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Transitioning to Circular Plastic Economy: A Comparative Study Between Bangladesh and Norway

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Acknowledgement

This study has been conducted as a part of the completion of my Master of Science in Global Management from Business school (HHN) of Nord University. This thesis constitutes 30 credits from my master study.

It has been both interesting and challenging for me to conduct a research based on transitioning to Circular Plastic Economy in Norway and Bangladesh. But it has given me profound insight about Circular economy and circular plastic economy practices both in developed country and developing country. The experience built up from conducting this research will be a motivation for me to further research on circular economy practices in different region.

I am incredibly grateful to my supervisor, Dolores Modic (Associate Professor, Nord University) for her valuable guidelines and support throughout this thesis. It was not possible to finish this report without her feedback and inspirations. I would like to thank to Leticia Antunes Nogueira (Associate professor, Nord University and Senior research scientist at Nordland Research Foundation) for the valuable initial discussion and suggestions about conducting the research.

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Lastly my gratitude and prayers for my father whom I lost couple of days ago, and my family members for their unconditional support and care to finish this master's degree.

Abstract

Waste and pollution are major concerns for today's world. To manage waste, especially plastic, the circular economy model needs to be implemented.

This study aims to analyze the challenges related to plastic circular economy through the PESTEL model, whilst comparing Norway and Bangladesh. To achieve the aim, two research questions have been formulated: (1) what are the challenges of implementing a circular economy in Norway and Bangladesh; and (2) what are the measures taken by Norway and Bangladesh to implement a circular plastic economy?

The theoretical background reflects the difference between linear and circular economy, as well as the literature related to the transition from a linear economy to a circular economy and how circular economy and plastic circular economy can contribute to sustainability, literature on regional disparities between Norway and Bangladesh and how that can impact the implementation of circular plastic economy. It also considers the literature stream on the critiques of circular economy regarding its design, implementation and progress.

The findings imply that there are several challenges for each country to implement a circular economy. Political challenges and instability, and lack of support from international organizations are detected. The economic challenges are related especially to a lack of structural changes and lack of financial support. The social challenges such as a lack of change in consumer mentalities and lack of trust regarding data and confidentiality between firms are present. Next, the technological challenges are lack of technological infrastructure and lack of sustainable product designs, and the environmental challenges are lack of environmental safeguards and excluding environmental costs from economic costs of the products. Finally, the legal challenges are especially the lack of strong legal framework and international guidance and inspections.

These challenges can be minimized through some proposed recommendations including a collection of accurate supply chain and materials flow data of the economy; setting feasible, yet flexible targets; promotion of waste reduction, converting waste into resources; exchange of the best practices between countries as well as the exchange of sustainable practices between firms; promoting responsible consumption on one side, and on the other extending producer responsibilities; providing financial incentives to the supporting firms; and a shift of taxation from labor to materials and chemicals usage.

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Chapter 1: Introduction

In today's world, plastic waste is one of the environmental contaminants. The use of plastic has increased by 20 times since 1960 worldwide (Bening et al., 2021). Moreover, the cycling of plastic waste was recorded in 2015, when it only accounted for 9% of total plastic waste, while the rest is lost in the environment (Ahmed et al., 2022). Although several adverse effects of plastic waste indicate that it should be avoided, it is practical, because of its lightweight, ease of use, cheapness, and versatility (Chen, 2020). Plastics can be used as substitutes for scarce environmental resources and can be helpful for health and safety measures such as protecting against food and water pollution, ensuring proper sanitation, reducing biohazards, determining hygiene in medication and other tasks, and so on. However, it also represents a global challenge for sustainability (Forrest et al., 2019).

Plastics have become an inseparable part of human lives because, at every step, people deal with plastic, polymers, and nano-plastics, such as every product in plastic packages such as honey, salt, sugar, bottles of drinks, accessories, micro-plastics used in tap water, or even in the air, etc. (Ghosh, 2020). On the other hand, plastic hinders the wildlife ecosystem because it deteriorates the balance, as many animals die yearly from plastic waste. Moreover, using contaminated plastic may cause several fatal diseases, including diabetes, heart disease, food poisoning, obesity, cancer, etc. More in general, plastic waste creates more environmental hazards through greenhouse gas emissions, climate change, and causing global warming (Karstensen et al., 2020).

Circular Economy (CE) can resolve the problem of plastic waste through reducing the use of plastic by using environment-friendly alternatives, innovative recycling processes, and reuse solutions, according to Siddique et al. (2022). The plastic industry, for example, is concerned about transforming its business model from a traditional linear economy to a circular economy which indicates plastics are no longer produced for a single-use purpose. Instead, it is reusable and recyclable (Ahmed, Mahmud, and Acet, 2022). Circular economy deals with each phase of a product's lifecycle from origin to reaching consumers' hands and not only with it, minimizing plastic waste (Forrest et al., 2019).

According to, Bening et al. (2021) circular economy deals with three major activities to resolve plastic waste, including elimination which considers the avoidance of plastic products as much as possible; innovation, which reflects how the plastics can be reused and recycled; and circulation, which reflects how the plastics can be kept in the market or in the economy to reduce the possibility to get them in the environment.

Various initiatives have been taken to develop the circular plastic economy stronger such as Global Commitment towards CPE and past plastic network, the UN treaty on plastic

pollution etc., to reach the global agenda for a circular plastic economy Bening et al. (2021). The goals are to reduce annual plastic waste in ocean by 80%, reduction of the greenhouse effect by 25%, creating jobs and increasing savings (Azizuddin, Shamsuzzoha, and Piya, 2021). The broader vision for a circular plastic economy is reducing unnecessary and problematic plastics, and the single-use packaging model must be avoided. The reusable models should be applied by 100% packaging through plastics, the plastics must be decoupled from scarce resources, and the packaging should be harmless to health and safety, prohibiting all kinds of chemicals (Karstensen, Engelsen, and Saha, 2020).

This thesis reflects the transition towards a circular plastic economy in Bangladesh and Norway. Here, the transition in both countries has been shown in a comparison showcasing how each country is trying to reach a circular plastic economy to reduce plastic footprint and ensure sustainability for both countries and draw comparisons between them. Every year, Bangladesh produces almost three hundred million tons of plastic; only 14% of plastics are recycled, the rest of the plastics get comminated in rivers, canals, and deep ocean water (Ahmed et al., 2022). Nonetheless, in comparison this rate of recycling is still higher than the world average at around 6 % (Azizuddin et al., 2021). So, there is a huge opportunity for developing countries like Bangladesh that can represent its contribution to moving towards a more circular economy (Siddique et al., 2022). If we turn now to Norway. Norway's plastic production and consumption are massive, despite being considered the first nation that took up the return schemes plan for plastic bottles (i.e., should be returned to the shops). But there are criticisms that those efforts are not effective enough since around 101 kg of plastics are thrown out by the users every year (Wang and Becidan, 2021). But in general, the country plans to transform into a circular plastic economy; it wants to reduce the use of plastics and single-use plastics. Moreover, the plan to implement the circular plastic economy is set for 2040 to reduce 100% of plastic waste (Sørumsbrenden, 2019). So, the country exhibits a strong commitment at least on the policy level. As we can see both countries have their set of attributes which we will attempt to consider during the analysis.

The methodologies used for this study reflect that it follows the positivism philosophy, the approach is deductive, the research strategy is an archival research strategy, the method is qualitative research through descriptive study, data is collected in a qualitative form and from secondary sources like thesis papers, articles, journals, books, websites, reports etc. Data analysis has been done using the PESTEL model.

