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Strengths, weaknesses, opportunities, and threats of waste management with circular economy principles in developing countries: A systematic review

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Abstract

The waste management problem is still one of the focus areas that need to be addressed in developing countries. In order to overcome the problem, circular economy is potentially be applied, circular economy can be applied. Circular economy is an offered alternative to the traditional linear economy (make, use, dispose of). Economic actors keep resources in use as long as possible, derive maximum value from use, then create and regenerate products and materials at the end of each service life. Circular economy, as a system that will be implemented in developing countries, should consider a number of internal and external elements in order to decide the best approach for the implementation. Therefore, this research aims to identify strengths, weaknesses, opportunities, and threats of waste management with circular economy principles in developing countries. A systematic review is used in this study on published 26 articles on waste management with circular economy principles, especially in developing countries. The result shows that many developing countries do not apply circular economy ideas in dealing with waste management problem. This study concludes that the circular economy brings a new approach to waste management and an incentive for future research that has great strengths and opportunities but also requires efforts to control the shortcomings and threats that are also posed in the implementation of this circular economy.

KEYWORDS

circular economy, developing countries, waste management

1 | INTRODUCTION

The world's population will continue to grow every year; in 2021, the population is estimated to reach 7.8 billion (Zulfikar, 2021). Urban areas are locations that many residents inhabit because of employment opportunities. It should be noted that approximately 228 million of the total population are residents of the 10 largest metropolitan areas in the world (mainly developing countries) (Diaz, 2017). Most developing countries have problems caused by the increase in waste for urban res-

idents, including environmental pollution, air pollution, lack of water supply, complex traffic jams, and inadequate sanitation access. The total waste in urban areas generated worldwide is approximately 1.3 billion tons per year, calculated using an estimated waste generation of 0.5 kg capita-day⁻¹ (Ezeudu & Ezeudu, 2019).

The topic of waste management is one of the most concerned issues in developing countries. Some critical needs that need to be reviewed are the readiness of political will to solve problems, clarity related to rules and regulations, funding problems to overcome waste problems,

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integration of waste problems in education curricula at all levels (Ferronato et al., 2019). Notably, there is no policy in developing countries related to the circular economy, especially for waste management. The significant obstacle to managing municipal waste properly is lack of political will. Converting a dumpsite into a sanitary landfill to improve waste management requires large fundraiser compared to the option of doing nothing, and only a few country leaders are willing to invest in this because it is politically unprofitable despite its potential urgency (Esa et al., 2017).

Linear economies involving linear processes have been adapted to production processes and supply chains in the 20th century (Halog & Anieke, 2021). The absence of the benefits of producing goods from raw materials, consumption, and final disposal are linear (Sariatli, 2017). Until the 20th century, great successes concerning the generation of material wealth were recorded in industrialized countries adapting linear economies (Sariatli, 2017). Despite the previous successes, scientists have predicted the linear economy's weakness and collapse in the 21st century. Switching from linear economy to circular economy is the appropriate way to ensure that future generations have sustainable natural resources such as comfortable environment, adequate food, abundant water, and prosperity.

Developing countries need to implement circular economy that provides broad benefits, especially to achieve sustainable development goals (SDGs)

Encouraging the circularity of resources in production is one of the exemplary efforts based on the circular economy concept that is applied to help solving environmental problems that arise due to improper waste management in today's era. In achieving global sustainability, states and local governments need a practical approach: the circular economy, one of the concepts gaining global appeal in dealing with solid waste issues. Additionally, policymakers in advanced countries and international organizations like the United Nations, etc. are currently very concerned about the development of the circular economy. Developing countries need to implement circular economy that provides broad benefits, especially to achieve sustainable development goals (SDGs). This should be conducted in order to ensure that sustainable consumption and production patterns are in line with the circular economy concept (Schroeder et al., 2019). Addressing the issue, the purpose of this paper is to review the literature based on strengths, weaknesses, opportunities, and threats regarding waste management with circular economy principles in developing countries.

2 | MATERIALS AND METHODS

This review described the strengths, weaknesses, opportunities, and threats in waste management with circular economy principles. The PRISMA theory (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) was applied in all stages of the review. Three keywords were used as key words during the search process, and 73 articles were obtained. The keywords were waste management, circular economy, and developing countries. The inclusion criteria in this review article are that the article must be in English and the research was conducted in a developing country. Afterwards, the articles were selected based on the suitability of titles and abstracts. Finally, 26 most relevant articles were selected and used in this study.

