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CIRCULAR ECONOMY IN EGYPT: AN OVERVIEW OF THE CURRENT LANDSCAPE AND POTENTIAL FOR GROWTH*

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Abstract. This paper provides an overview of the circular economy in Egypt. With the country facing significant environmental challenges, a circular economy approach can offer sustainable solutions to Egypt's environmental challenges by addressing issues like limited resources, waste generation, and a growing population in an eco-friendly and long-term perspective. This research employs a mixed-methods approach, including a literature review, surveys, and consultations with key stakeholders. The analysis reveals that although there are numerous challenges to establishing a circular economy in Egypt, such as limited understanding, insufficient government backing, and inadequate infrastructure, there are also opportunities, such as increasing demand for eco-friendly goods and services, as well as a receptive business environment. The paper recommends various policy and practical interventions to overcome these barriers and capitalize on these opportunities, including increasing awareness and understanding of the circular economy, developing supportive programs and regulations, investing in infrastructure and technology, and fostering stakeholder collaboration. This paper provides valuable insights into the potential for a circular economy in Egypt and the steps that can be taken to create a more sustainable future for the country. As such, it will interest policymakers, researchers, and practitioners working in the sustainability and environmental management field. The successful implementation of a circular economy in Egypt will require collective efforts from stakeholders to promote long-term sustainability and environmental stewardship.

Keywords: Egypt; Circular economy; SWOT; sustainable solutions; food waste; agriculture waste

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1. Introduction

The paper is structured as follows: first, in this paragraph, we will provide an overview of the Circular Economy concept and its relevance to the food and agriculture sector. Second, we will review the literature on circular economy opportunities and barriers, focusing on Egypt. Third, we will present a case study of the agricultural circular economy in Egypt, including the current practices, challenges, and opportunities for circular economy interventions.

Circular Economy (CE) is a framework that seeks to reduce waste and pollution and maximize the value of products and materials by sharing, leasing, reusing, repairing, refurbishing, and recycling them. As a new economic development model, CE promotes maximum reuse/recycling of materials, goods, and components to reduce waste generation to the greatest extent possible (Ghisellini et al., 2018). This concept has recently captured the attention of scholars and practitioners (Kirchherr, 2022; Köhler et al., 2019; Milios, 2021; Hartley et al., 2020; Piccinetti et al., 2023). It is based on three principles: eliminating waste and pollution, circulating products and materials at their highest value, and regenerating nature (Nobre & Tavares, 2021; Kirchherr et al., 2023).

The conservation of natural resources has become a rising global concern in recent years, and the concept of Circular Economy has gained significant prominence due to its comprehensive nature, encompassing a wide range of related concepts (Geisendorf & Pietrulla, 2017). According to research, the CE can generate economic opportunities and help develop jobs. Various studies and reports have highlighted the potential job creation benefits of the Circular Economy.

The Ellen MacArthur Foundation's study on the European Union estimates that by 2030, the adoption of circular economy practices could result in the creation of 700,000 new jobs. These jobs would be in sectors such as recycling, remanufacturing, and refurbishing, which are essential components of any economy adopting circular models (Ellen MacArthur Foundation, 2015). The International Labour Organization (ILO) has also studied a circular economy's potential job creation benefits. The ILO study found that the growth of a circular economy could provide new job opportunities in sectors such as waste management, repair and maintenance, and recycling. This demonstrates the potential for the circular economy to provide both environmental and economic benefits by creating new jobs and opportunities for employment (ILO, 2019). The relevance of the Circular Economy in the East Mediterranean and Middle East (EMME) region has been highlighted by the EMME Climate Change Initiative because of its positive concurrent effects towards climate change mitigation and generation of local wealth (EMME CCI, 2022)

