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TRANSFORMING WASTE IN THE PHILIPPINES: CIRCULAR ECONOMY'S IMPACT ON BUSINESS AND ENVIRONMENT

Justine Marc SALVACION[1*], Karl CAMPOS[2]

[1]*University of Southeastern Philippines, Davao City, Philippines, jmpsalvacion01202401176@usep.edu.ph*
[2]*University of Southeastern Philippines, Davao City, Philippines, karl.campos@usep.edu.ph*

Abstract: *Circular economy's (CE) increasing attention leads to many countries adopting it and became a policy tool to advance sustainability as stated in the research of (Padilla-Rivera et al., 2020). This study focused on how CE can impact both business and the environment specifically in the Philippines to address the notable lack of literature review focusing on this topic in the context of the Philippines. The research derived themes such as a lack of regulatory framework, strengthening and standardization for better implementation, and low awareness. The study showed that addressing these issues and fostering practices that promote sustainability and economic growth is essential. Lastly, this research provides a better view of how proper implementation of the CE can affect both business and the environment.*
Keywords: *Circular economy, Philippines, sustainability, business practices, environment*

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1. Introduction

Sustainability of the environment is crucial, especially in the current context, where climate change has become a significant and serious problem for all of us. As a result, the Circular Economy (CE) has attracted increasing research interest and is being embraced by various stakeholders, including municipal and national governments, academia, and businesses. Consequently, CE has emerged as a policy tool to advance sustainability (Padilla-Rivera et al., 2020). It is important for businesses to minimize their consumption of raw materials in order to conserve the limited resources available. Additionally, by utilizing and applying CE principles, traditional linear economies based on the "take, make, dispose" model can be transformed (Zhu et al., 2018).

The Circular Economy (CE) represents a new sustainable paradigm driven by the understanding that resources can be utilized and allocated more efficiently. This approach aims to minimize waste and emissions through a circular cycle, contrasting with the traditional linear model of make-use-dispose (Geissdoerfer et al., 2017). However, while Murray et al. (2017) highlight that circular approaches can enhance certain aspects of sustainability, they note a significant gap in integrating social dimensions. A literature review conducted by Padilla-

* Corresponding author

Rivera et al. (2020) further indicates that despite being promoted as a tool for sustainable development, the current CE framework lacks clarity regarding its ability to enhance social well-being for both present and future generations. Which compromises the impact of CE, thus, with the current framework of CE there is no guarantee that this will provide a more sustainable model compared to linear economies. Moreover, the social dimension is a crucial aspect of both CE and sustainable development. Corvellec et al. (2021) critique the CE, arguing that it falls short of its advocates' claims. The literature review conducted by them points out inherent limitations, unclear theoretical foundations, and potential obstacles to implementation, suggesting that the concept may not be as promising as it appears.

In the context of Philippines, according to the World Bank classification, the Philippines is a lower middle-income country and one of the emerging market economies in the East Asia and Pacific region. While the country boasts a globally recognized competitive workforce (United Nations Industrial Development Organization), it also faces significant environmental issues. The Philippines is one of the largest contributors to global ocean plastic pollution, generating an estimated 2.7 million tons of plastic waste each year, with approximately 20 percent ending up in the ocean (United States Agency for International Development). This situation highlights that the Circular Economy (CE) in the Philippines remains inefficient, disorganized, and underdeveloped. One indicator of this inefficiency is the difficulty in penetrating international solid waste management markets. Additionally, Plastic Flamingo (Plaf) has pointed out that there is currently no local market for recyclables, leading to most recycled products being exported. Case study participants also expressed concerns about the poor implementation and enforcement of the provisions of RA 9003. For instance, Barangay Mintal noted ongoing challenges in enforcing basic provisions of the law, such as source segregation and proper sorting and handling (Bueta et al., 2023).

While existing literature reviews has examined the Circular Economy (CE) and its impact on various aspects, especially the environment, there is a notable lack of literature review focusing with this topic in the context of the Philippines. Therefore, this review will not solely focus on the international environmental impact of CE, this literature review will focus on the impact of Circular Economy (CE) towards the business and environmental aspect of the Philippines. The aim is to evaluate if CE can significantly influence the businesses and environment of the Philippines if implemented properly and efficiently. Additionally, this research will serve as a foundation for future studies that seek to expand on the scope of CE and its impacts.

2. Methodology

This review adheres to general systematic review principles (Tranfield et al., 2003) and is based on research articles published from 2014 to September 2024. The academic databases used for searching included Google Scholar, Semantic Scholar, ScienceDirect, and Philippine Institute for Development Studies. The time span was selected to determine the significant impact of Circular Economy (CE) to the environment and businesses of the Philippines over the past decade.

The literatures that will be candidates for literature review were determined and filtered with the use of keywords: “circular economy Philippines,” “business impact of circular economy in Philippines,” “environmental impact of circular economy in Philippines,” “environment circular economy AND Philippines,” “business AND circular economy AND Philippines,” “circular economy AND Philippines.” The first search generated approximately 6,240 potential studies.