2.1 | Eligibility criteria

The PICOC (Participant-Intervention-Comparison-Outcomes-Context) format, based on the Joanna Briggs Institute (JBI) (Institute, 2014), was used to review articles by establishing inclusion criteria

The PICOC (Participant-Intervention-Comparison-Outcomes-Context) format, based on the Joanna Briggs Institute (JBI) (Institute, 2014), was used to review articles by establishing inclusion criteria. Articles on utilizing circular economy principles in waste management (e.g., inorganic waste, organic waste, manufacturing waste, electronic waste) were included in this review. The articles with inappropriate subject descriptions including articles on waste management without circular economy principles, articles that were not published in academic journals (e.g., unpublished dissertations) as well as studies on waste management in circular economy in developed countries were excluded from the study. The final outcome of this study was intended to measure strengths, weaknesses, opportunities, and threats of waste management with circular economy principles in developing countries.

2.2 | Search strategy

Some relevant keywords used in this research are: "waste management", "circular economy", and "developing countries". Appropriate

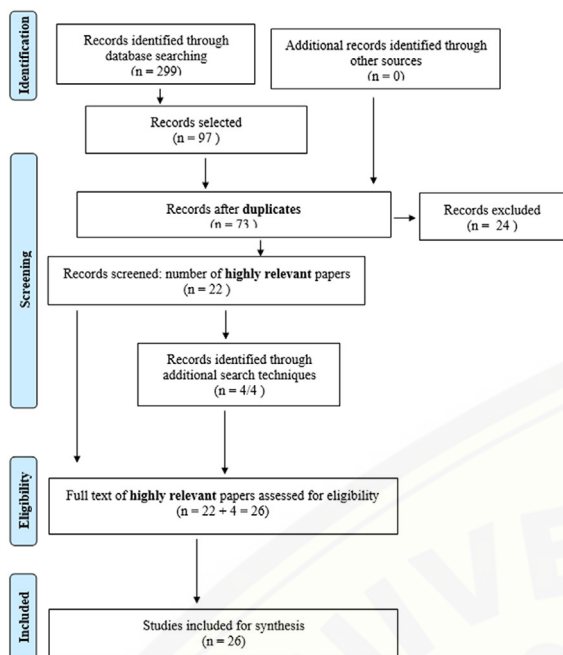


EXHIBIT 1 Summary of evidence selection and search [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

article titles and abstracts are reviewed in-depth related to the topic's relevance to the strengths, weaknesses, opportunities, and threats of waste management with circular economy principles in developing countries.

EXHIBIT 2 Research methodology and geographic distribution are reviewed in a database of 26 papers

	Reference	Total papers
Research methodology		
Literature review	(Esa et al., 2017; Manickam & Duraisamy, 2019; Ngan et al., 2019; Priyadarshini & Abhilash, 2020; Sharma et al., 2020; Wright et al., 2019)	6
Case study	(Bekchanov & Mirzabaev, 2018; Ddiba et al., 2020; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Kurniawan et al., 2021)	4
Model	(Da Silva, 2018)	1
Survey	(Ferronato, 2021; Ritzén & Sandström, 2017)	2
Theoretical and conceptual papers	(Goyal et al., 2018)	1
Analysis	(Bekchanov & Mirzabaev, 2018; Borrello et al., 2016; Diaz, 2017; Guarnieri et al., 2020; Ilić & Nikolić, 2016; Luttenberger, 2020; Manninen et al., 2018; Oliveira et al., 2018; Ribić et al., 2017; Schneider et al., 2017; Symeonides et al., 2019; Tariq et al., 2021)	12
Geographical context		
Asia	(Bekchanov & Mirzabaev, 2018; Esa et al., 2017; Goyal et al., 2018; Kurniawan et al., 2021; Manickam & Duraisamy, 2019; Priyadarshini & Abhilash, 2020; Schneider et al., 2017; Sharma et al., 2020; Tariq et al., 2021)	9
Europe	(Ilić & Nikolić, 2016; Luttenberger, 2020; Ribić et al., 2017; Symeonides et al., 2019)	4
America	(Da Silva, 2018; Ferronato, 2021; Guarnieri et al., 2020; Oliveira et al., 2018)	4
Africa	(Ddiba et al., 2020; Ezeudu & Ezeudu, 2019)	2
Worldwide	(Borrello et al., 2016; Diaz, 2017; Ferronato et al., 2019; Manninen et al., 2018; Ngan et al., 2019; Ritzén & Sandström, 2017; Wright et al., 2019)	7

2.3 | Study selection

The databases used in this study are Elsevier, Web of Science, and Scopus for articles published between 2016 and 2021. Relevant abstracts were reviewed without duplication of articles.