Egypt has a population of over 100 million people and a growing economy (World Bank, 2021). The country's resource consumption and waste generation have been increasing in recent years, putting pressure on the environment and limiting opportunities for sustainable economic development. Implementing circular economy practices could help address these challenges and promote a more sustainable future for Egypt (Milik, 2021). The Cabinet's Information and Decision Support Center (IDSC) recently released an infographic highlighting Egypt's continued inclusion in growth-stage countries in the Circular Gap Report 2021, alongside major emerging markets such as China, Mexico, Indonesia, Vietnam, and Brazil. The annual report covers 176 countries worldwide and is published with the World Economic Forum in Davos. Its purpose is to draw the attention of decision-makers in economically developed nations to the importance of adopting circular economy strategies for a more sustainable future. The growth-stage countries identified in the report are seen as promising economies that can lead the transition to a circular economy and are responsible for increasing resource recycling rates to ensure the success of relevant strategies. The report suggests that Circular Economy can potentially reduce global greenhouse gas emissions by 39 per cent and virgin resource use by 28 per cent through smart strategies and reduced material consumption (IDSC, 2022).

The concept of a circular economy has gained significant traction in recent years as more and more countries seek to address environmental challenges sustainably. In Egypt, a circular economy approach can potentially address waste management, resource efficiency and job creation issues. However, implementing such an approach has its challenges. (Iskandar, 2021; Roberts, 2023). For instance, a group of multinationals backed by Egypt's government have created a plastic recovery scheme which rewards informal collectors through digital credits (Iskandar, 2021). The United Nations Industrial Development Organization (UNIDO) will launch two pilot projects on circular textile production in Egypt (EU Neighbours South, 2022).

Limited research has been conducted on implementing Circular Economy principles in Egypt; however, some studies have examined the potential barriers and opportunities to implementing such practices in the country. According to a search query in the Scopus database, the number of publications on the Circular Economy in Egypt has steadily increased in recent years. As of the knowledge cutoff date of 2022, there were a total of 142 publications on CE in Egypt indexed in Scopus. Out of these, 92 were articles in scholarly journals, 5 were conference papers, and 4 were book chapters. The earliest publication on Circular Economy in Egypt was in 2018, and the number of publications has been growing (Figure 1). The topics covered in these publications range from case studies on CE practices in specific industries to policy recommendations for promoting CE approaches in Egypt. These publications reflect a growing interest in CE principles in Egypt and the need for more research and discussion on implementing these principles in practice.

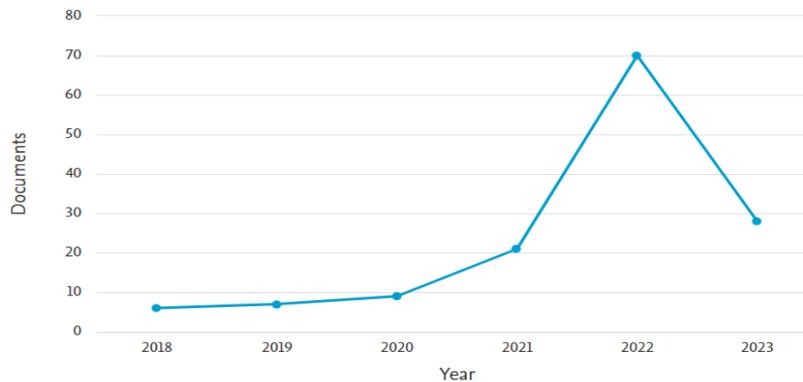


Figure 1. CE publications for Egyptian researchers (source: Scopus 2023).

The issue of waste management is a significant challenge for Egypt, as the country generates an estimated 100 million tons of waste annually, where the main streams of waste in Egypt are: agricultural waste (34%), cleansing of canals and irrigation networks (28%), MSW (23%), construction waste (6%) and industrial waste (5%) (Nassar et al., 2023; Chemonics Egypt and Cleantech Arabia, 2018). The lack of an effective waste management system has led to various environmental and health problems, including pollution of water and soil resources, air pollution, and public health risks. Recently, the Egyptian government has launched several initiatives and programs to improve waste management in the country. For example, in 2018, the government launched a program called "Egypt Without Waste," which aims to reduce the amount of waste sent to landfills and promote recycling and other sustainable waste management practices. The program includes various activities, such as awareness campaigns, infrastructure development, and business incentives to adopt sustainable practices.