To narrow these potential studies, a two-step screening which includes practical screening, and inclusion criteria (Becheik et al., 2006). Practical screening was applied to titles and abstracts of the 6,240 potential studies to eliminate duplicates and research that are not aligned with the review's aim. This screening was done by the author to ensure that all relevant studies were included. The searching was limited to topics that are published in the English language, specific timeframe that was set for this review, review articles and specifically in the Philippine context. Following the application of practical screening, 268 relevant studies were determined.

For the second step of the screening, studies must meet the criteria of the review to be considered in the final literature review:

- **Circular Economy**. Economic concepts such as reduction of waste production, efficient resource allocation, 3Rs, and sustainable production should be covered.
- **Impact on the Environment**. The research should assess the impact of CE on the environment, including but not limited to the management of waste, mitigating pollution, and proper usage of resources.
- **Impact on the Business**. The study should examine the impact of CE on businesses, such as innovation, economic benefits, efficiency in operations, and employment.
- **Context**. The research must be conducted in the Philippine context, ensuring that the research that will be used will reflect the current situation of the country.
- **Methodology and Publication Date**. To support the findings the study must use a strong methodology, which includes qualitative and quantitative approaches. On the other hand, the study should be recent (e.g., published within the last 10 years) to ensure that the results and information are current and reflective of the current situation in the country.

The screening was applied to abstract, results, conclusion sections of the studies. After the review, it was found that 48 studies did not meet the criteria. As a result, 78 potential studies were kept for analysis. Finally, a full reading was conducted to determine the final studies that will be included for the literature review. Then, it was determined that only 30 will be included for the literature review process. The figure below shows the process adopted to carry out the literature review.

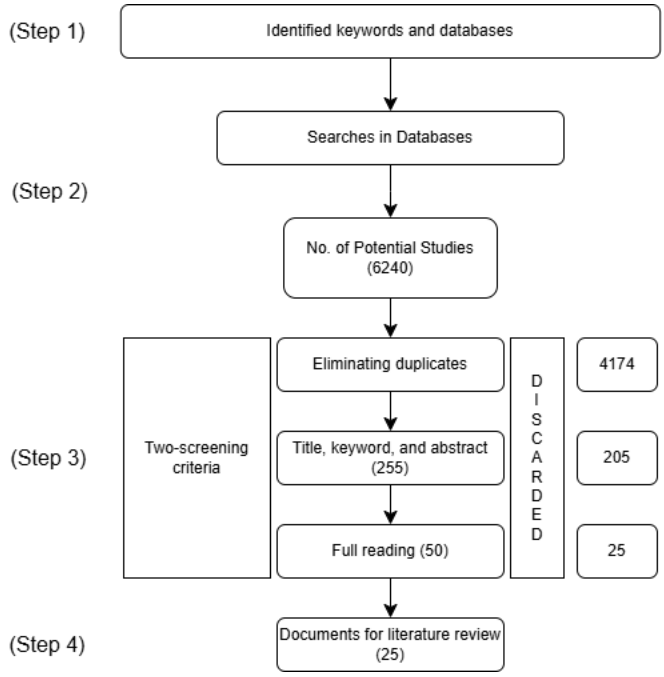

Figure 1. Research strategy implemented to undertake the systematic review
Source: Model adapted from the research of Padilla-Rivera et al., 2020)

3. Literature review

3.1. Introduction to Circular Economy (CE)

Circular Economy (CE) is defined as a model for transforming an economy that seeks to separate economic growth from improper resource consumption and environmental exploitation (Ekins et al., 2019).

Furthermore, their study provided a wide coverage and answered the questions; What is CE? Why adopt CE? And Where is CE implemented?

1. **What is CE?** According to Ekins et al. (2019), CE can be used to minimize waste and properly make use of resources. It aims to create a system wherein the lifecycle of a product is extended which reduces the consumption of finite resources. One principle is resource circularity which contradicts the traditional linear model of production. Resource circularity refers to the continuous use of resources by reusing and recycling the materials from waste produced.
2. **Why adopt CE?** CE can help address the environmental issues that the world is currently facing. Adopting CE can help mitigate climate change and resource depletion. Moreover, CE can provide job opportunities and innovation that lead to strengthening government policies in order to properly shift towards CE.
3. **Where is CE implemented?** With the attention that the CE gained, numerous countries are adopting CE, particularly in Europe. Europe established the European Union's Circular Economy Action Plan to provide countries a guide how to transition towards CE. On the other hand, CE can be implemented in various industries and aspects; manufacturing and service industry. Additionally, CE is implemented in the community with the 3Rs that focus on waste reduction and local resource management.

The research of Ekins et al. (2019), highlighted that CE is not only essential for mitigating environmental issues, but also offers economic and social benefits. On top of that, a change across various sectors, innovative business models, and supportive policy frameworks are all essential for successful implementation of CE. Thus, there is a need for collaboration between governments, businesses, and communities to overcome barriers in transitioning towards CE.

3.2. Current state of circular economy in the Philippines

Having laws and regulations on how to manage waste will not just benefit the businesses but also the environment in which the resources are coming from. By implementing CE in the Philippines and with proper governance the country will achieve a sustainable environment. In addition, it will help business to practice how to reduce waste production, have good waste management, resource allocation, and other benefits that CE could offer.

As stated in the research of Borongan and NaRanong (2022), the Philippines, specifically Manila and other Local Government Units (LGUs), should promote a wide range of practices that move beyond the traditional linear "take, make, use, dispose." This allows barangays and LGUs to take more responsibility in achieving long-term waste management and promoting circularity.