2.4 | Synthesis of results

The results of this review were explained in a narrative form including comprehensive descriptions of systematic review of strengths, weaknesses, opportunities, and threats of waste management with circular economy principles in developing countries (Exhibit 1).

3 | RESULTS AND DISCUSSION

The results of the analysis of selected articles from 26 articles are described in several sub-chapters; the methodology used and the geographical distribution of each paper, and the results can be seen in Exhibit 2. The table describes the number of papers reviewed based on several research methodologies specified by the author. The percentage value obtained for each sub-section is discussed in detail below.

3.1 | Paper distribution

Exhibit 3 depicts the distribution of all 26 papers. This figure shows that articles from 2016 to 2021 experienced fluctuations in growth. The number of publications increased from 2017 to 2019 and then

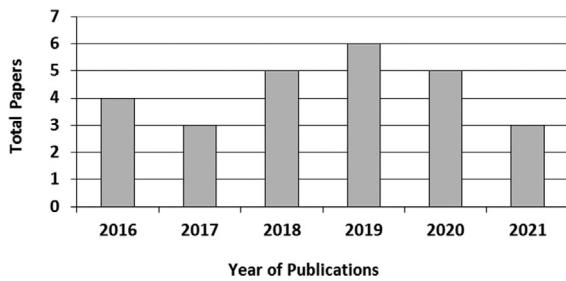


EXHIBIT 3 Distribution of reviewed papers by year of publication

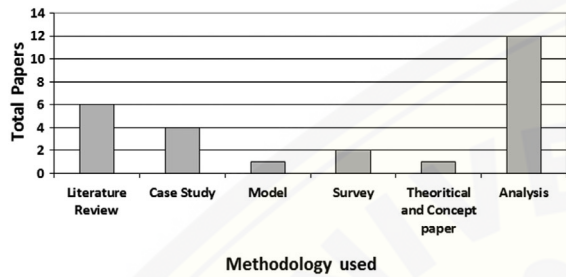


EXHIBIT 4 Distribution of reviewed papers by research methodology used

decreased from 2020 to 2021. The increase in publications over a certain period means that developing countries show an increasing interest in the circular economy. Circular economy helps solve the problem of waste management and promotes the efficiency of material resources in the waste management process.

3.2 | Research methodology

The results for the research methodology used in the 26 reviewed articles are presented in Exhibit 4. Research methodologies used in published circular economy studies are analysis, literature reviews, case studies, models, surveys, and finally, theoretical, and conceptual papers. The 26 articles were conducted in different geographic areas, including Europe, Asia, and America. In Europe, the countries reviewed as case studies are developing countries based on World Bank data, including Serbia, Croatia, and Cyprus. Meanwhile, the countries reviewed as case studies in Asia are Vietnam, Sri Lanka, and Pakistan. Most of the articles reviewed in America focus on Brazil. This clearly shows that developing countries are very interested in implementing circular economy-related to their response to environmental problems due to their growing population.

The most used design in case study, while the second is merely literature review. It can be identified and illustrated in Exhibit 4. A total of six reviewed papers used literature review as research methodology to review previous studies on circular economies in other areas. As another comparison, four other papers use case studies to explain the circular economy in several geographic regions. Two articles cite surveys as the methodology used, one article cites models, and finally, theory and concepts are the least cited methods in journals with one paper.