1.1 Motivation for the Research

During my master's degree in 'Global Management', I have learned that there are many environmental challenges in our economy. During the master's program, I attended two courses about Circular Economy and have understood the importance and relevance of CE implementation. CE deals e.g., with the product lifecycle and how the products can be reused or recycled to reduce environmental pollution, or more broadly it deals with narrowing, slowing, and closing the material flow loops (Bocken et al., 2016). In the meantime, I have found that plastic waste is a significant environmental challenge for the economy of any nation because of its origins of significant contaminations. I saw an interesting idea that countries can reduce such plastic pollution through circular plastic economy. My knowledge was mostly theoretical, so, I want to gather more practical knowledge on the issue of whether there are any circular plastic economy plan and how they are being implemented. Because of this, when I got the opportunity from my course teacher to conduct a thesis paper, I chose the topic of circular plastic economy and how they are implanted in Bangladesh and Norway in a comparative view as this topic is related to the field of my interest.

To achieve the United Nations' sustainable development goals world economy is moving towards a liner to the circular economy; for this reason, lots of research are ongoing by different academia, the MacArthur Foundation and on an individual basis. All relevant sectors like academia, research bodies, and public-private bodies should act together to practice more circularity in our economy. So far, only a few studies have investigated the potential and current situation of circular economy practices in Bangladesh, but lots of research and investigation are going on in Norway. Therefore, it motivates me to investigate the plastic circularity practice in a comparative view and I selected Bangladesh and Norway as two contrasting examples.

1.2 Research Aim and Objectives

The research aims to assess the transition towards the circular plastic economy of Bangladesh and Norway in a comparative view. And to reach the broad aim of the research, some objectives are formulated, which are as follows:

- To identify the common challenges Bangladesh and Norway face when transitioning to a circular plastic economy.
- To compare the actions regarding the transition to a circular plastic economy between Bangladesh and Norway.
- To assess how far Bangladesh and Norway are in achieving the sustainable development goals by practicing a circular plastic economy.

I aim to contribute not only by exposing the common challenges, and potential regional disparities, but also by finetuning the PESTEL framework to be able to better analyze the circular plastic economy factors.

1.3 Research Questions

Three research questions have been formulated to meet the objectives formulated above. The main research question is as follows:

1. What are the common challenges of the plastic circular economy in Norway and Bangladesh categorized according to the PESTEL model?

I have also formulated two sub-questions to answer the main research question.

- a. What is the present status quo (current state) of the plastic circular economy in Norway and Bangladesh by addressing political, economic, social, technological, environmental, and legal factors?
- b. What are the differences between measures Bangladesh and Norway took to implement a transition toward a circular plastic economy?

1.4 Overview of the Research

As mentioned, this research paper will help us understand the transition to the circular plastic economy in Norway and Bangladesh and draw conclusion from their comparison. I aim to contribute not only by exposing the common challenges, and potential regional disparities, but also by finetuning the PESTEL framework to be able to better analyze the circular plastic economy factors.

The first chapter of this research deals with the background data, rationale, research aim, objectives, and questions formulation to design further chapters such as literature review and methodology to conduct the research paper well.

In chapter two, I will discuss relevant theoretical perspectives that will help me to answer my research question; the main areas of discussion will be the circular economy, areas and models of circular plastic economy, its importance and contribution to ensuring the sustainability of a nation, and how a linear economy can be transformed to a circular plastic economy in the light of existing literature as well as in brief economic disparity between Norway and Bangladesh has been discussed.

In chapter three, I have discussed the methodology part where the methodology directs the paper is based on a comparative study between Norway and Bangladesh to show

PESTEL analysis can be used to analyze circular plastic economy, indicating the paper is a systematic review of previous literature, where secondary data will be used to determine my thesis questions outcomes.

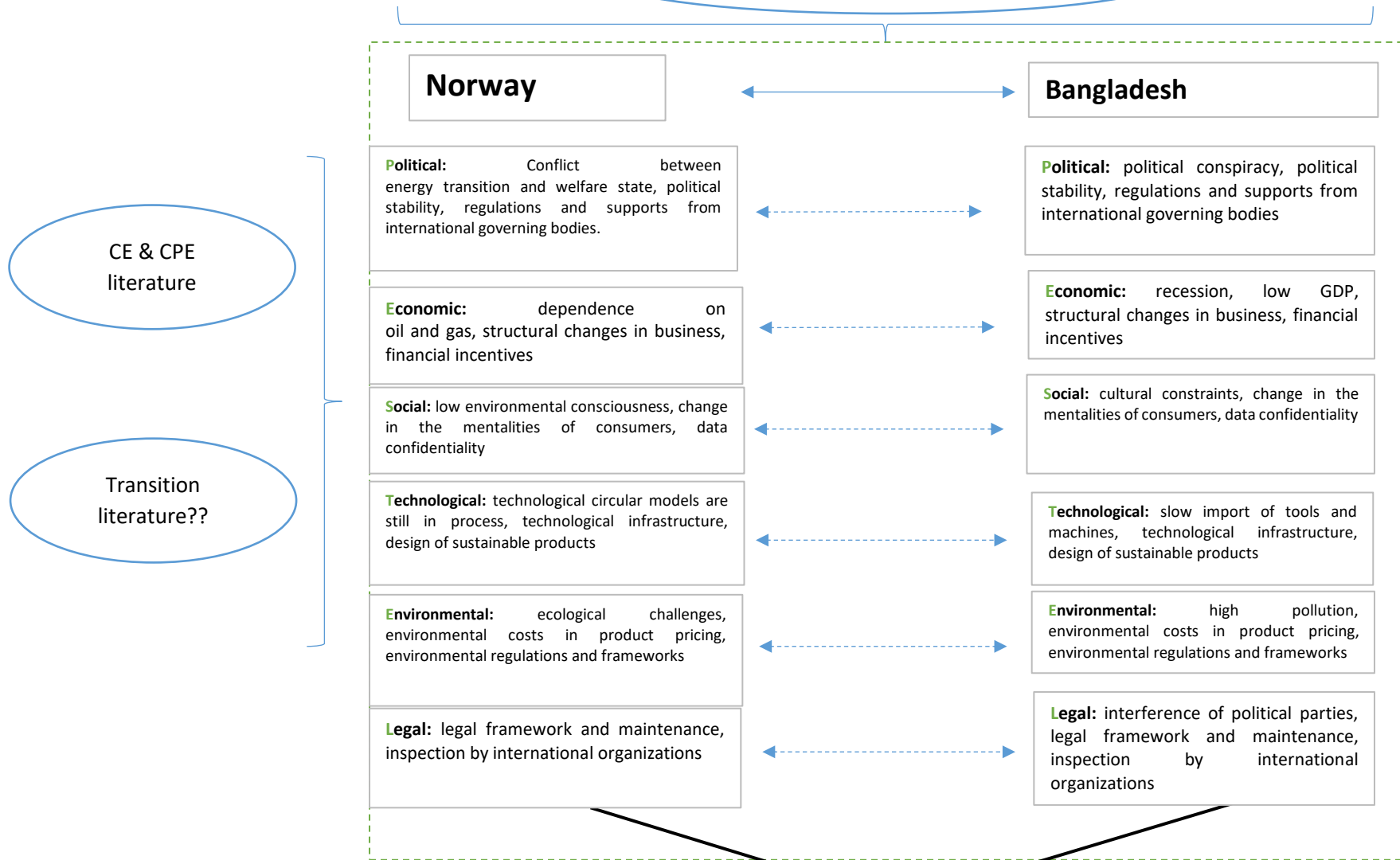
In chapter four, I will present the findings through PESTEL analysis; the analysis and findings will show us how political, economic, social, technological, legal, and environmental factors can contribute to the transition towards a circular plastic economy in each individual country, as well as a comparative view between Bangladesh and Norway regarding how differently they are adopting the concept of circular plastic economy and how well they are progressing.

