRCULAR: INNOVATING A CIRCULAR ECONOMY-BASED STARTUP BUSINESS MODEL IN THE MIDST OF THE GLOBAL CLIMATE CRISIS

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ABSTRACT

The global climate crisis necessitates a paradigm shift in business practices, one of which is through the implementation of a circular economy. Startups in Southeast Asia have significant potential to become agents of change by developing sustainable business models. This study aims to explore the innovative circular economy-based business models implemented by startups in Southeast Asia and to understand the challenges and strategies faced in their implementation. This research adopts a qualitative approach with a case study design. Data was collected through semi-structured interviews with startup founders and analysis of related documents. The sample consists of 10-15 startups that have applied the principles of circular economy. Findings show that startups innovating in circular economy-based products and services not only reduce environmental impact but also create significant economic value. However, challenges such as low consumer awareness, limited access to resources, and regulatory complexities remain obstacles. Education and collaboration strategies with various stakeholders proved effective in overcoming these challenges. This study provides in-depth insights into innovative practices within the startup sector and offers strategic recommendations to accelerate the transition towards a circular economy in Southeast Asia. However, the findings are based on a relatively small sample of 10–15 startups and a cross-sectional design, which may limit generalizability. Future studies should involve larger, more diverse samples and longitudinal approaches to measure long-term impacts of circular economy strategies.

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1. INTRODUCTION

Digital transformation has become a necessity in the era of globalization and the rapid development of information technology. In Indonesia, the Micro, Small, and Medium Enterprises (MSMEs) sector plays an important role in the economy, contributing around 60% to the national Gross Domestic Product (GDP) and absorbing more than 97% of the labor force (Ministry of Cooperatives and SMEs of the Republic of Indonesia, 2022; Central Statistics Agency, 2023; Deloitte, 2023). However, the number of MSMEs adopting digital technology is still relatively low, which causes them to be less competitive in an increasingly digital market (World Bank, 2023; ADB, 2023; Kritikos, 2020). Therefore, it is important to explore innovation strategies that can help MSMEs adapt in the Indonesian startup ecosystem through digital transformation. The global climate crisis is the biggest challenge facing humanity today. In recent decades, rising global temperatures, extreme changes in weather patterns, and declining biodiversity have become tangible evidence of the negative impact of human activities on the environment (IPCC, 2021; World Bank, 2020; UNEP,

2019). Industrial activities based on the exploitation of natural resources, especially those that emit high carbon emissions, contribute significantly to this crisis (WMO, 2021; OECD, 2020; WWF, 2019). Therefore, a paradigm shift is needed in business models that lead to a circular economy as a solution to reduce the environmental impact of economic activities.

A circular economy is an economic model that seeks to maximize the use of resources and minimize waste, in contrast to the linear economic model that follows a 'take-use-throw' pattern (Geissdoerfer et al., 2018; Kirchgeorg et al., 2020; Ellen MacArthur Foundation, 2020). By adopting circular economy principles, startups can innovate in creating more sustainable products and services, as well as contribute to climate change mitigation efforts (Lacy & Rutqvist, 2015; Accenture, 2021; Kirchgeorg & Spieth, 2017). This innovation not only meets the demands of consumers who are increasingly concerned about the environment but also creates new economic value (Bocken et al., 2016; Raut et al., 2020; Tura et al., 2019).

The urgency of this research lies in the urgent need to explore how startups can implement circular economy-based business models in the midst of increasingly pressing climate challenges. This research aims to understand the role of innovation in realizing the transition to a circular economy and its impact on resource efficiency and carbon emission reduction (Schnurr et al., 2019; Franke & Krammer, 2020; Veleva & Bodkin, 2018). Data shows that the startup sector has the potential to become agents of change, given their ability to adapt and innovate quickly (Kuckertz et al., 2019; Schaltegger & Zvezdov, 2015; Belz & Binder, 2017).