On top of that, the study of Quisquisan (2024), revealed that there is an absence of ordinances or governmental regulations that will determine their role and responsibility in managing the waste produced in terms of Construction and Demolition Waste (CDW). The study revealed that there is a transfer of responsibility which reflects how unconcerned the participants are about the endpoint of the waste generated from their project. Additionally, the study also presented a framework that to ensure an effective implementation discussion towards the roles and responsibilities of stakeholders are necessary and that these rules and

regulations are in the contract agreements to legally bind the waste management system throughout the different phases of construction.

In correlation with this, the construction sector contributed seven percent (7%) of the country's gross domestic product (GDP) in 2023. The national government's infrastructure program brought in approximately 14.2 million pesos (Balita, 2024). With 270,311 people that are in the construction industry implementing the circular economy, it can make a big impact. Presented below is a statistical representation of the numbers of workers in each construction category.

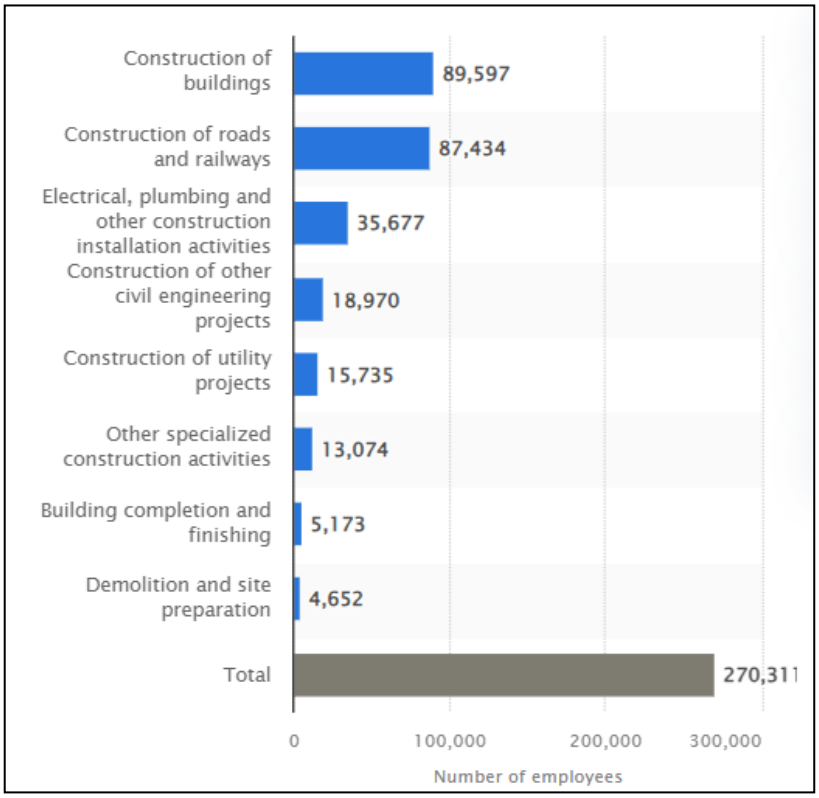

Figure 2. Number of employees in the construction establishments in the Philippines in 2021, by industry group

Source: Statista

According to the results discussed in the study of Pintor and Godezano (2019), there are seen efforts by the government to recognize science and technology as facilitators of innovative trash management techniques. The government appears to need to re-institutionalize the programs for trash management, which are funded by the National Government and local government units. Additionally, the government has to improve its collaboration with the business sector by providing incentives to organizations that support the circular economy to inspire them to develop creative goods designed with this in mind. Innovation, science, and technology should also be embedded in the nation's government and educational framework to facilitate technology developments and find use in waste management-related issues. Without question, the Philippines needs to do more to foster the creation of new knowledge. And to make the conversion of knowledge into useful applications. Increased support and political are also needed.

The research presented highlighted the current state of the Circular Economy (CE) in the Philippines, revealing both its potential and existing challenges. It is evident that proactive measures are necessary to leverage CE to the country's advantage. The findings indicate a

significant gap in collaboration between the Philippine government and private sector, which hinders innovation and effective implementation of circular practices. Embracing CE principles can significantly contribute to the nation's overall development, promoting a more resilient economy and a healthier environment for future generations.

3.3. Impact of CE on business practices

With the circular economy offering numerous opportunities, it comes with its own impact, specifically in the aspect of business. Implementing a circular economy can reduce waste production and develop sustainable processes for producing products. Thus, in this section of the literature review, it will discuss the findings of related literature about the current issues and how CE can provide solutions or alternatives to solve the issues on the business aspect.

1.8 tons of fish waste come from the wet fish market stalls in Metro Manila every year that they claimed were being managed, collected, and segregated by the garbage collectors. On the other hand, inconsistency of protocols and practices was observed from the respondents. Which indicated that the protocols are not strictly implemented and management for waste remains ineffective (De Ungria et al., 2021).

Research by Rustia et al. (2023) states that through decades, there has been a considerable degradation of the Placuna placenta fishery. And that the meat became a waste and underexploited due to its very low value despite being nutritious. In spite of the actions taken by locals to regulate this issue, these actions have never been followed at the provincial and national level.