Additionally, there have been efforts to develop recycling and waste management infrastructure in Egypt. For example, in 2021, the Egyptian government announced plans to build the largest waste-to-energy plant in the world in the city of Cairo. The plant will process 6,000 tons of waste per day and generate electricity that can be used to power homes and businesses in the city.

Egypt took a significant step towards addressing this issue with the publication of Law No. 202 of 2020, which promulgated a new Waste Management Law (UNEP, 2020). The new Waste Management Law in Egypt promotes Circular Economy principles by regulating waste management practices, including waste collection, transportation, and recycling. The law places a strong emphasis on promoting sustainable waste management practices, such as the reduction of waste at the source, the separation of waste at the point of generation, and the promotion of recycling and recovery of resources. By promoting these sustainable waste management practices, the law will help reduce the amount of waste generated in the country and promote the recovery of valuable resources from waste streams.

The number of waste recycling plants in a given area is closely related to the garbage disposed of daily. In areas with a high volume of garbage, there is often a greater need for recycling plants to manage waste and prevent it from ending up in landfills or polluting the environment. Conversely, areas with lower levels of waste may have fewer or no recycling plants. Table (1) shows the amount of garbage that is disposed of daily and the number of waste recycling factories in Egypt, which amounted to 51 factories in 2020, and the amount of waste that was disposed of in that year reached 32.0 million tons (IDSC, 2022).

Table 1. Number of waste recycling factories in Egypt

Indicator	2016	2017	2018	2019	2020
The number of waste recycling factories	63	49	49	52	51
The amount of garbage that is disposed of yearly (million tons)	15.5	21.1	87.7	36.6	32.5

2. Methodology

The methodology for the paper involves a mixed-methods approach that combines a literature review, case studies of companies that have applied the concept of circular economy in Egypt in the agriculture sector, and a SWOT analysis. The literature review involves gathering information on Circular Economy principles and their implementation in Egypt. The review includes academic articles, reports, and other relevant literature. Success stories of companies implementing circular economy principles in Egypt are also gathered and analyzed. Case studies of companies that have applied the circular economy concept in Egypt in Agriculture are conducted. Those case studies provide real-world examples of the challenges and opportunities of implementing circular economy principles in Egypt. The case studies also highlight the benefits companies can achieve by embracing circular economy principles. A SWOT analysis is conducted to identify the strengths, weaknesses, opportunities, and threats associated with implementing a circular economy in Egypt. The SWOT analysis is based on a literature review and expert discussions and aims to provide a comprehensive understanding of Egypt's current state of the art.

The analysis results are then used to identify the key barriers and opportunities and develop recommendations for policy and practical interventions to overcome these barriers and capitalize on these opportunities. The success stories of companies that have implemented Circular Economy principles in Egypt are used as examples to demonstrate the potential benefits of CE implementation and to provide guidance for policymakers and businesses looking to implement its principles in Egypt.

3. Results

The research will provide an in-depth analysis of the barriers and opportunities for implementing CE in Egypt. The outcomes of this research will help policymakers and stakeholders develop effective policies and strategies to promote a circular economy in Egypt, reduce waste, and promote sustainability. Additionally, the research will provide a foundation for future studies on the Circular Economy in Egypt and other developing countries.

3.1. SWOT analysis of Circular Economy in Egypt

Our SWOT analysis of CE in Egypt indicates numerous critical strengths, weaknesses, opportunities, and threats that impact the current and future perspectives of applying its concept in the country (Table 2).