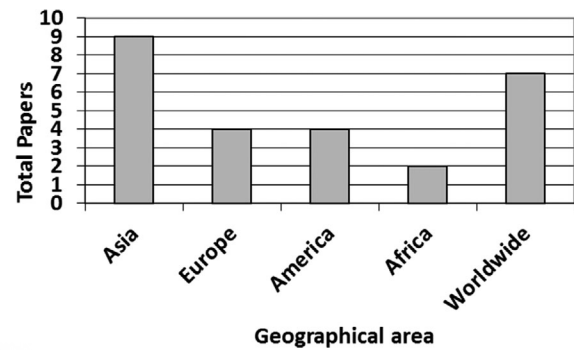


EXHIBIT 5 Total geographic distribution reviewed in selected papers

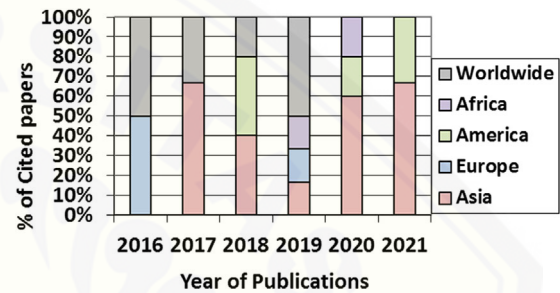


EXHIBIT 6 Percentage of geographic distribution of reviewed papers per year of publication [Color figure can be viewed at wileyonlinelibrary.com]

3.3 | Geographical distribution

Geographical distribution identifies the country or region from which research is generally carried out, and different countries or geographical areas are taken each year of publication. Asia, Europe, America, and Africa were the setting in which the studies were conducted, illustrated in Exhibit 5.

Many authors referred to European Union to make the setting of the studies being pseudo. However, this review has some exceptions where one country is quoted and included in a systematic review. For certain countries, no reference is made because, as illustrated in the Exhibit 5.

The geographic distribution illustrated in Exhibit 6 contains the year of publication. It shows different percentages based on papers reviewed in each country and region and taken in the year of publication between 2016 and 2021. Asia has high publication rate from 2017 to 2021 based on Exhibit 6, followed by Europe, and America, while Africa has a minor publication among the others. In 2019, Asia is the continent that has most publication in circular economy. Several developing countries in Europe experienced a downward trend in publications related to the circular economy from 2016. As circular economy has become a widely adopted policy to address the problem of waste management in the European region., publications related to the circular economy on the African continent began to experience a significant increase in 2019. While in America, especially in Brazil, research on the circular economy started to appear in 2018 and beyond. Brazil is

EXHIBIT 7 Assessment of strengths, weaknesses, opportunities, and threats of waste management with circular economy principles**Strengths**

- The waste stream turns into a valuable resource with several possibilities on offer. (Bekchanov & Mirzabaev, 2018; Borrello et al., 2016; Esa et al., 2017; Goyal et al., 2018; Oliveira et al., 2018; Ribić et al., 2017; Sharma et al., 2020; Symeonides et al., 2019)
- Reducing greenhouse gas emissions and improving the environment. (Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Luttenberger, 2020; Manninen et al., 2018; Ngan et al., 2019; Priyadarshini & Abhilash, 2020; Schneider et al., 2017)
- Produces simultaneously bio-based chemicals and energy. (Bekchanov & Mirzabaev, 2018; Esa et al., 2017; Ngan et al., 2019; Oliveira et al., 2018; Schneider et al., 2017; Sharma et al., 2020)
- “Reduce Reuse Recycle” reduces costs. (Da Silva, 2018; Ddiba et al., 2020; Diaz, 2017; Esa et al., 2017; Ezeudu & Ezeudu, 2019; Ferronato, 2021; Guarnieri et al., 2020; Halog & Anieke, 2021; Kurniawan et al., 2021; Luttenberger, 2020; Manickam & Duraisamy, 2019; Priyadarshini & Abhilash, 2020; Ribić et al., 2017; Schneider et al., 2017; Symeonides et al., 2019)
- Creates synergies in cooperative projects. (Ddiba et al., 2020; Esa et al., 2017; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Guarnieri et al., 2020; Ngan et al., 2019; Sharma et al., 2020)