Then, in chapter five, the results will be discussed considering the underlying literature, thus connecting the front end and the back end of the thesis.

Finally, in chapter six, I will conclude my research findings, discussion, and further recommendations for future research about implementing the circular plastic economy better.

1.5 Conceptual framework

Regional disparities literature??



Common challenges: Lack of political stability, Lack of regulations and supports from international governing bodies, Lack of structural changes in business, Lack of financial incentives, Lack of change in the mentalities of consumers regarding sustainable products, Lack of data privacy in cross-sharing materials between firms, Lack of technological infrastructure, Lack of design of sustainable products, Exclusion of environmental costs in product pricing, Lack of environmental regulations and frameworks, Lack of legal framework and maintenance, and Lack of inspection by international organization.

Chapter 2: Theoretical Background

This part provides the background knowledge of various theories, models, and concepts regarding the research topic. So, this section is first going to focus on a detailed understanding of the circular economy and how it is distinguishable from a traditional linear economy. Secondly, I use that insights to provide a deep insight into the circular plastic economy with relevant models and concepts to understand how the plastic circular economy can contribute to ensuring the sustainability of the economy to realize the importance of circular plastic economy better. Also, thirdly the challenges of transition to a circular economy have been shown with different approaches to minimize them. Furthermore, I consult the literature on the regional disparity as I focus on the continuation of my thesis on the comparison between Norway and Bangladesh. Finally, I briefly outline some of the critique of circular economy as this is relevant in the light of providing some recommendations at the end of my thesis.

2.1 Traditional Linear Economy and Circular Economy

A traditional linear economy can be defined as the collection of raw materials, processing them to create a final product, and selling them to consumers. Consumers use or consume them until it becomes scrap and throw them out after it has no use anymore (Aurisano et al., 2021). There is no concern for an ecological and sustainable footprint in this process, and the product lifecycle has been finished after it is thrown out (Bucknall, 2020). The linear economy is about taking raw materials, making products, and disposing of them as waste, which is considered an eco-efficient process.

The product lifecycle is very short that starts from purchasing raw materials and finishes to the selling of products to the consumers; the concept of reuse and recycling is scarce and often used as downcycling, which refers to the process of making a different type of products using the remaining scrap which is not much more robust and reliable than the original product (Crippa et al., 2019). Geng et al. (2019) stated that this type of process is often used by companies that follow a business model focusing on products only and achieving the economic goal of the company, which is profitability and profit growth. Companies must be more concerned about environmental safeguards or sustainability, the most buzzing business topic nowadays.

Circular economy literature often talks about infinite versus finite resources. The world does not have infinite resources; instead, it has limited resources that have a definite end one day, so such resources should be used and utilized carefully with a concern of

conserving them for future generations (Ghosh, 2020). This is impossible in the traditional linear economy. An alternative model should be processed by the joint efforts of consumers, marketers, the government, and other concerned parties. This alternative model can be the circular economy.

In Figure 1, which is adopted by Crippa et al. (2019), it is clearly shown how the linear economy works- take, make, consume and thrown away after its uses. So, it is clear to us that linear economy doesn't think about sustainable future rather than making money.

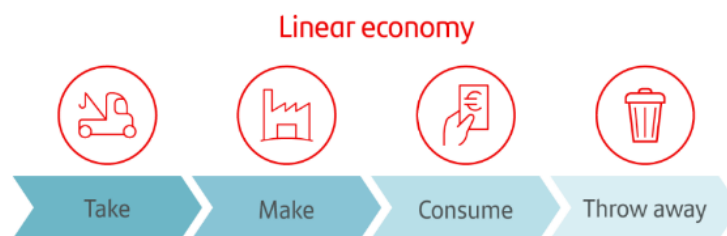


Figure 1. Traditional Linear Economy

(Source: Crippa et al., 2019)

Hahladakis et al. (2020) posit that the circular economy is however the mode of the economy where productions are made with the concern that the products have little impact on the environment or have less footprint. Circular economy model is “as a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops thanks to long-lasting design, maintenance, repair, reuse remanufacturing, refurbishing, and recycling” (Geissdoerfer et al., 2017). Furthermore, Ellen MacArthur Foundation (2020) identifies circular business model as it will reduce costs, increase revenues and minimize risk and lastly it promises economic sector to subsidize to a transition to sustainability.

According to Huysman et al. (2017), circular economy has several principles to ensure sustainability, including reducing, reusing, and recycling. Moreover, Huysman et al. (2017) stated that reducing implies the reduction of consumption of products that has severe or little impact on the environment, reusing implies searching for another new use of the product or package rather than throwing it into the trash, and recycling implies that

using the old products that are useless to produce or make something new for a new user and this is how the waste can be minimized, and sustainability can be achieved.

Khan et al. (2020) argued that the companies focusing on the circular economy model focus on sustainability and service rather than profitability and products, respectively, unlike the linear economy. The process is considered the eco-effectiveness model because it helps to ensure sustainability without sacrificing economic goals. The product lifecycle here is considered a long way because multiple lifecycles of a single product can be ensured (Meys et al., 2020). Here recycling can be done through upcycling, which ensures giving birth of a new product for new use by using the old product halfway through its use or not using it much, and the new one becomes more practical and valuable. Cascading ensures when there is any product in the process affecting the other or the whole process and removing the product from the process, and high-grade recycling ensures the recycled products are made of high quality. It has more value in the market than the previous one (Paletta et al., 2019). This is how the circular economy can ensure sustainability through reducing environmental footprint and severe impact that the linear economy cannot process.



Figure 2. Circular Economy

(Source: Crippa et al., 2019)

In Figure 2, which I adopt from Crippa et al. (2019), we see the CE loop, where CE emphasizes to recycle, reduce and reusages to minimize the waste from the society. Payne et al. (2019) stated that from the concepts of both linear and circular economy, Circular economy deals with an eco-effectiveness process that ensures a proactive measure to reduce environmental footprint and the linear economy is more like a reactive process that after creating trash or waste, reduction strategies are taken. In the figure three Eco-efficiency and eco-effectiveness (Zhao et al., 2022) where its showing that with

the time frame of circularity practice (reduce, recycle, upcycle, reuse and rethink) eco-efficiency increases and had positive impact on environment.

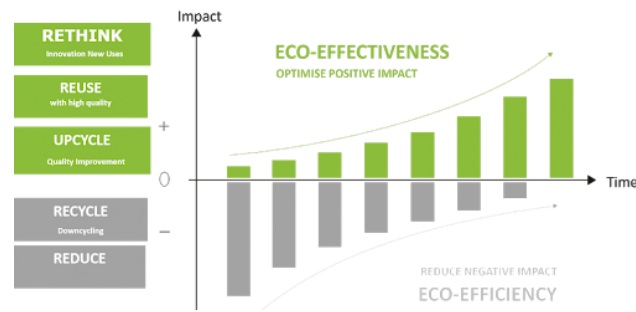


Figure 3. Eco-efficiency and eco-effectiveness

(Source: Zhao et al., 2022)

2.2 Circular Plastic Economy

In the last half-century, the production and use of plastic have increased by 20 times more. Plastic is handy as it is versatile, but at the same time, it is wasteful, too (Sheldon and Norton, 2020). Moreover, when it becomes waste, the adverse effects on the environment, society, and economy are severe. Plastic becomes waste mainly when it is used for packaging. According to statistics, only 16% of plastic packages are reused or recycled, and around 95% of plastic values are lost in the environment annually (Simon, 2019).