Quoted from Segundo Eclar Romero (2024) Philippine Daily Inquirer, "In the last decade alone, we have seen more devastating mining disasters. On Aug. 1, 2012, Philex Mining Corp.'s Padcal Mine in Benguet released 20.6 million metric tons of toxic waste, the largest in the country's history. On Sept. 8, 2008, heavy monsoon rains triggered a landslide in Compostela Valley, burying a mining village and killing 14 people. On Feb. 13, 2013, a landslide in Semirara Coal Mine in Antique, the largest coal mine in the country, killed five workers. On Feb. 6, 2024, a landslide in a gold mine in Masara, Davao de Oro, claimed nearly 100 lives and buried homes." However, the study of Balbin et al. (2023) revealed that mined-out places can be utilized to produce renewable energy: solar, wind, and biomass. And a possibility of production of bricks, ceramic tiles, and other products with the use of waste from mining. On the other hand, implementation of the circular economy can be seen as so early, and it needs extensive commitment and support from the government, industry, and community. The research implies that there are ways in which the negative impact of mining can be reduced and that it can foster a lot of possible ways and alternatives in which it can give business to many.

On the other hand, the Philippine Statistics Authority (PSA) revealed that the nation's unemployment rate decreased from 4.5 percent in June 2023 to 3.1 percent, as stated in the National Economic and Development Authority's (NEDA) report on August 7, 2024. This rate is in line with the December 2023 record. In correlation with this, the findings of the research conducted by Castillo et al. (2024) emphasized that unemployment in the Philippines is complicated and needs a well-thought-out strategy. Policy interventions in macro and micro aspects of economics are needed; they support inclusive growth, job creation, education, and skills development, which increase the employability of the labor force. The findings also identified how important it is to solve problems in the labor market. In which the research stated that combating unemployment is a long-term project and that tackle-related issues can reduce unemployment and promote more sustainable economic growth.

In addition, to form one eco-brick, it contains 50 to 100 pieces of plastic, as stated by Rebultan (2018). Additionally, the study of Ang (2020) showed the steps of how the leading recycled plastic brick-making company in the country, GreenAntz, makes their eco-friendly

bricks and how they extend not just their product but also allow them to have their own mini manufacturing hubs. It showed that they have three hubs: barangay eco-hub, community eco-hub, and commercial eco-hub. Which cumulatively processes for about 10.6 kg of plastic waste a month, producing 57,000 eco-casts and 62,000 eco-bricks. The research of Ang (2020) shows that with proper facilities and steps reducing waste production and producing products with it is possible and can be used in leaning towards a sustainable environment and economic growth. In correlation with this, Mati Ridge Homes in Mati City, Davao Oriental, constructs a housing project in a 29,010 square meter land, which was constructed using eco-cast from GreenAntz (Alivio, 2021).

The research of Balanay and Halog (2018) reviewed tools for implementing a circular economy and some applications for the Philippine textile industry. Their study showed that methods need great harmonization and standardization, and in the case of the nation's textile industry, it still needs to catch up. By completely knowing how CE can be implemented properly and efficiently, it can help make informed decisions to establish "circular" initiatives up to the macro level, which cuts down on inefficiency and waste production.

The above-presented research showed that the circular economy can affect business practices in the Philippines. The studies displayed different issues that the Philippines' business aspect faces. On the other hand, the research presented above also presented how the CE can contribute to solving these issues and how businesses can benefit from it. With the circular economy being implemented in the business aspect, it can help mitigate large costs in production, and build sustainable economic growth. Which can open up new opportunities and enhance the employability of the labor market.

3.4. Environmental impacts of CE

This section, it will discuss how CE can have an impact on the environment. One of the main issues especially in the business aspect is about resource allocation and waste management which affects the environment. Thus, this section will show how CE can contribute into having a sustainable environment.

According to Bueta (2022), which summarizes the measures that have yet translated into a binding law or policy as of the writing of his research. These are few of the categories of proposals of the measures his research identified from 2021 up to 2022.

1. Waste management, particularly of toxic and hazardous substances. Many of the most common recommendations center on strengthening general waste management regulations and improving the regulation of hazardous and toxic chemicals. This also includes awareness-raising and educational programs, particularly in colleges and universities. The majority of these suggestions surfaced during the sessions of the 15th and 16th Congresses.
2. Regulation of plastic. Regulating plastics is one of the most prevalent categories of proposals, particularly in the current and recent Congress sessions. These proposals include banning specific plastic products, especially single-use plastics (SUPs); enhancing recovery and recycling efforts; improving product labeling; promoting the use of alternative or native materials; offering incentives for compliance; and increasing penalties for noncompliance and violations.
3. Ban on waste importation and regulation of waste trade. Recently, illegal waste shipments have underscored the risks linked to waste trading. Despite increasing demands for a ban on these practices, the Philippines still permits the importation of recyclable waste and scraps, alongside efforts to ratify the Basel Ban Amendment.

Additionally, Bueta (2022) concluded with recommendations that can help in implementing the circular economy: having a plan for the long run, proper and effective enforcement of waste

management, a whole-of-society approach is needed, the policy should shift alongside cultural and societal shifts, and taking note of other critical issues that can bog down reforms.