Opportunities

- A high amount of waste is available. (Da Silva, 2018; Esa et al., 2017; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Guarnieri et al., 2020; Kurniawan et al., 2021; Priyadarshini & Abhilash, 2020; Ribić et al., 2017; Schneider et al., 2017; Sharma et al., 2020; Symeonides et al., 2019)
- Relevant investment introduced by the Government. (Ferronato, 2021; Ferronato et al., 2019; Manninen et al., 2018; Oliveira et al., 2018; Priyadarshini & Abhilash, 2020)
- Possible inclusion of big industries and private companies. (Ddiba et al., 2020; Esa et al., 2017; Ferronato et al., 2019; Guarnieri et al., 2020; Ngan et al., 2019; Oliveira et al., 2018; Ribić et al., 2017)
- Optimization of the collection. (Bekchanov & Mirzabaev, 2018; Borrello et al., 2016; Diaz, 2017; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Kurniawan et al., 2021; Ngan et al., 2019; Priyadarshini & Abhilash, 2020; Schneider et al., 2017; Sharma et al., 2020; Symeonides et al., 2019)

Weakness

- Structural weaknesses for innovation systems lead to technological immaturity and stakeholder networks. (Da Silva, 2018; Ddiba et al., 2020; Diaz, 2017; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Guarnieri et al., 2020; Ilić & Nikolić, 2016; Manninen et al., 2018; Ribić et al., 2017; Ritzén & Sandström, 2017; Sharma et al., 2020; Symeonides et al., 2019)
- Supply chain management complexity and logistics costs. (Bekchanov & Mirzabaev, 2018; Esa et al., 2017; Ferronato et al., 2019; Guarnieri et al., 2020; Ilić & Nikolić, 2016; Ngan et al., 2019; Ribić et al., 2017; Schneider et al., 2017; Symeonides et al., 2019)
- Environmental and seasonal factors limit the availability of sufficient biomass. (Borrello et al., 2016; Esa et al., 2017; Schneider et al., 2017; Sharma et al., 2020; Symeonides et al., 2019; Wright et al., 2019)
- Other sources are often better in product efficiency. (Ddiba et al., 2020; Esa et al., 2017; Ezeudu & Ezeudu, 2019; Ferronato, 2021; Ilić & Nikolić, 2016; Ngan et al., 2019)
- Unsupportive government policy. (Ddiba et al., 2020; Diaz, 2017; Guarnieri et al., 2020; Ilić & Nikolić, 2016; Kurniawan et al., 2021; Ngan et al., 2019; Sharma et al., 2020)

Threats

- High investments are required for including the population with sensitivity campaigns. (Bekchanov & Mirzabaev, 2018; Ddiba et al., 2020; Diaz, 2017; Esa et al., 2017; Ferronato et al., 2019; Guarnieri et al., 2020; Symeonides et al., 2019)
- Difficulties in the application of selective collection systems into the community. (Diaz, 2017; Ezeudu & Ezeudu, 2019; Ferronato, 2021; Ferronato et al., 2019; Ngan et al., 2019; Priyadarshini & Abhilash, 2020; Ribić et al., 2017; Schneider et al., 2017; Sharma et al., 2020; Symeonides et al., 2019)
- Difficulties in control and monitoring. (Da Silva, 2018; Ferronato et al., 2019; Guarnieri et al., 2020; Ilić & Nikolić, 2016; Sharma et al., 2020)
- Lack of space for introducing new waste management plants and facilities. (Borrello et al., 2016; Ddiba et al., 2020; Esa et al., 2017; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Kurniawan et al., 2021; Manninen et al., 2018; Ngan et al., 2019; Ribić et al., 2017; Symeonides et al., 2019)
- Data available are mostly incomplete. (Bekchanov & Mirzabaev, 2018; Ddiba et al., 2020; Ferronato et al., 2019; Schneider et al., 2017)
- High investment risk. (Diaz, 2017; Ferronato et al., 2019; Guarnieri et al., 2020; Kurniawan et al., 2021; Ribić et al., 2017; Symeonides et al., 2019; Tariq et al., 2021; Wright et al., 2019)

currently developing circular economy at the national level, which correlates with global recognition.

3.4 | Strengths, weaknesses, opportunities, and threats of waste management with circular economy principles in developing countries

Articles published in the last five years or about 80% show that circular economy studies are developing, especially in developing countries (Homrich et al., 2018). Exhibit 7 discusses the main results obtained in the systematic review analysis related to the strengths, weaknesses,

opportunities, and threats for the circular economy in the context of waste management in developing countries.