Van Eygen, Laner, and Fellner (2018) argued that the circular plastic economy is the process of producing plastic goods or packages with a view not to use them but rather to reuse them over multiple lifecycles. Moreover, the whole process is designed so that produced plastics will be used maximumly, no plastic will be lost in the environment, and no toxins will be spread to the economy. Moreover, according to Yuan et al. (2021), plastic packaging will fit in the system for reuse, recycling, and composting.

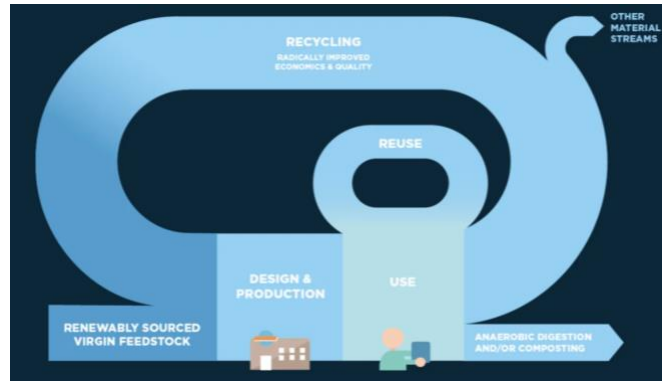


Figure 4. Circular Plastic Economy

(Source: Hahladakis et al., 2020)

The circular plastic economy ensures that no plastic will be wasted or vanish or will create pollution through 3 significant actions, including the elimination of all the plastic products that create problems, reuse through innovation that will make the plastic to be recycled, reused, and composted, and circulation of plastic so that they have not vanished in the economy (Zhao et al., 2022).

Elimination is an important activity to ensure circular plastic economy. Because the demand, production, and use of plastic goods and packaging are increasing day by day, and such increase cannot be demolished at once as well as it is also not possible to make the plastic flow grow in the economy but not in the environment (Bening et al., 2021). So, Chen (2020) stated that the way is to reduce the amount of unnecessary and wasteful plastic.

Next, Forrest et al. (2019) argued that the reuse activity is the most innovative. It is the business-to-customer (B2C) process where businesses exchange the ownership of plastic packaging with the consumers. It is the responsibility of the consumers to return it to the business by leaving their homes as required.



Figure 5. Business-to-customer reuse model

(Source: Bucknall, 2020)

Business-to-customer reuse model (see Figure 6 adapted after Bucknall, 2020) is divided into four parts, including the refill at home, return from home, refill to go, and return to go, which is presented in the circle and is divided based on the criteria of refill by the use, return to business, on the go, and at home (Ghosh, 2020).

Refill at home by the user implies that customers hold the package at home and stay at home, and the seller or company reaches the customer's doors to refill the container on a subscription basis, or the customer refills the container with some other products for other use at home (Karstensen et al., 2020). Siddique et al. (2022) stated that return from home, the second proportion of the reuse circle, implies that customers stay at home, and the companies are responsible for collecting the containers from customers' homes through a logistic service. Refill on the go, the third portion of the reuse circle, implies that the customer is responsible for refilling the container by leaving their house and going to the seller (Ahmed et al., 2022). Moreover, lastly, the fourth proportion of the reuse circle is the return-to-go approach which implies that the customer leaves their home, goes to the seller, and returns the container as per the company policy, for example, return machines (Karstensen et al., 2020).

Wang and Becidan (2021) agreed with the statement that the reusing model can reduce costs of transportation and packaging for consumers and sellers by ensuring the supply of refills of empty containers of compact goods. It can also ensure brand loyalty of the customers and can retain customers by encouraging them to reuse, return, and not end

up with packaging through reward schemes (Gong et al., 2020). It ensures adaptability to the needs and preferences of the consumers because it helps them decide their packaging, decide the number of products or quantities required, and they can bring different flavors as needed. Again, Aurisano, Weber, and Fantke (2021) stated that it helps to rebuild the user experience because consumers get a favor from the marketer if the packaging is designed in a high-end way that they can use several times for several purposes. They feel it is cheap because the initial cost spreads over several uses.

Bucknall (2020) agreed that it also helps the producers get economies of scale to ensure operational optimization by sharing the opportunity to use reusable packaging across different brands and sectors. The Coca-Cola Company does an example of such activity. Moreover, at last, Crippa et al. (2019) argued that it helps to gather user information about their preferences and needs by employing digital technologies in the reusable packaging system, such as GPS tracking, sensors, Etc.

The circulation or material circulation process implies that materials or plastic used in the packaging will be circulated continuously in the economy and will not be vanished there (Geng et al., 2019). Moreover, some activities are needed to be employed, including collecting and sorting a biological process and then rebuilding the newly introduced products from the previous one. This is how the packaging materials can reenter the circular economy, and it differs from the reuse model in that reuse helps to circulate the package through washing and not reshaping the old ones. In contrast, circulation is reusing old packages by rebuilding and reshaping them through a breakdown process (Ghosh, 2020). This is how the circular plastic economy evolves in the economy, society, and environment to create and ensure sustainability for living being.

Hahladakis et al. (2020) stated that the circular economy is considered the only remedy for the pollution problem of plastic. Moreover, there are some approaches to ensure a circular plastic economy to build sustainability, such as using savory and perishable plastic packaging, using no packages for solid products, and increasing the consumption of products free from packaging. Huysman et al. (2017) agreed that using savory and perishable packaging ensures that using alternatives to plastic that are easily edible such as brown seaweed, is a renewable natural resource that can be used to contain goods instead of single-use plastic bottles, cups, and other containers, Etc. For example, Ooho packaging which is used in restaurants to contain sauces and tablespoons of ketchup instead of using plastic cups and mini containers for them.

Next, Khan et al. (2020) argued that the approach of not using packaging for solid goods ensures that if it is possible to convert liquids to solid products, that will reduce the use of

plastic packaging. It can reduce transportation costs, and emissions of toxins, increase consumer convenience, e-commerce presence, consumers can purchase in large quantities, etc. This approach is adopted by lush stores where the packaging was previously required for liquid shampoos, soaps, toothpaste tubes, fragrances, and other beauty products. However, now it can reduce packaging waste by alternating such liquids with solid products (Meys et al., 2020).

Moreover, lastly, increasing the consumption of goods that do not require packaging, such as fruits and vegetables, and although they are perishable but can increase their shelf-life using a wrap or coat of Appel that reduces water loss and oxidation of fruits and vegetables and ensure a fresh meal (Paletta et al., 2019). So, the suppliers of such products can use these alternatives to reduce plastic packaging and waste.

2.3 Contribution of Circular Plastic Economy to Build Sustainability

According to Payne et al. (2019) sustainability of a nation or economy could be achieved when there is economic growth, environmental safeguards, the local economy benefits, full employment, and less dependency on other nations, and the circular economy can assure all the required actions to become a sustainable economy. In connection to this, circular plastic economy is a new economy to reduce plastic pollution and make the economy, society, and environment more sustainable (Meys et al., 2020).