Table (2) SWOT analysis of circular economy in Egypt

Strengths	Opportunities
<ul style="list-style-type: none"> • gypt has a rich cultural heritage and a strong tradition of craftsmanship. This strength can be leveraged in the circular economy by promoting local craftsmanship, traditional production methods, and artisanal products. (Moubarak & Qassem, 2018). • gypt has abundant natural resources, such as fertile land, renewable energy, and mineral deposits. • gypt's strategic geographical location, bridging Africa and the Middle East, presents regional collaboration and trade opportunities in the circular economy. • gypt can generate value from agricultural, food, and plastic waste through recycling, composting, and energy generation. (Hassan et al., 2014) • n light of the fluctuation of global prices, supply chain issues, and the failure to import products is one of the points that appear as a strength in the application of enhancing the efficiency of local resources by reducing imports of raw materials, fuel, and manufactured goods, and increasing competitiveness. • he Egyptian government has made a solid commitment to the circular economy, as evidenced by the recent passage of a new law on waste management No. 202 of 2020. • Egypt has a large and growing population, providing a significant market for recycled products. • Egypt has a strong manufacturing sector that could benefit from a reliable supply of recycled materials. • Launch of successful pilot initiatives and programs to develop the waste recycling sector and promote using recycled products. • Egypt has a strong entrepreneurial culture, which can help to drive the development of circular economy businesses 	<ul style="list-style-type: none"> • There is a growing demand for sustainable products and services around the world that will allow Egypt to export circular economy products and services to other countries (Maxwell & van der Vorst, 2003). • The rise of the digital economy can support the circular economy in Egypt by making it easier to connect businesses and consumers, track the flow of materials, and manage waste. • Developing new technologies, such as 3D printing and nanotechnology, can help make the circular economy in Egypt more efficient and effective (Laskurain-Iturbe et al., 2021). • The Egyptian government increasingly supports the circular economy, which could lead to increased investment and policy support. • Public-private partnerships can help to bridge the gap between the public and private sectors and can be a valuable tool for implementing circular economy initiatives (Bogovac et al., 2021). • Egyptian universities' research and development can help develop new technologies and business models that support the circular economy. • Policy reforms of Egyptian waste management laws can create a more favourable environment for the circular economy by providing tax breaks or investment incentives. • Egypt's strategic location could be a gateway for circular economy activities in neighbouring countries, such as Libya and Sudan. • There is significant potential for circular economy activities in agriculture, which is a major contributor to Egypt's economy. • Egypt's textile industry could benefit from circular economy approaches, such as recycling and upcycling, as it is a major source of waste and pollution. • Egypt has significant tourism industry could benefit from circular economy initiatives around waste reduction and resource conservation.

Strengths	Opportunities
<p>(Kirby & Ibrahim, 2010).</p> <ul style="list-style-type: none"> The rise of the digital economy in Egypt can help to support the circular economy by making it easier to connect businesses and consumers, track the flow of materials, and manage waste (Hong Nham & Ha, 2022). 	
Weakness	Threats
<ul style="list-style-type: none"> Egypt relies heavily on imported raw materials, challenging resource independence in a circular economy. The concept of a circular economy is still relatively new in Egypt, and there is a need to raise awareness and educate stakeholders about its benefits and implementation strategies. The country needs integrated waste management infrastructure to avoid unhealthy waste mismanagement, pollution and poor sanitation. The population needs to show more awareness of circular economy benefits and how it works. Despite education campaigns, widespread acceptance and participation in the transition may still be limited. The recycling infrastructure in Egypt needs to be developed, with limited collection and processing facilities. The informal sector dominates the recycling industry in Egypt, which can result in inefficient and unsafe practices. Environmental, economic, and social challenges such as air pollution, water scarcity and high unemployment rates hinder progress towards a green economy (Geels, 2013). Participation of the business sector in adopting sustainable business models helps the development of an effective green supply chain. A lack of international cooperation on circular economy issues can make it difficult for Egypt to implement circular economy policies and programs. 	<ul style="list-style-type: none"> The economic challenges could impact the successful implementation of a circular economy (Cantú et al., 2021). Shifting from a linear to a circular economy requires a significant change in behaviour and mindset among individuals, businesses, and policymakers. Resistance to change and reluctance to adopt new practices may hinder the transition (Upadhayay & Alqassimi, 2018). Climate change exacerbates sustainability challenges and risks. Impacts are already being felt and will considerably hamper progress if not addressed through solutions that also reduce emissions. There needs to be more funds and competing priorities to affect the implementation of CE in the country. Powerful incumbent industries may actively work to obstruct a transition that threatens their linear business models and profits. The lack of infrastructure and public awareness could hinder the growth of the recycling industry in Egypt. Competition from other countries or regions with more developed recycling infrastructure could limit the growth of the recycling industry in Egypt. The implementation of circular economy initiatives may face technical challenges that include developing new technologies, managing complex supply chains, or the integration of circular economy principles into existing business models.