Domingo and Manejar (2021), concluded in their research that almost two decades after the approval of RA 9003 also known as the Ecological Solid Waste Management Act of 2000, the country is still struggling with solid waste management issues. Their research provided pieces of evidence to support this claim, they stated that the policy for illegal dumpsites is weak despite the supposed transition to sanitary landfills. Additionally, during pre-pandemic the consumption of waste in many cities and towns are high and even during the pandemic in which the economy has slowed down, the level of this issue remained high. And lastly, their research concluded that there have not been enough improvements in policies and institutions at both local and national levels to effectively address these issues.

In conclusion, the findings from Bueta (2022) and the research by Domingo and Manejar (2021) highlight the ongoing challenges and opportunities in implementing effective waste management policies in the Philippines. Bueta identifies key proposals from 2021 to 2022 that have yet to be translated into binding laws, emphasizing the need for stronger regulations on toxic waste management, plastic regulation, and the control of waste importation. Overall, concrete actions and sustained commitment are essential to overcome the existing barriers. By prioritizing comprehensive and cohesive waste management strategies, the Philippines can move toward a more sustainable future and fully realize the benefits of the Circular Economy.

3.5. Social implications

This section will explore the various opportunities that the CE presents, highlighting the potential to transform economies and promote sustainability.

Palma-Torres et al. (2024) identified several opportunities for the veneer and plywood industry, including the use of recycled wood waste, adopting resin as a binding agent, and cascading wood waste, which cuts down their cost in production. However, their research also discussed challenges, including meeting demands while ensuring regeneration goals, low investment in innovation, harvesting practices, waste route issues, non-compliance to cleaner production and industrial symbiosis, and policy-related barriers. In addition, Francine Ang (2020) recommended enhancing the marketing efforts to increase the product awareness. Furthermore, focusing on partnerships with contractors that share similar values will help gain traction within the housebuilding market.

The study of Pausta et al. (2023) about the "On-Farm Septage Treatment and Nutrient Recycling for Sustainable Agriculture in the Philippines" revealed a great result. The study showed how recovered phosphorus fertilizer (RPF) can help local farms. They explained that 100 liters of waste processed can produce about 290 grams of RPF. And by breaking down the waste the soluble phosphate increases from 12.84mg/L to 76.74m/L and after treatment, about 98.5% of the phosphate can be recovered as fertilizer. The result of their study showed how big of an impact CE can do. This study showed how the CE can help how to lessen the costs of producing products by utilizing the waste that they also produce and how it can help the farmers with waste removal and fertilizer costs without compromising their production.

The Philippines have limited experience with waste-to-energy technologies, when in fact the country has a high volume of solid waste in the local landfills wherein the waste-to-energy technology is needed in order to meet the demand for cleaner sources of energy and to convert enormous waste into cheaper technology (Agaton et al., 2020). Moreover, the research of Agaton et al. (2020) also revealed that burning and dumping waste contributes to the growing environmental and health issues. However, it was later on revealed that incineration is the most profitable (USD 3 cents/kWh) compared to gasification and pyrolysis which are more

expensive. Additionally, many factors need to be considered such as market and economic factors before making decisions about waste-to-energy investments.

In conclusion, this section underscores the significant opportunities presented by the Circular Economy (CE) in transforming industries and promoting sustainability. The research by Palma-Torres et al. (2024) highlights potential advancements in the veneer and plywood industry through the use of recycled wood waste and innovative practices, while also pointing out challenges that must be addressed, such as investment in innovation and policy barriers. Similarly, the study by Pausta et al. (2023) demonstrates the practical benefits of CE in agriculture, particularly through the recovery of phosphorus fertilizer from septage, which not only reduces production costs but also supports local farmers. Agaton et al. (2020) emphasize the urgent need for cleaner energy sources to mitigate environmental and health issues associated with waste disposal. Overall, embracing the principles of the Circular Economy can lead to substantial economic and environmental benefits for the Philippines.

3.6. Barriers to implications of CE

The circular economy (CE) has gained attention for being a transformative approach to sustainable development. Despite numerous benefits, the transition to a CE is still fraught with challenges. Currently, in the Philippines, there is no integrated circular economy strategy or policy framework that exists (ADB, 2020). By examining these obstacles, we can understand the complexities of implementing the CE and identify strategies on how to overcome them, ultimately facilitating more sustainable and circular economic practices.

Additionally, the study of Langit et al. (2024), addressed the issues in Bay, Laguna. Their study emphasized the issues in the segregation of wastes, underutilized materials facilities for recovering materials, and lack of household recyclable collection that costs millions of losses. Additionally, their study proposed an Integrated Waste Management Technology System (IWMTS) project which utilizes an innovative and systematic circular economy approach to waste management.

An article published by Ma. Aurora D. Geotina-Garcia which entitled "Strengthening Women Entrepreneurs," showed a statistics about the number of women-led MSMEs in the country. The article revealed that the Department of Trade and Industry (DTI) registered 630,688 businesses during 2019 and 55.8% and 64% of the MSMEs that the Negosyo Centers supported was either owned or led by a woman/women. On the other hand, the National Association of Training Centers for Cooperatives (NATCCO) reported that out of the 5.8 millon members, 64% of its members are women. In correlation with this, the study of Katigbak and Villaruel (2023), showed that there is low level of awareness regarding CE principles among women-led micro, small, and medium enterprises (MSMEs). Thus, with this result it shows that there is a poor execution of circularity. This involves poor waste management, resource recovery, and resource consumption. The study highlights that there is still a poor education in the country about the implications of the CE and its effects towards businesses and environment.