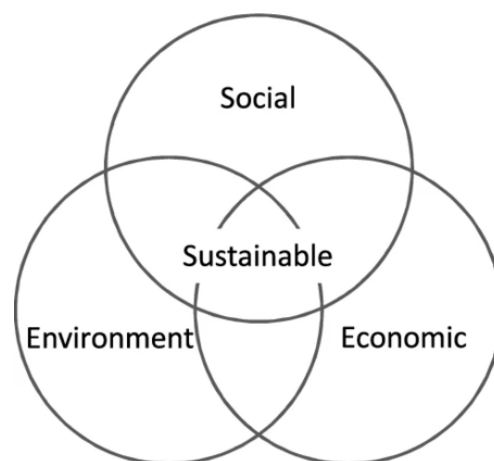


Figure 6: How circular economy ensures sustainability

Source: (Aurisano, Weber, and Fantke, 2021)

Figure 6 show us how circular economy ensures sustainability through environmental, social and economic development (Aurisano, Weber, and Fantke, 2021). Circular

economy helps to ensure sustainability by full utilization of non-renewable resources because there are only limited non-renewable resources in the world, and they need to be reserved for future generations and plastic is a non-renewable resource that should be recycled and reused (Robaina et al., 2020). Moreover, for that reason, the circulation of resources to the economy is a must, and there are no alternatives other than the circular economy that helps to reuse, recycle, and compost the materials so they do not become lost and reduce the further use of similar natural resources which are not renewable.

Sanchez et al. (2020) stated that circular plastic economy where plastic production and use need to be limited that also helps to lower carbon emissions by reducing the transportation of new resources. Moreover, Shamsuyeva and Endres (2021) argued that this minimization of gas in a cycle helps to reduce the possibility of the greenhouse effect on the environment and economy as well as climate change. It also encourages ensuring zero waste because, in the environment, most of the problems and pollution occur due to the abundance of waste anywhere in cities and in rural areas.

Sheldon and Norton (2020) stated that the circular plastic economy helps to reduce waste by circulating plastic in the economy through multiple lifecycles of that product helps to reduce the destruction of wildlife, ocean and sea life and to ensure better health for the human being. Simon (2019) agreed that it also provides benefits to the consumers in the sense that by reusing the plastic packaging that is produced with high-end design, they can reduce the cost of consumption such as they are not bound to purchase the same thing in a fixed bundle instead, they can purchase in varying quantity and mixed flavors. They can contain them in old packages.

Van Eygen, Laner, and Fellner (2018) stated that this could reduce their cost, increase their savings, and ensure further investment that eventually is good for the nation's economic growth. It also benefits the company by helping them to ensure an economy of scale by using old resources, sharing the same packaging with other brands or sectors, and ensuring productivity; they can reduce materials and operations costs and enjoy high revenues and profits. And according to, Ellen MacArthur Foundation (2020) Circular business models are to reduce costs, increase revenues, and manage risks, as well as provide possibilities for the finance sector to contribute to a transition to sustainability.

Also, Yuan et al. (2021) argued that for companies, there are some other benefits to using the circular plastic economy as a business model, such as they can get more loyal customers when customers find that the companies are involved in a sustainable approach as well as their costs are also reducing, and this may lead to higher sales, higher revenues, and higher profit. Again, Zhao et al. (2022) agreed that the companies

could exploit more businesses in this model, such as new businesses, for the collection of old materials, refurbishing, and recycling businesses can give them more opportunities to be profitable.

Policies and regulations adopted by the political system of a country, or the international organizations have a direct importance to build a circular plastic economy like policies on compostable plastics, increasing micro-plastics, restrictions on plastic bags and packaging, reducing single-use plastic and plastic waste to build sustainability in the economy through lower waste, pollution, and diseases (Zhao et al., 2022).

Thus, increasing company profits raises more investment in the economy, which increases economic growth and sustainability. Azizuddin et al. (2021) stated that the new opportunity for businesses to introduce new units of businesses could ensure more employment opportunities that help to reduce the curse of unemployment in the economy and nation and raise infrastructure and development.

The nation which practices circular economy can enjoy more resource independence because all the countries do not have an abundance of required materials; they need to be circulated in business, so they need to import them from foreign countries. Suppose they can reuse the resources they have in the local economy. In that case, they need fewer resources to fulfil more needs of the people that reduces the dependence on materials and resources imported from foreign countries. That also can increase the export of their resources to other countries and can enjoy more foreign earnings and can enjoy a positive balance of payment (Crippa et al., 2019).

It also raises the social values and norms of the people of that nation in a sustainable manner where people will believe that wastage is a curse, and they will build awareness about it by themselves. They will create communities, voluntary organizations, non-profit institutes, Etc., to reduce plastic pollution. When people, businesses, government, and other stakeholders of the economy come forward to act against plastic waste and pollution and raise the plastic circular economy, the economy will be more sustainable and praiseworthy (Aurisano et al., 2021).

Moreover, when foreign investors find that the nation is more sustainable in the economy, society, and environment, they will prefer it for investment, leading to its development (Bucknall, 2020). Thus, a circular plastic economy will give a new identity to a nation on the world map by ensuring sustainability and growth.

2.4 Factors Affecting Transition to Circular Economy

Pollution, biodiversity, climate change, Etc., are raising issues for global sustainability and environmental concern. Moreover, to limit such issues, there is a need to implement a socio-technical transition from both local and global perspectives that will result from a low level of global warming, pollution, and biodiversity and will improve efficiency in resources and the lives of human beings (Alvarado et al., 2021).

The political structure and government policies are critical for such a socio-technical transition to sustainability. Many regional and global organizations have come forward to implement this transition, as European Union (EU) has targeted reducing carbon emissions by 80% by 2050 and reducing biodiversity loss by 2020. China and the United States have committed to climate change by 2025 and 2030 (Del Vecchio et al., 2021).

Højbye and Sand (2018) posit that these transition pathways are the interactive model of social, technical, ecological, and institutional perspectives. Moreover, there are several challenges to this sustainability transition pathway, including multiple scales, geography, and temporality of the transition process, uncertainties for innovation and complexities for forecasting, the inertia of existing systems and emergence of newness, problems to customize innovations with changing social purposes and shared objects, and complexity in social, economic, and technical changes (Geels, 2011). Similarly, Ellen MacArthur Foundation (2020) identifies circular business model as it will reduce costs, increase revenues and minimize risk and lastly it promises economic sector to subsidize to a transition to sustainability.

Scales, geographies, and temporality imply that socio-technical transition requires several periods and multiple phases to be implemented, such as cultural, organizational, jurisdictional, and territorial. Moreover, some governance implications exist regarding the transition to a circular economy or sustainability (Jaeger and Upadhyay, 2020). Firstly, more than innovation and diffusion of that innovation is needed for the transition; instead, there needs to be an integration of all other scales to implement a sustainability transition. Secondly, transitions only sometimes happen suddenly; instead, there needs to be long-term planning and requires proper projections of the planning over time. Thirdly, there needs to be a close integration between the multiple scales of geographical concerns, such as local, national, regional, and global, with several phenomena like organization, behavior, practice, and institutions (Michellini et al., 2017).