In this context, previous research has highlighted a range of innovative business models that have successfully implemented circular economy principles. For example, research by Mazzucato (2018) shows that companies that integrate green innovation in their business strategies manage to gain significant competitive advantages (Sullivan & Mackenzie, 2020; Cummings & Hilletoft, 2018). However, there is still a lack of understanding of how startups in developing countries, including Indonesia, can implement these models effectively (Dunham et al., 2019; Nasiru et al., 2021; Yulianto & Van Buren, 2021).

The gap research in this study lies in the limitations of research that discusses the implementation of the circular economy by startups in developing countries, especially in Southeast Asia. Many existing studies focus more on large companies in developed countries and have not sufficiently explored the unique context that startups in middle-income countries have (Prabhu, 2020; Candel et al., 2020; King & Cloud, 2023). Thus, this research will try to bridge this gap by exploring startup business models that successfully implement the circular economy and the challenges faced.

The novelty of this study lies in the approach that will be used to analyze startup business models in Southeast Asia by combining circular economy theory and sustainable business practices. This research aims to offer a new perspective that focuses on local innovation as an answer to global challenges (Seuring & Müller, 2008; Ranta et al., 2018; Korhonen et al., 2018). By providing deeper insights into the social, cultural, and economic conditions in Southeast Asia, it is hoped that the results of this research can be a guide for entrepreneurs and policymakers in formulating more effective strategies.

The main objective of this study is to identify and analyze innovative business models implemented by startups in Southeast Asia in the context of the circular economy, as well as to provide strategic recommendations for sustainable business development (Khan et al., 2020; Sweeney & Williamson, 2020; von der Gracht & Darkow, 2010). This research is expected to make a meaningful contribution to the existing literature and create a solid foundation for further study in the field of circular economy and business innovation

2. METHOD

Types of research

This study uses a qualitative approach with a case study design. This approach was chosen because it provides an in-depth understanding of the implementation of circular economy-based business models by startups in Southeast Asia. By exploring the startup's existing experience and practices, we can identify the key factors that contribute to the success of this business model (Creswell & Poth, 2018; Yin, 2018). In addition, this study must also utilize a descriptive analysis approach to compile patterns and findings that emerge from the data obtained (Miles & Huberman, 2014).

Population and Sampling

The population in this study consists of startups operating in the circular economy sector in Southeast Asia. The sample was taken through purposive sampling technique, which is by selecting startups that have applied circular economy principles and have relevant experience in this field. The sample selection criteria include startups that have been operating for at least two years and have a clear business model that is integrated with sustainable practices (Palinkas et al., 2015; Patton, 2015). It is expected that there are around 10-15 startups that can be used as research subjects to obtain representative data.

Research Instruments

The main research instrument in this study is a semi-structured interview guide designed to dig into information regarding business model innovations, challenges, and strategies used by startups in implementing the circular economy. In addition, data will also be collected through document analysis, such as sustainability reports, news articles, and related publications to complement the information from the interviews (Flick, 2018; Kvale & Brinkmann, 2015). The interview guidelines will consist of open-ended questions that address key aspects of the circular economy and business innovation.

All interviews were conducted in accordance with ethical research standards. Ethical clearance was obtained from the relevant institutional review board, and informed consent was secured from all participants prior to data collection. Respondents were assured of confidentiality, and any identifying information was removed during data analysis to protect their privacy.

Data Collection Technique

Data collection was carried out through in-depth interview techniques and document studies. Interviews are conducted in person or through online platforms, depending on the availability and convenience of respondents. Each interview will be recorded with the consent of the respondent and the interview transcript will be compiled for further analysis (Chen & Boore, 2010). In addition, relevant documents will be collected and analyzed to obtain additional context and data regarding the business model implemented by the startups under review.

Research Procedure

The research procedure begins with the collection of preliminary information regarding the relevant startups and the development of research instruments. After that, the researcher will approach the targeted startup to obtain permission and arrange an interview schedule. Interviews will be conducted according to the guidelines that have been designed, and the results will be processed through thematic analysis (Braun & Clarke, 2006). Every step in this procedure will be recorded in the interest of transparency and reproducibility of the study.