In conclusion, the Circular Economy (CE) presents a promising pathway for sustainable development, yet its implementation in the Philippines faces significant challenges. The absence of an integrated CE strategy or policy framework complicates the transition (ADB, 2020). Analyzing these obstacles can help identify effective strategies for fostering sustainable practices. This gap in understanding leads to ineffective waste management and resource recovery practices, underscoring the need for better education on CE's benefits and implications.

Overall, enhancing awareness and implementing comprehensive strategies are crucial for promoting a successful transition to a Circular Economy in the Philippines, particularly among women-led enterprises, which represent a significant portion of the MSME landscape.

4. Results and discussion

The results in this literature review were derived using thematic analysis method. Thematic analysis is a qualitative data analysis method that involves reading through a data set and identifying patterns in meaning across the data to derive themes. Through this method, the data are analyzed by making a transcript and narrowing it down by finding patterns in the textual data (Naeem et al., 2023).

Through analyzing the findings of each research that was used for literature review themes were derived based on ts findings. Below is the thematic of the themes derived.

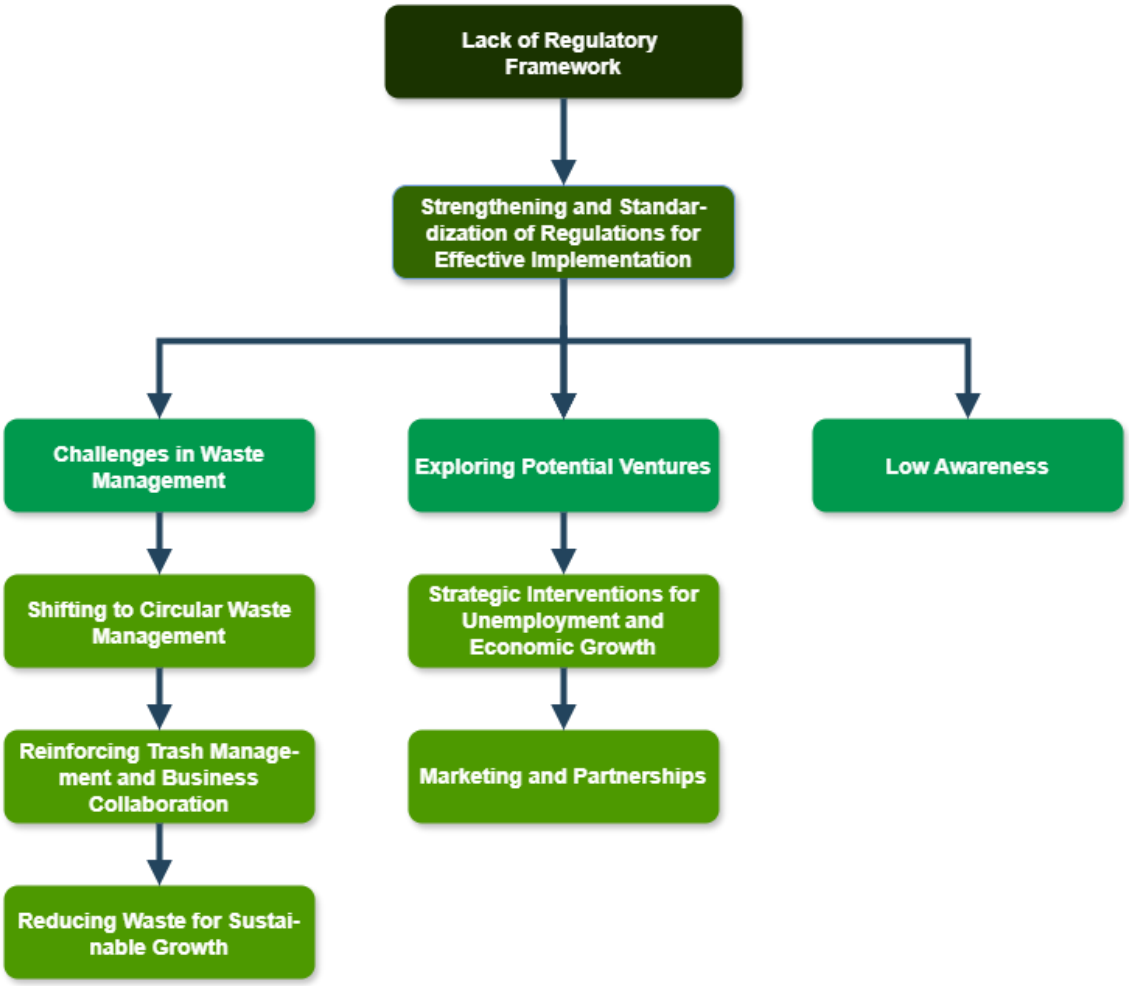

Figure 3. Thematic Map of the Derived Themes

4.1. Lack of regulatory framework

One of the main findings and the most important theme is the lack of regulatory framework. Emphasized in the study of Quisquisan (2024), that there is an absence of ordinances or governmental regulations that will determine whose role it is to take responsibility when it comes to managing waste. The research also found how unconcerned the participants were about the endpoint of their waste. Thus, it can be seen that there is a lack of

regulatory framework in which wastes aren't managed properly and responsibly due to the poor implementation of protocols and practices.