Complexity and uncertainty refer to innovation, and change is dynamic, unpredictable, and uncontrollable. Because a novelty can face several challenges, including slow development, rapid diffusion, competition from substitutes, and cycles of disappointments. When innovation is more uncertain and unpredictable, the socio-

technical change becomes more disruptive. Moreover, this is because of some countervailing forces, including losses, resistance to change, and uncertain costs (Turnheim et al., 2015).

The innovation and inertia challenge refers to the problem of capturing the results of dual governance in the transition pathways, including promoting radical innovations and eliminating the mature and other new incumbents. This inertia can be expressed by the structural techno-economic challenge that often causes sunk investments due to predictions based on past observations and trends regarding economic aspects (Turnheim et al., 2015).

Incompatibility with goals means that judging the appropriateness, efficiency, and effectiveness of innovation also requires new criteria. Regulations and policies developed to support the innovation for public goods like health, education, infrastructure, and the environment may change the existing values, norms, and ideologies. So, public debates and needs raise innovations that ultimately require narrative changes and can create wars and coalitions (Vanhamäk et al., 2020).

Lastly, the challenge of governing technology or innovation and the change in social structures refers to the fact that there are different perspectives regarding technological shaping and supporting and can cause indiscipline (Del Vecchio et al., 2021). Moreover, there are three governing systems of transitions, including command and control public policy, where the central dominance is government and creates the challenge regarding effectiveness and legitimacy. Then, the public-private governance system where primary dominants are business and government and the accountability, effectiveness, and legitimacy challenges. Moreover, adaptive governance, where the primary dominants are business, government, and society, can create a problem regarding coordination and intervention (Høibye and Sand, 2018).

Three approaches to sustainable transition include quantitative systems modelling, socio-technical analysis, and initiative-based learning that can help resolve the challenges (Vanhamäk et al., 2020).

Quantitative system analysis includes several quantitative methods like networking, integrated analysis, techno-economic analysis, agent system, complex system, Etc., to provide insight into a forward-looking transition system (Geels, 2011). This is done by assessing the policies for the transition from a social perspective and past projections against the objectives or goals. This approach is straightforward and structured and can quickly assess various policies' effects on the transition pathways. On the other hand, this oversimplified approach can create problems because it does not emphasize the effects

of social actors and behavior, and the focus towards implementation needs to be expanded (Alvarado et al., 2021).

This socio-technical transition requires a systematic change and can be expressed through a multi-level perspective (MLP) model where the transition toward a circular economy and sustainability can be done through 3 levels, including niches, regimes, and socio-technical landscapes (Modic and Rončević, 2018). Niches can be defined as spaces where innovation takes place by the protections from dominant parties. Regimes are networks combining various actors, social groups, formal and informal rules to maintain the system, and technological elements. So, it can be said that regimes are a combination of technology, social institutions, and actors. This level cannot be changed through a radical transformation; incremental changes can only happen (Alvarado et al., 2021). The socio-technical landscape can be defined as the combination of outer trends and critical events such as demographic changes, macroeconomic prospects, political improvements, cultural and social values, climate change, crises, wars, Etc. Any change in the landscape factors can ensure opportunities for niches and create pressure for regime changes (Geels, 2011).

Moreover, Initiative-based learning is more critical to the social actors because their expectations and practices are essential for the transition pathways. Their sense of rationality regarding the long-term objectives of transition sustainability is affected by their environment and social groups (Høiby and Sand, 2018). It focuses on the dynamism of the social actors, such as their behaviors, learning, values, Etc., and on the expectations of practitioners and stakeholders of the innovation to be transited. Moreover, this approach has some problems, including focusing on short-term contexts and ignoring the broader structural forces, and the results can hardly be generalized from the entire transition process (Vanhamäk et al., 2020).

2.5 Regional Disparity

As transition requires a systematic change to the economy, which is also subjected regional characteristics, it is essential to capture the regional concerns to adapt to the changes regarding technology, innovation, or sustainability (Seah et al., 2021).

As the research is a comparative study between Norway and Bangladesh, the regional disparity of interest is that between Northern Europe and South-Asian regions, respectively.

There is a close link between the transition of an economy with its regional innovation system, innovation policy, institutional framework, and geographical proximity (Boschma

et al., 2017). Also, whether a new activity can be accepted or cannot be accepted by an economy depends on its regional capabilities (Gong and Hassink, 2020).

South Asia comprises of nine countries, including Bangladesh. It is defined based on geographical proximity, where most countries need to be developed in their economic status and a lack of dynamism in social and political aspects. Also, there in Bangladesh needs to be more proximity to the innovative countries of the world (Seah et al., 2021). The innovation system of this region is more resistant because they believe that any new technology that improves human performance may lead to considerable risks if not maintained properly. Also, the technological revolution is mainly dominated by the private sector. The institutional structure is developed by SAARC (South Asian Association for Regional Cooperation), ADB (Asian Development Bank), BIMSTEC (Bay of Bengal Initiative for Multi-Sectoral, Technical, and Economic Cooperation), Etc. which continuously work for economic development and cooperation as well as takes initiatives to foster innovation (Seah et al., 2021).

In Northern Europe, there are nine countries, including Norway. It is also grouped based on geographical proximity. However, the topmost innovative countries in the world, including Denmark, Finland, and Sweden, reveal that the region is innovation focused. It is also a part of EEA, that evaluates the region through an innovation-based scorecard. Hence, these regional countries primarily focus on innovation, change, transition, and sustainability through innovation policies. Also, the regional countries' economic condition is mainly developed, indicating their knowledge base and favorable to invest in new technologies and changes (Bouzarovski and Tirado Herrero, 2017).

So, it can be said that developed infrastructure, business modules, and technology are enough to link an economy to the linear model. Also, the existing businesses have enough capacity, financing and information to transfer to a circular economy. This is because traditional investors ignore the projects of risky innovations, consumers do not change their conventional buying behavior, and the price is not determined based on the actual cost of resources used by the society that fails the policies developed for the transition to a circular economy (European Commission, 2014).

2.6 Critique of Circular Economy

Though circular economy has a positive impact on environment, it is not an easy task to ensure sustainability. Different research bodies addressed different critiques to the circular economy and circular business models because they claim that the circular economy has gentle limits, unclear theoretical grounds, and that its application faces structural obstacles (Corvellec, Stoweel, Johanson, 2021). At first, Circular economy

has emerged in Asia, more specifically in China, as key principle for the industrial and environmental policies (Winans et al., 2017; Zhu et al., 2019), then this idea was introduced in different countries.

Though circular economy has been described as revolutionary innovation, it is not a new idea. As circular economy is defined in different ways, so this term means different things to different people (Kirchherr et al., 2017). Because the concept and its application have almost exclusively been developed and driven by practitioners, policy makers, businesses, business consultants, business associations, business foundations, and many more (Korhonen et al., 2018a). And those different definitions are typically used for different theoretical basis (Kirchherr et al., 2017).

Some critiques about circularity are related to the fact that cyclical systems consume resources and create wastes and emissions (Korhonen et al., 2018a), and energy needed to operate circular economy (Allwood, 2014). For that we need renewable energy (Haas et al., 2015). Shortage of material properties and the reprocessing technologies are other obstacles to closing materials loops (Velis & Vrancken, 2015, p. 774). Indulgence in the environment (Cullen, 2017), contamination (Baxter et al., 2017) and tiring down of materials (Parrique et al., 2019). Etc. prohibits the circular economy practices.