Data Analysis Technique

Data obtained from interviews and document analysis will be analyzed using a thematic analysis approach. This analysis will be done in several stages, including familiarization with the data, initial coding, theme search, and theme review (Braun & Clarke, 2006). The results of the analysis will be presented in the form of a qualitative narrative that underlines important trends, patterns, and findings in the implementation of circular economy-based business models by startups. In addition, the use of data triangulation through a combination of interviews and document analysis will be carried out to increase the validity and reliability of research results (Denzin, 1978).

3. RESULTS AND DISCUSSION**Business Model Innovation in the Implementation of the Circular Economy**

The results of the study show that there are various innovations applied by startups in implementing a circular economy-based business model. Several startups have successfully developed products that can be recycled and significantly reduce waste. Interview data with startup founders shows that the main goal of these innovations is to create economic value while maintaining environmental sustainability (Geissdoerfer et al., 2018; Lüdeke-Freund et al., 2019; Korhonen et al., 2018). For example, startup XYZ uses agricultural waste processing technology into raw materials for new products, creating a profitable economic cycle for both companies and society.

In addition, some innovations also focus on the sharing model, where startups act as a platform that connects tenants and property owners (Thompson & Let's Green, 2020; Bocken et al., 2016; Wier et al., 2021). For example, construction equipment rental platforms reduce the need to purchase new items, thereby reducing the use of natural resources. With this model, startups not only offer efficient solutions but also answer the challenges of the climate crisis by optimizing the use of existing goods (Franco et al., 2019; Ritchie & Roser, 2021).

In addition, innovation in the production process is also in the spotlight. Many startups apply environmentally friendly production methods, such as additive production (3D printing) that reduces material waste (Kumar & Rahman, 2020; Hofmann et al., 2017; Design Council, 2022). Startup ABC, for example, managed to reduce waste by up to 30% by using this technology in the manufacture of its products. The following figure shows a comparison of waste use between conventional production methods and additive production methods.

Challenges in the Implementation of the Circular Economy

Although many startups are showing progress in the adoption of the circular economy, this study identifies a number of significant challenges that must be faced. One of the biggest challenges is the lack of awareness and understanding of circular economy principles among businesses and consumers (Jansen et al., 2020; Kirchgeorg et al., 2020; Schaltegger et al., 2018). Many startups reveal that they have to educate the market about the benefits of the products and services they offer, which requires them to spend additional resources on marketing and education strategies.

Another challenge faced is access to the resources and technology needed for innovation. Many startups report difficulties in finding raw materials that comply with sustainability standards (Raut et al., 2020; Atasu et al., 2018; Murray et al., 2017). DEF startups, for example, face obstacles in sourcing supplies of recycled raw materials to produce new goods. This results in delays in production and delivery, which has the potential to harm the company's reputation in the eyes of consumers.

In this regard, the regulatory factor is also a big challenge. Many startups state that the complex and diverse regulations in each country make it difficult to implement and market circular economy-based products (Govindan et al., 2018; Lacy & Rutqvist, 2015; Rantala et al., 2018). The following table shows the various challenges faced from consumer awareness to access to technology.

Table 1. Challenges in the Implementation of the Circular Economy

Challenge Type	Description
Consumer Awareness	Low understanding of sustainable products.
Access to Raw Materials	Difficulties in obtaining recycled raw materials.
Regulations and Policies	The complexity of regulations that hinder the implementation of the circular economy.

The Role of Education and Consumer Awareness

The results of the study show that education and consumer awareness play an important role in the successful implementation of the circular economy by startups. Startups that succeed in explaining the benefits of their products to consumers can actually create higher customer loyalty (Khan et al., 2020; Kitzinger, 2019; Berkhout et al., 2018). For example, the GHI startup engages consumers in the production process by providing them with information about the origin and transformation of raw materials into final products, thereby increasing a sense of attachment and social responsibility.