The first point is about power, a valuable resource that can be transformed by a waste stream which is an available offer. Circular economy approach in waste management will produce a valuable resource such as electrical energy that provides benefits to people in developing countries (Bekchanov & Mirzabaev, 2018; Borrello et al., 2016; Esa et al., 2017; Goyal et al., 2018; Oliveira et al., 2018; Ribić et al., 2017; Sharma et al., 2020; Symeonides et al., 2019). The application of circular economy in waste management will have a good impact on the environment and reduce greenhouse gas emissions (Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Luttenberger, 2020;

Manninen et al., 2018; Ngan et al., 2019; Priyadarshini & Abhilash, 2020; Schneider et al., 2017). Some waste management processes that are less than optimal will produce gases that cause greenhouse gas emissions. Instead, the implementation of circular economy will create bio-based energy and have chemicals at the same time (Bekchanov & Mirzabaev, 2018; Esa et al., 2017; Ngan et al., 2019; Oliveira et al., 2018; Schneider et al., 2017; Sharma et al., 2020), and there will be cost reductions due to the length of the economic chain which causes wasted costs in waste management if linear economy is applied (Da Silva, 2018; Ddiba et al., 2020; Diaz, 2017; Esa et al., 2017; Ezeudu & Ezeudu, 2019; Ferronato, 2021; Guarnieri et al., 2020; Halog & Anieke, 2021; Kurniawan et al., 2021; Luttenberger, 2020; Manickam & Duraisamy, 2019; Priyadarshini & Abhilash, 2020; Ribić et al., 2017; Schneider et al., 2017; Symeonides et al., 2019). Waste management with circular economy principles in developing countries will provide opportunities to create synergy in cooperative projects for abundant parties (Ddiba et al., 2020; Esa et al., 2017; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Guarnieri et al., 2020; Ngan et al., 2019; Sharma et al., 2020).

The immaturity of technology and stakeholder networks are structural weakness for existing innovation systems in developing countries (Da Silva, 2018; Ddiba et al., 2020; Diaz, 2017; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Guarnieri et al., 2020; Ilić & Nikolić, 2016; Manninen et al., 2018; Ribić et al., 2017; Ritzén & Sandström, 2017; Sharma et al., 2020; Symeonides et al., 2019). Logistics costs and supply chain management complexity are also problems that will be faced in the application of waste management with the principles of circular economy (Bekchanov & Mirzabaev, 2018; Esa et al., 2017; Ferronato et al., 2019; Guarnieri et al., 2020; Ilić & Nikolić, 2016; Ngan et al., 2019; Ribić et al., 2017; Schneider et al., 2017; Symeonides et al., 2019). Most developing countries do not have sufficient biomass availability due to environmental and seasonal factors (Borrello et al., 2016; Esa et al., 2017; Schneider et al., 2017; Sharma et al., 2020; Symeonides et al., 2019; Wright et al., 2019). In some cases, the efficiency of the final product is often uncompetitive with other sources (Ddiba et al., 2020; Esa et al., 2017; Ezeudu & Ezeudu, 2019; Ferronato, 2021; Ilić & Nikolić, 2016; Ngan et al., 2019), and government policies are not supportive (Ddiba et al., 2020; Diaz, 2017; Guarnieri et al., 2020; Ilić & Nikolić, 2016; Kurniawan et al., 2021; Ngan et al., 2019; Sharma et al., 2020). This will hinder the development of waste management with the principle of circular economy in developing countries.

Opportunities for successful implementation of waste management with circular economy principles in developing countries can be achieved because of the high amount of waste available caused by the increasing number of people in developing countries (Da Silva, 2018; Esa et al., 2017; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Guarnieri et al., 2020; Kurniawan et al., 2021; Priyadarshini & Abhilash, 2020; Ribić et al., 2017; Schneider et al., 2017; Sharma et al., 2020; Symeonides et al., 2019). Ironically, top 10 highest populated countries are developing countries. Based on several other studies, the circular economy is a relevant investment introduced by the government (Ferronato, 2021; Ferronato et al., 2019; Manninen et al., 2018; Oliveira et al., 2018; Priyadarshini & Abhilash, 2020). The inclusion of big indus-

tries and private companies are possible to manage waste management with circular economy in developing countries (Ddiba et al., 2020; Esa et al., 2017; Ferronato et al., 2019; Guarnieri et al., 2020; Ngan et al., 2019; Oliveira et al., 2018; Ribić et al., 2017). Optimizing of the collection will provide economic benefits that affect local, national and global economy (Bekchanov & Mirzabaev, 2018; Borrello et al., 2016; Diaz, 2017; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Kurniawan et al., 2021; Ngan et al., 2019; Priyadarshini & Abhilash, 2020; Schneider et al., 2017; Sharma et al., 2020; Symeonides et al., 2019).