This aligns with the research of De Ungria et al. (2021), whose study revealed that there is an inconsistency of protocols and practices. This indicates that due to this poor implementation and management of waste, there is still a large problem in effective waste management. In correlation with this Khalid Rhaji in Earth.Org (2024) that plastic pollution is one of the severe problems in the country which was described by the World Bank as 'staggering' due to an insufficient waste management system and a very high dependence on single-use plastic and annually producing 2.7 million tons of plastic waste. This issue leads the country to lose around US$890 million to unrecycled plastic products. Moreover, another research by the Asian Development Bank (2020) which states that there is no integrated circular economy strategy or policy framework that exists.

Therefore, an importance of regulatory framework is needed. By closing the gap in the issues towards waste management the country can help mitigate further environmental issues but also helps economic growth.

4.2. Strengthening and standardization for effective implementations

Through strengthening regulations it can help aid the lack of regulatory framework and can help into better implementation of protocols and practices into achieving a more circular economy helping both business and environmental issues in the Philippines.

Rustia et al. (2023) revealed that a major issue when it comes to harvesting Placuna Placenta which is used to produce windowpane the meat that is coming from it even being nutritious became a waste and is not being used properly. However, there are actions taken by locals to answer this issue but the regulations are not strong enough to be adapted at the provincial or national level.

This highlights how resources are being exploited and that even though waste can still be used it becomes waste just because it is not the main material or resource that is needed for the production. Additionally, this shows how important the strengthening of regulations are and the need for action in national level to adapt and improve the actions made by locals to resolve the issues.

Department of Environment and Natural Resources (DENR) has 9 administrative order and 3 memorandum circular regarding toxic chemicals and hazardous wastes. One of this is the Republic Act 6969 or the "Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990." This law encompasses all policies, regulations, and guidelines pertaining to toxic and hazardous chemicals and nuclear wastes in the Philippines. This law aims to protect the public from toxic waste that was carelessly handled or disposed of hazardous wastes; and to regulate the use, movement and disposal of chemicals, hazardous and nuclear wastes in the country.

However despite the law being implemented in the country, Bueta (2022) emphasized that there is still a need for stronger regulations on toxic waste management and plastic Additionally, the research of Balanay and Halog (2018), states that methods need great harmonization and standardization and knowing how to implement CE properly it can ensure an efficient implementation which can contribute to making informed decisions that will establish initiatives up to the macro level and cuts down inefficiency and waste production. regulation.

4.3. Challenges in waste management

Lack of regulatory framework and a need for strengthening and standardization of protocols and officers can lead to many things, one of which is the challenges in waste management. This issue is so rampant and relevant in today's time.

There are not enough improvements in the policies and institutions at both local and national levels to effectively address these issues. Concluded in the research of Domingo and Manejar (2021) that even after almost two decades of the approval of RA 9003 also known as the Ecological Solid Waste Management Act of 2000, the country is still struggling with solid waste management issues. In addition to that, their research provided pieces of evidence to support this claim, they stated that the policy for illegal dumpsites is weak despite the supposed transition to sanitary landfills.

Additionally, the study of Domingo and Manejar (2021) is a statement on how weak the implementation of rules is when it comes to waste management. Thus, it became one of the major challenges for managing waste and effectively transitioning towards a circular economy. Furthermore, meeting demands while ensuring regeneration goals, low investment in innovation, harvesting practices, waste route issues, non-compliance to cleaner production and industrial symbiosis, and policy-related barriers were also identified and became an issue even though there are opportunities that the circular economy could offer in the industry of veneer and plywood (Palma-Torres et al. 2024).

On top of that, Langit et al. (2024) emphasized the issues in the segregation of wastes, underutilized materials facilities for recovering materials, and lack of household recyclable collection that costs millions of losses. These studies emphasized how important it is for us to address these issues. Implementing an effective circular economy means facing the issues we have in our country and one of them is waste management in different fields be it in our environment, businesses, or industry. Thus, the theme challenges in waste management has three (3) sub-themes; Shifting to Circular Waste Management, Reinforcing Trash Management, and Reducing Waste for Sustainable Growth.

- Shifting to Circular Waste Management. Borongan and NaRanong (2022) stated in their research that the country should promote a wide range of practices that move beyond the traditional linear "take, make, use, dispose." This allows barangays and LGUs to take more responsibility for achieving long-term waste management and promoting circularity. Starting small, yet ensuring that these protocols and practices are being done properly can lead to a big impact. Promoting a wide range of practices can give the country choice of which practices suit better in their situation and what practices are needed to answer the issues that they are facing.
- Reinforcing Trash Management and Business Collaboration. The Philippines accounts for more than one-third (36%) of plastic inputs this is because the country has many islands wherein the majority of the population lives near coastal areas (Our World in Data). Thus, the government needs to re-institutionalize the programs for trash management, and improve its collaboration with the business sector by providing incentives to organizations that support the circular economy to inspire them to develop creative goods designed with this in mind (Pintor and Godezano 2019). Addressing waste management issues and strengthening the implementation of it will start from the government itself. Thus, improving what is currently being implemented into a more suitable program that will answer the issue of trash management is essential.
- Reducing Waste for Sustainable Growth. Having proper facilities and steps in reducing waste production and producing products with it is possible and can be used in leaning towards a sustainable environment and economic growth (Ang, 2020). Understanding