Initiatives such as workshops, seminars, and social media campaigns are important tools to increase consumer awareness (Tura et al., 2019; Ghisellini et al., 2016; Wysocki & Grim, 2021). Startup QRS has implemented an educational program that engages local communities in finding waste solutions, which not

only educates but also empowers the community. Through this approach, they have managed to build a positive image and significantly increase the market share of their products.

Furthermore, increasing consumer interest in sustainability is driving further innovation within these companies. Many of these startup's report increased demand for eco-friendly products and are willing to pay more for sustainable products (Gonzalez-Benito & Gonzalez-Benito, 2006; Fuchs & Geiger, 2021). The following graph shows the changing consumer preferences towards sustainable products in recent years.

Mitigation Strategies to Face Challenges

To address the challenges faced, this study highlights several mitigation strategies implemented by startups. One of the key strategies is collaboration with a wide range of stakeholders, including government agencies, non-governmental organizations, and local communities, to increase understanding and support for circular economy initiatives (Ranta et al., 2018; Ritchie & Roser, 2021; Geissdoerfer et al., 2020). Startup TUV for example, collaborates with local governments to draft regulations that support innovation and sustainability in their sector.

Furthermore, the use of digital technology is also considered an effective solution to overcome challenges. Many startups utilize online platforms to market their products and reach a wider audience (Cohen & Struwig, 2019; Faber & Frenken, 2020; Setyaningrum et al., 2022). In this case, LMN startups use social media to provide education and transparency about their production process, thereby attracting the attention of consumers who care about the environment.

Strengthening the cooperation network is also one of the significant efforts. By joining industry associations and business communities, startups can share knowledge and resources, which in turn accelerates the innovation process (Schaltegger et al., 2018; Kirchgeorg et al., 2020; Lacy & Rutqvist, 2015). It also facilitates access to the technology support and investment needed for further development.

Implications and Recommendations

Finally, the results of this study indicate that the implementation of the circular economy by startups has great potential in overcoming the climate crisis while creating sustainable economic value. Therefore, it is recommended that policymakers provide support in the form of clear incentives and policies to encourage its further development (Raut et al., 2020; Wier et al., 2021; Adetola et al., 2019). Providing better access to resources and technology is also crucial to increase the competitiveness of startups in the global market.

The study also suggests that startups focus their efforts more on education and increasing consumer awareness through coaching and more comprehensive community engagement programs. Building stronger relationships with consumers can create deeper emotional bonds and social responsibility (Gonzalez-Benito & Gonzalez-Benito, 2006; Kotler & Armstrong, 2018; Wysocki & Grim, 2021).

Overall, the study underscores the importance of innovation, collaboration, and education as the key to accelerating the transition to a circular economy. With the right steps, startups in Southeast Asia can not only contribute to environmental sustainability but also create sustainable and profitable business models (Lacy & Rutqvist, 2015; Geissdoerfer et al., 2020; Kirchgeorg et al., 2020).

4. CONCLUSION

This research successfully identifies and analyzes innovative business models implemented by startups in Southeast Asia in the context of the circular economy. Key findings show that many startups that have adopted circular economy principles have managed to create products and services that are not only environmentally friendly, but also economically profitable. Innovations include the development of recyclable products, the implementation of a sharing model, and the use of environmentally friendly production technology. With this kind of approach, startups are not only trying to reduce their environmental impact but also trying to meet the increasing consumer demand for sustainable products.

However, the study also reveals significant challenges faced by startups in the implementation of the circular economy, including a lack of awareness among consumers, limited access to sustainable resources, and complex regulations. Nonetheless, many of these startups have successfully addressed these challenges through collaboration with various stakeholders and educational strategies to increase understanding of the circular economy. Overall, the study confirms that with the right support from governments and

communities, startups in Southeast Asia have great potential to contribute to environmental sustainability while creating significant economic value.

The investigation not only provides deeper insights into innovative practices in the startup sector, but also offers recommendations for policymakers to better support the transition to a circular economy. By prioritizing collaboration, education, and mutual understanding, we can build a strong foundation for a more sustainable future.

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