The threat to the implementation of waste management with circular economy is to involve population campaigns that requires high investment (Bekchanov & Mirzabaev, 2018; Ddiba et al., 2020; Diaz, 2017; Esa et al., 2017; Ferronato et al., 2019; Guarnieri et al., 2020; Symeonides et al., 2019). Significant funds are needed to switch from linear economy to circular economy, resulting in high investment risk (Diaz, 2017; Ezeudu & Ezeudu, 2019; Ferronato, 2021; Ferronato et al., 2019; Ngan et al., 2019; Priyadarshini & Abhilash, 2020; Ribić et al., 2017; Schneider et al., 2017; Sharma et al., 2020; Symeonides et al., 2019). The high investment risk has become an obstacle in the development of the implementation of waste management with the circular economy principle. In developing countries, data availability is inadequate (Da Silva, 2018; Ferronato et al., 2019; Guarnieri et al., 2020; Ilić & Nikolić, 2016; Sharma et al., 2020). Most of the existing data are not well recorded in the end, resulting difficulties in controlling and monitoring (Borrello et al., 2016; Ddiba et al., 2020; Esa et al., 2017; Ezeudu & Ezeudu, 2019; Ferronato et al., 2019; Kurniawan et al., 2021; Manninen et al., 2018; Ngan et al., 2019; Ribić et al., 2017; Symeonides et al., 2019). The mindset of the community is also a threat in implementing the circular economy because one of the components of waste management is the application of selective collection systems into the community (Bekchanov & Mirzabaev, 2018; Ddiba et al., 2020; Ferronato et al., 2019; Schneider et al., 2017). Lack of loopholes to introduce new waste management facilities and new waste management plants is another emerging threat (Diaz, 2017; Ferronato et al., 2019; Guarnieri et al., 2020; Kurniawan et al., 2021; Ribić et al., 2017; Symeonides et al., 2019; Tariq et al., 2021; Wright et al., 2019).

4 | FUTURE PERSPECTIVE AND RECOMMENDATION

Researchers in various journals spread worldwide have widely used the taxonomy of the circular economy concept. The idea of circular economy has been discussed in the past few decades. This paper aims to discover the gaps in developing countries in handling waste management with circular economy concept through systematic review. Hopefully, new research will be proposed based on this systematic review. The findings in this systematic review can contribute to other researchers in the future who will look at the link between waste management and circular economy principles. They will understand the strengths, weaknesses, opportunities, and threats to implement waste management with circular economy principles in developing countries. It is envisaged that by providing an obvious explanation, it

will be possible to assist the implementation of a waste management based on circular economy principles in nations or regions where the policy is ineffective. This paper highlights that the circular economy brings new concepts in waste management in developing countries but needs adjustments in several aspects contained in this paper. There are several recommendation for future researchers. First, formulating an appropriate model to implement waste management with circular economy principles in developing countries based on strengths, weaknesses, opportunities, and threats is advisable. Second, further investigation of circular economy practices in waste management and its value chain should be conducted, particularly in developing countries with high populations. Third, examine the relationship between the circular economy and other related aspects through correlational study is highly recommended, especially regarding to the application to waste management.

5 | CONCLUSION

Introduced to address waste management issues and achieving sustainability, circular economy is a concept that potentially attract discussion in the future. As a result of this study, "Reduce Reuse Recycle" reduces costs is an example of the strength of implementing the circular economy that is most commonly identified in developing countries. The high amount of waste available and optimization of the collection are the opportunity factors that can be maximized in implementing circular economy in developing countries. The most challenging obstacle in implementing circular economy in developing countries is the lack of structural role in innovation system that results in underdevelopment of technology and the absence of solid stakeholder network. Besides, the issues in monitoring controlled programs and high investments risks should be overcome.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data supporting this study findings are available from the corresponding author upon reasonable request.

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