In circular economy waste is considered as resource and that resource is generated as primary goods (Zink & Geyer, 2017). As waste is considered as resource, unexpectedly it increases the demand for waste rather than decreasing the volume (Greer et al., 2021). Difficulties of circular economy implementation happens at three levels- policy levels, individual level and organizational level that means that limited implementation so far (Kirchherr et al., 2018). Although the concept is widely ideal though its “practicalities” (Holmes et al., 2021, p. 63) and actual performances are limited and fragile (Gregson et al., 2015).

On organization level different circular business model and different approach to circularity (Geissdoerfer et al., 2018), which also limiting certain activities in circularity (Stål & Corvellec, 2018). Similarly, consumers level the circular economy meets similar structural challenges like- not paying much attention to customers values in circular business models and how they respond (Hobson & Lynch, 2016) and consumer interest to accept the new things. In case of using waste there are some hindrances like price volatility and lack of supply (Babbitt et al., 2018, p. 1), lower quality waste (Zink & Geyer, 2017), contaminated waste (Baxter et al., 2017), legacy matters (Goldberg, 2017), and

other inherent uncertainties (Linder & Williander, 2017) that limit uses of secondary resources.

We don't know the short term and long-term environmental effect on our environment when designing reuse, remanufacturing, and recycling projects (Korhonen et al., 2018a) therefore, it's not clear how circular economy can satisfy sustainable global future. However, circular economy can bring with it prosperity and a socially positive footprint, vice versa as well for many but: "...even by hiding or graying that there will be winners and losers... circular economy is not a neutral system, it will be materialized through a broader social-political framework, and there is no guarantee that the final results will be positive for societies" (Mavropoulos & Nilsen, 2020, p. 4).

Due to the global need and the comprehensive nature of circular economy concept, there is a need of public, private, consumers and civil society to align their circular goals, without this circular economy will be implemented partially that may affects our environment negatively.

2.7 Summary of Theoretical Background

The linear economy works in a source-make-dispose way. In contrast, the circular economy deals with the reuse and recycling of plastic, and they differ in eco-efficiency and eco-effectiveness, profit and sustainability, etc.

The circular plastic economy deals with three principles: elimination, reuse, and circulation of plastic products that reduce them to become waste and loss. Then, there are many contributions of the circular plastic economy to make a nation more sustainable, including it helps to reduce environmental pollution, increase consumer savings, enhance business opportunities to increase economies of scale, profitability, etc., that increases the economic growth of the nation. It helps to develop social values among the community regarding minimizing plastic use or reuse to reduce waste.

Several challenges for transition pathways to circular economy or sustainability include scales, geographies, temporality, incompatible goals, inertia, governance policies, and complexity and uncertainty. Also, some transition approaches include quantitative system modelling, socio-technical transition analysis, and initiative-based learning. Moreover, we posit there are regional disparities between Norway and Bangladesh regarding geographical proximity, institutional framework, innovation system, and policies.

2.8 Gap Identification

This theoretical background is all about giving a deep insight into the circular economy, how it works to ensure less plastic pollution in terms of plastic circular economy, how it differs from the linear economy, how it contributes to the sustainability of the nation, how a transition to a circular economy faces various challenges and the approaches of transition, and the regional disparity between Norway and Bangladesh. However, there is a gap between how it plays out in the two countries regarding how a circular plastic economy can be transformed into a linear economy and what factors can affect the transition to a circular plastic economy. So, this will be analyzed and found throughout the research paper to generalize a reliable conclusion.

Chapter 3: Research Methodology

Research methodology is defined as a strategy which specifies how research will be conducted (Melnikovas, 2018). The methodology ensures that how the research has been conducted in terms of what method will be used, what type of data will be used, from where data will be gathered and how, what instrument is required to collect data, how the collected data will be organized, coded if it is necessary, and analyzed to reach the pre-set research questions, as well as how the results will be presented and how these will be interpreted to make the audience understand and realize the research findings as worthy (Welch et al., 2020). For constructing the methodology of my thesis, I apply the theoretical concept of 'research onion' referred by Saunders et al (2019) and Bell et al (2022). So, this section has covered the research philosophy, research method, research strategy, research design, and ethical considerations to answer the research questions above through the reflection of the research onion model.

3.1 Onion Model

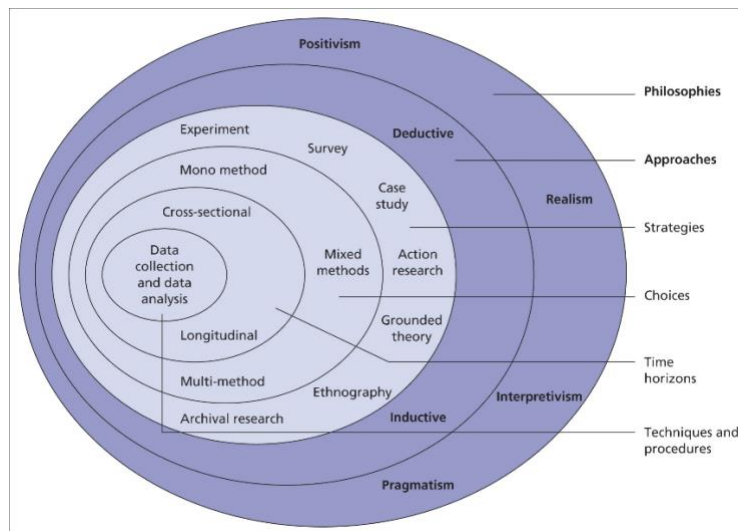


Figure 7: Research Onion

Source: (Bell et al., 2022)

Research Onion guides the researchers to use an accurate research methodology. It implies that there are some layers that the researcher must follow to ensure a reliable methodology that will help to answer the research questions (Antwi and Hamza, 2015). It assists the researcher from the beginning by guiding which philosophy (positivism, interpretivism, pragmatism, or realism) is a better choice for the research purpose; after

selecting the research philosophy, it aims to design the research approach (inductive or deductive), then to select the research strategy (survey, case study, archival research, experiment, or grounded theory), then the choice of research methods (mono, mixed, or multi-methods), selection of research time-horizon (cross-sectional or longitudinal), and adoption of techniques and procedures to collect and analyses data (Bell et al., 2022). The reflection of this model in this research has been given as follows.

3.2 Research Philosophy

Research philosophy deals with the nature of the study undertaken by the researcher. Moreover, generally, it shows the current state of standing of the researcher in the journey of his research. It suggests the proper method for a particular study to collect and analyze data based on the research topic and questions (Bell et al., 2022). Moreover, four major types of philosophies can be undertaken to conduct research properly: positivism, pragmatism, interpretivism, and realism. The researcher can adopt any of them according to his or her choice of conducting the research. The positivist perspective sees the world as something that can be examined by simply seeing and analyzing it. Positivist theories take an "objective" view of reality, basing their assumptions on studying measurable, observable phenomena like nations and international organizations. As a result, positivism is grounded in the scientific investigation of empirical data (Chang et al., 2020). The researchers here put only objective judgments based on the analysis and findings, and the researchers' interest will not be biased. This type of research is highly structured and accepted. Then, research conducted by pragmatic researchers is highlighted by its freshness and vibrancy since its designs contain operational judgements based on "what will work best" in obtaining answers for the topics under inquiry (Hair et al., 2019). One philosophical strategy for inquiry is known as interpretivism. It is a philosophical view that says people are distinct from natural occurrences because of their potential to give those things meaning. Because of their complexity, social worlds, according to interpretivism, cannot be explored in the same manner as physical phenomena. Interpretive research is all about new and more varied perspectives on the world we live in.