3.2. Case studies of circular economy in Agriculture and Food Production in Egypt

Egypt has been actively exploring ways to implement circular economy practices in agriculture, and there have been some notable success stories in this field. Agricultural wastes in Egypt range from 30-35 million tons a year, of which only 7 million tons as animal feed and 4 million as organic manure are being utilized (Mustafa, 2015). According to CAPMAS, the amount of agricultural waste generated by some governorates reached 3.6 million tons in 2020, distributed over Dakahlia, Kafr ElSheikh, Sharkia, Behera, Damietta, Port Said, Gharbia, Kalyoubia governorates percentages of (41.8%, 14.2%, 11.8%, 10.4%, 10%, 6.5%, 5%, 0.3%) respectively (Figure 2), while the amount of agricultural recycled waste reached 1.5 million tons distributed over Kalyoubia, Kafr El-Sheikh, Gharbia, Behera governorates. (CAPMAS, 2022)

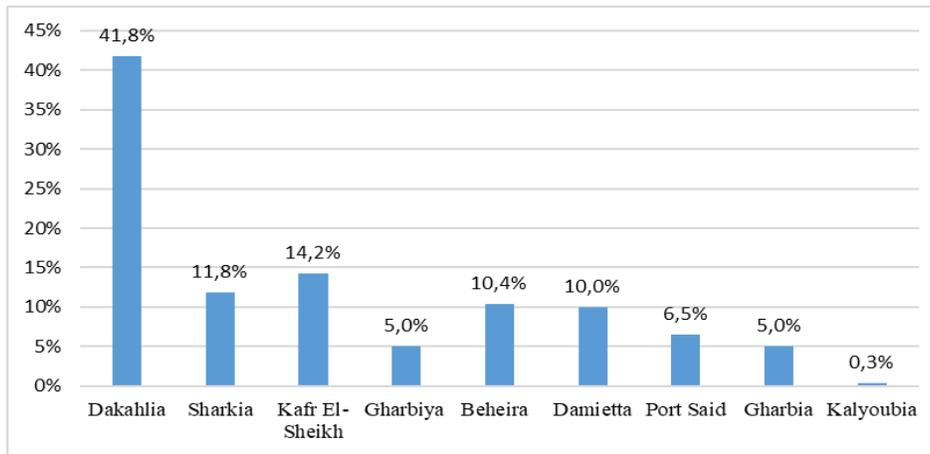


Figure 2. Percentage Distribution of the amount of agricultural waste generated in some governorates of the republic in 2020 (source: CAPMAS, 2022).

Adopting integrated farming systems is one example of successful circular economy practices in agriculture in Egypt. Crop residues, animal manure, and other organic waste materials are used as inputs for crop production in these systems, reducing the need for synthetic fertilizers and pesticides. This approach has improved soil health and fertility, increased crop yields, and reduced farmers' production costs (El-Mashad et al., 2003). Composting is also a widely used circular economy practice in Egyptian agriculture. Organic waste materials, such as crop residues, animal manure, and food waste, can be used by farmers to create high-quality compost that can be used as a soil amendment and fertilizer (Elfeki et al., 2017).

Aquaponics, an integrated system that combines fish farming and hydroponic agriculture, is another successful CE practice in Egyptian agriculture. Aquaponics uses a closed water cycle with low water and energy consumption, which can be provided by using renewable energy sources such as solar energy to produce fish protein and crops (Hanlon et al. 2013; Aguilara-Titus et al. 2014). Aquaponics has proven to be a highly productive and sustainable agricultural method in Egypt, particularly in urban areas with limited space (El-Essawy et al., 2019). These success stories show that adopting circular economy practices in agriculture can result in increased productivity, less waste, and greater resilience in the face of environmental and economic challenges. By implementing these practices, farmers in Egypt can benefit from improved soil health, lower production costs, and additional income streams.