the current situation and giving an appropriate is needed. Additionally, utilizing what is currently in the communities is another option when it comes to reducing waste as stated in the study of Ang (2020). Moreover, the study by Ang (2020) showed the steps of how GreenAntz makes their eco-friendly bricks and how they extend not just their product but also allow them to have their own mini manufacturing hubs which cumulatively process about 10.6 kg of plastic waste, producing 57,000 eco-casts and 62,000 eco-bricks per month. The research of Ang (2020) shows that with proper facilities and steps reducing waste production and producing products with it can significantly leave an impact towards the environment and the issues towards environment and opening doors for exploring potential ventures.

4.4. Exploring potential ventures

Mined-out places can be utilized to produce renewable energy. Additionally, there is a possibility of production of products with the use of waste from mining (Balbin et al., 2023). Moreover, their research stated that there is a need for extensive commitment and support from the government, industry, community in order for this to be achieved.

In correlation, Pausta et al. (2023) showed how the CE can help how to lessen the costs of producing products by utilizing the waste produced and how it can help the farmers with waste removal and fertilizer costs. Through exploring potential ventures, Philippines can make use of their issues into their advantage. Revealed in the study of Agaton (2020), they stated that the Philippines have limited experience with waste-to-energy technologies, when in fact the country has a high volume of solid waste in the local landfills wherein the waste-to-energy technology is needed in order to meet the demand for cleaner sources of energy.However, many factors needs to be considered such as market and economic factors before making decisions about waste-to-energy investments.

To sum up, the research above shows that through effective implementation of CE potential ventures can be explored. With these potential ventures that the CE could offer the country will lean forward to a more sustainable economy and contributes economic growth and make strategic interventions for unemployment and utilizes marketing and partnerships.

- **Strategic Interventions for Unemployment and Economic Growth**. Castillo et al. (2024), emphasized that unemployment in the Philippines needs a well-thought-out strategy in order to properly assess the actions needed. In addition, policy interventions in macro and micro aspects of economics are needed. It can reduce unemployment and promote more sustainable economic growth.
- **Marketing and Partnerships**. Enhancing the marketing efforts to increase the product awareness, also, focusing on partnerships with contractors that share similar values will help gain traction within the housebuilding market (Ang, 2020).

4.5. Low awareness

According to Katigbak and Villaruel (2023) awareness regarding CE principles among women-led micro, small, and medium enterprises (MSMEs) is low. Their key findings involve poor waste management, resource recovery, and resource consumption. Their study highlights that there is still a poor education in the country about the implications of the CE. As a result, its impact affects towards businesses and environment.

Addressing this disconnect is crucial. Fostering stronger practices that widens the knowledge and awareness of the country on what the CE can do. And what are the effects when implemented properly. With this, it will help build a sustainable environment and contribute towards nation-building improving the quality of life, environmental status, and business practices.

Resolving these issues could lead to transformative changes, not only within the business sector but also for environmental sustainability. Embracing CE principles can significantly contribute to the nation's overall development, promoting a more resilient economy and a healthier environment for future generations. Fostering a future that secures both resources and the environment, creating a balanced approach where economic development does not compromise the environment. This involves implementing sustainable practices that ensure resources are used efficiently and responsibly.

5. Conclusion and recommendation

The research findings include a lack of regulatory framework, strengthening and standardization for effective implementations, challenges in waste management, shifting to circular waste management, reinforcing trash management and business collaboration, reducing waste for sustainable growth, exploring potential ventures, strategic interventions for unemployment and economic growth, marketing and partnerships, and low awareness.

The themes that were derived using thematic analysis showed the need for strengthening the protocols and practices in order to address the issues properly and effectively. Additionally, it was revealed that the common and most prevalent issue is waste management. Thus, addressing these issues and fostering practices that promote sustainability and economic growth is essential.

Embracing circular economy (CE) principles, businesses can innovate ways that reduce their impact on the environment. It helps promote proper resource allocation and usage. Additionally, creating a system where materials are reused and repurposed that breaks the traditional linear economy. Moreover, there is a need for collaboration among various stakeholders—government, businesses, and communities in order to establish policies and practices. By working together, we can build a resilient economy that thrives with a flourishing environment, ensuring a better quality of life for all.

For future research, it is recommended to conduct a case study and analyze the challenges faced and how it was successfully faced, which helps provide a clearer picture of best practices that could be used. Also, investigating the implications of CE practices on SMEs in the Philippines would be beneficial as this will help understand how businesses adopt and what support is needed to do so that they can have a broader adoption of these practices.

On the other hand, future research can also focus on the community's role when it comes to engagement in CE initiatives. With this, it can help identify strategies that are effective for increasing public awareness and involvement. Addressing these areas, future research can help contribute towards the advancement of the CE in the Philippines, benefiting both businesses and the environment.

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