SEKEM is one company in Egypt implementing circular economy principles in agriculture. It is an Egyptian agro-industrial company founded in 1977 to promote sustainable development and social responsibility. The company follows biodynamic farming principles, which emphasize the integration of agriculture, animal husbandry, and sustainability to create a closed-loop system that minimizes waste and maximizes resource use (Shahin & Khater, 2020); SEKEM cultivates its crops using biodynamic farming methods, which include the use of natural fertilizers, cover crops, and crop rotation to improve soil health and fertility. This method completely offsets the need for synthetic fertilizers and pesticides, as well as waste and the environmental impact of farming. SEKEM makes high-quality compost from organic waste materials like crop residues and animal manure, used as a soil amendment and fertilizer. This method reduces waste while improving soil health and fertility, resulting in higher crop yields and lower production costs.

SEKEM is dedicated to encouraging social responsibility and long-term development in Egypt. The company offers education and healthcare services to its employees, their families, and the public. SEKEM has also established several social initiatives, such as a school for special needs children and a vocational training centre

for women. SEKEM's circular economy practices have assisted the company in various ways, including improved soil health and fertility, reduced waste, and increased resource efficiency. Furthermore, SEKEM's commitment to social responsibility has aided in the well-being of its employees and the broader community. Overall, SEKEM's success demonstrates that circular economy principles can be effectively applied in Egyptian agriculture, leading to improved sustainability, resilience, and social capital.

TAGADDOD is another case study of a successful startup with a circular economy business model focusing on repurposing waste resources to create value. The focus of Tagaddod on converting waste cooking oil into biodiesel is an excellent example of a circular economy business strategy. They can develop a clean fuel that can replace standard diesel by collecting waste oil from hotels, restaurants, and now households. This not only helps to minimize waste and pollution but also helps to transition to a more sustainable energy system (Tagaddod, 2023).

Tagaddod is a waste management startup in Egypt that was founded in 2013. The company began as a senior class project in waste management of vegetable oil for Cairo University and has since grown into a successful business that focuses on bio-diesel production from used cooking oil. The startup's success is based on its circular economy business model that focuses on reusing waste resources to create value. Tagaddod's innovative approach to waste management has contributed to reducing waste and pollution in Egypt and allowed the company to expand its operations to other countries, including Lebanon, Jordan, and across the European continent. The company has received recognition for its innovative and sustainable practices, including being named one of the country's most promising startups by Forbes and being recognized by CairoScene's 25 under 25 in 2015 (Tagaddod, 2023).

It's impressive that Tagaddod has expanded its operations beyond Egypt and exported to other countries, demonstrating the potential for circular economy startups to have a global impact. Their recognition by CairoScene and Forbes further demonstrates the importance of their work and the potential for circular economy startups to be recognized for their innovative and sustainable practices (Tagaddod, 2023).

WOTECH aims to produce wood from rice straw. Rice husk is a byproduct of rice milling and is considered an agricultural waste in many countries, including Egypt. However, it can potentially be a valuable resource in a circular economy. In Egypt, rice husk is primarily used as fuel for boilers in the rice mills or sold as animal feed or bedding. However, there are also opportunities to use rice husk in other applications, such as energy production or the production of value-added products; the annual production of Egyptian rice is nearly four million tons, and the best practice of circular economy is to convert rice husk to wood. The Wotech project includes establishing a factory for producing wood "MDF" with a capacity of 205,000 square meters annually in the city of Idku, Egypt, with investments estimated at 217 million euros. It is the first factory for producing wood using rice straw in the Middle East using German technology (Wotec, 2023). The project will achieve double returns as it will reduce environmental pollution rates; in addition to that, it will contribute to meeting the needs of the local market for wood and medium-density boards (MDF).

4. Discussion

The transition to a circular economy in Egypt

Egypt is facing severe environmental challenges like water scarcity, waste mismanagement and depletion of natural resources. The linear take-make-waste economy needs to be more sustainable for Egypt's growing population and development needs. A circular economy is critically needed. Egypt has clear opportunities to adopt CE principles, especially in renewable energy and waste management. Some promising initiatives and projects are already underway. However, a larger-scale systemic transition is required. Egypt has the potential advantage over lower-income countries to accelerate the circular transition. Things like reusing and repairing waste are already part of everyday economic activity. Building on these strengths can boost the circular shift.

Obstacles like consumer mindset, reliance on primary resources and short-term attitudes must be addressed. Widespread adoption of circular principles, values and practices is critical.

Education and awareness raising are important. Where youth entrepreneurship and innovation enthusiasm in Egypt can be tapped into to drive new circular business models and solutions. Creating opportunities and platforms for circular startups is a smart move. International cooperation, knowledge sharing and funding support can greatly help Egypt's circular transition. The EU's Green Deal strategies and SDGs provide useful guidelines. Partnerships with leading circular organizations can help overcome challenges. Make no mistake; the circular transition will be transformative and immensely beneficial for Egypt's economy, environment, jobs, health and prosperity. The opportunities outweigh the obstacles. Nevertheless, a holistic and concerted effort is needed.

The transition to a Circular Economy is a complex process that requires collaboration and partnerships between businesses, policymakers, and other stakeholders. By working together, these groups can share resources, expertise, and best practices and help to create a more cohesive and integrated approach to circular patterns. Also, Support innovation and entrepreneurship in a circular economy, particularly in developing new technologies and business models. Egypt could benefit from targeted support for startups and entrepreneurs focused on circular practices, such as developing new recycling technologies or producing biodegradable materials.

5. Conclusion

Egypt has great potential to leverage its abundant natural resources, strong tradition of craftsmanship, strategic location, and growing entrepreneurial culture to transition towards a circular economy. The recent passage of a new law on waste management by the government demonstrates a solid commitment to this cause. However, challenges such as the lack of integrated waste management infrastructure, underdeveloped recycling infrastructure, and limited awareness of circular economy strategies and benefits still need to be overcome. The participation of the business sector in adopting sustainable business models and international cooperation on circular economy issues will be crucial for Egypt to fully realize the economic, environmental, and social benefits of a circular economy. With concerted efforts and collaborations, Egypt can turn its challenges into opportunities and become a leader in the circular economy in the region.

The SEKEM, Tagaddod, and Wotech case studies demonstrate the potential for circular economy practices to be successfully implemented in agriculture and waste management in Egypt. These examples show that circular economy practices can lead to improved sustainability, reduced waste, and increased resource efficiency while creating social and economic benefits. The success of these companies highlights the importance of innovative and sustainable business models in achieving a circular economy and promoting sustainable development. While challenges remain, such as the need for greater awareness and education, and the development of infrastructure and regulations to support circular economy practices, the examples of SEKEM, Tagaddod, and Wotech offer a glimpse of the possibilities for a more sustainable future in Egypt. With continued efforts and collaborations, Egypt can become a leader in the circular economy in the region, promoting sustainable development and enhancing its economic and social well-being.

6. Recommendations

Based on the information provided in the previous sections, several recommendations can be made to promote the adoption of circular economy practices in Egypt:

- Circular Economy's advantages must be made known to the Egyptian government, enterprises, and the public by running campaigns to raise awareness and educate the public and offering financial incentives to companies that use CE principles.

- Egypt must build the infrastructure required to enable Circular Economy that covers recycling facilities, waste management systems, and renewable energy sources.
- Creating public-private partnerships can be useful for putting circular economy policies into action.
- Research and development projects should be targeted towards creating innovative technology and business models that enable the circular economy.
- The government and the private sector should support circular economy startups, such as funding, training, and mentorship programs, to help them grow and expand their operations.
- The generation of disposable waste can be avoided by low-cost investments such as implementing local circular loops and digital systems to connect the circular stakeholders and improve the logistics.
- Enhancing waste collection and sorting infrastructure, offering financial incentives for recycling, and encouraging businesses and customers to support recycling will expand CE value chains, lessening the quantity of waste Egypt produces and reducing the dependency on imports.
- Egypt might create simpler goods to repair, reuse, and recycle. This might be accomplished by collaborating with companies to create new, more sustainable product designs.

Therefore, there is a need for more research to understand the potential benefits, challenges, and opportunities associated with Circular Economy practices in different sectors and regions of the country. This research can inform policymaking and help identify areas where support is needed to promote adopting CE practices.

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