Moreover, the presumption of the scientific philosophy known as realism is that reality exists apart from the human intellect. This worldview emphasizes that new information can and should be obtained methodically and scientifically. Two types of realism are direct and critical (Bougie and Sekaran, 2019). For this research purpose, positivist philosophy has been adopted, which reflects that the research data have been collected from secondary sources to generalize the findings from reality and interpret the results as it is based on objective judgment and using previous literature evidence such as the data of

how the macro-economic factors are affecting to implement a plastic circular economy based on a systematic literature review and have been interpreted well.

3.3 Research Approach

After selecting the research philosophy, the researcher needs to select a research approach that indicates the generalization of a conclusion based on several research activities. Based on the research approach, other activities of methodology are designed. There are two research approaches: inductive and deductive (Welch et al., 2020). An inductive approach is undertaken for the research, which is conducted to develop preliminary assumptions, models, concepts, theories, etc. for a particular problem that has not been found before. So, the inductive research process starts with developing theories, models, and assumptions by observing reality in the preliminary stage and ends with a generalization of a conclusion based on the observation. It is subjective (Snyder, 2019).

On the other hand, deductive research is done when existing theories and assumptions were developed previously for a particular problem and applied to solve the research problem (Bougie and Sekaran, 2019). So, the process starts with identifying the required or related existing theories and models, developing hypotheses, collecting data, analyzing those data, and ends with testing the hypotheses. So, inductive research primarily develops new theories, and deductive research confirms those theories to practical research problems (Sekaran and Bougie, 2016). For this research purpose, the deductive approach has been selected because, in this research, there are already developed models and theories regarding the circular plastic economy that are used in the literature reviews section, such as the three principles of circular economy, the process of the linear economy, sustainability approach which is applied based on the circular economy model, and the research problem is to find out the impact of macro-economic factors to implement circular plastic economy practically using those theories and models such as for this problem to be solved the PESTEL model implication has been showing in the analysis and discussion section.

3.4 Research Strategy

Research strategy is more related to how the research will be done in a structured way or not (Easterby-Smith et al., 2021). There are five types of research strategies including experimental, case study, correlational, action research, and archival research. Experimental research design implies there should be some variables that will be manipulated to prove a research question. Correlational design implies detecting the

relation between the variables identified to solve the research problem (Bell et al., 2022). Action research implies that there should be several solutions to a particular problem and selecting the best one to solve the problem quickly.

Moreover, the case study implies that the researcher should have an in-depth discussion of the research problem systematically without the manipulation of data. Lastly, archival research implies that data will be drawn from existing materials or sources or is a way of reviewing the existing data for new research (Basias and Pollalis, 2018). An archival research strategy has been adopted for this research because the data will be collected from existing sources related to this research aim through a systematic review.

3.5 Research Method

Moreover, after selecting the research approach, it is compulsory to select a research method that best suits the research approach and philosophy to meet the research questions (Bougie and Sekaran, 2019). Research method implies selecting a sample size, collecting data, and analyzing them to conclude, and there are three types of research methods quantitative, qualitative, and mixed (Hair et al., 2019). The qualitative research method deals with selecting a small sample size from the total population or target population if it requires primary data or collecting data from secondary sources such as websites, journals, articles, books, Etc., collecting data from them in a descriptive form, and analyzing and interpreting them using qualitative tools such as grounded theory, case study, content analysis, semantic analysis, Etc. (Easterby-Smith et al., 2021). On the other hand, the quantitative method implies that research data may be primary or secondary. However, they are required to collect in a numerical value or should be coded to numerical value if needed and analyzing them using statistical and scientific tools such as descriptive statistics, regression analysis, correlation analysis, hypotheses testing, t-test, z-test, exploratory factor analysis, and confirmatory factor analysis, Etc. (Chang et al., 2020). Such a scientific method helps to provide more solid and reliable results for the research that can be generalized well for a large population. The sample size is significant here, proving it is more representative of the target population. Moreover, lastly, the mixed method implies that the researcher can simultaneously use qualitative and quantitative methods to provide more robust results and conclusions (Bougie and Sekaran, 2019).

For this research purpose, the qualitative research method has been selected because the data is collected in a descriptive form from secondary sources such as journals, articles, master thesis, books, Etc., which are related to the field of circular economy and circular plastic economy of Bangladesh and Norway.

3.6 Research Time-horizon

The research time horizon implies how many points of time to collect data will be considered according to the research aim and objectives (Chang et al., 2020). The time horizon can be of 2 types, including longitudinal which implies data of a particular problem will be collected for several points of time and studies based on changes and progressions are this type and cross-sectional data, where data is collected for one point of time to understand the current state of the problem (Hair et al., 2019). For this research, a cross-sectional time horizon has been used because the current state of the plastic circular economy has been analyzed comparatively between Norway and Bangladesh.

3.7 Data Collection and Analysis

Data can be collected from 2 sources: primary and secondary sources. Primary source implies that data will be collected from the research subjects or the research population, who will provide raw data without misleading or mal information (Bougie and Sekaran, 2019). Secondary source implies that data will be collected from other than research subjects and the data can be found in an organized way, but sometimes, there is a tendency for data misrepresentation as well as the sources are already published articles, journals, newspapers, news portals, books, websites, magazines, Etc. and the sources must be reliable with high impact ratings (Antwi and Hamza, 2015). Also, data can be of two types: qualitative and quantitative. Qualitative data is collected in a descriptive form which can provide more insight into the problem, and quantitative data is collected in a numeric form which is very easy to analyze and put reliable results with statistical evidence (Chang et al., 2020).

For this thesis' research purpose, the archival research design has been used where the qualitative data has been collected from secondary sources, and has been presented systematically, or the research is designed as a systematic literature review to analyze the data of other authors more generously to answer the research questions well.

3.8 Ethical Considerations

Ethical issues in research are some of the genres or standard of behavior that should be followed by the researchers to protect the rights of developing research strategy and to make a trusted relationship with the respondents (Saunders et al., 2012). For both

qualitative and quantitative research, there are some ethical principles to be considered at the time of conducting research (Antwi and Hamza, 2015). This research is a systematic literature review based on a qualitative study, and the ethical considerations are given as follows. This research has fulfilled the principle of plagiarism: no data is copied from other sources, and the user data from other sources are correctly cited, quoted, and referenced. As the research has shown a comparison between Bangladesh and Norway, no data has been used that can humiliate the nations, and no confidential data has been disclosed throughout this research. Also, proper transparency is maintained for the audience to watch out for the reference list from where data has been collected.

3.9 PESTEL as a Framework

PESTEL analysis refers to a country's macroeconomic factors analysis, also known as the external environmental analysis, used mostly by organizations and firms (Marsh et al., 2022). Also, it is essential in the development and implementation of national policies, because it helps to analyze the political forces, economic forces, social forces, technological forces, environmental forces, and legal forces to assess the current state of the country and to predict whether potential challenges will threaten the actions taken by the policies or not (Tabassum and Rezwana, 2021). These forces can also reflect the current state of circular plastic economy implementation of both countries.

Some additional fine-tuning of the specifics needed to be done, so it could be used as a guideline for my use of the PESTEL in the case of the circular plastic economy. For this I have used previous insights from a variety of works (Bianchini et al., 2019; Ritzen and Sandstrom, 2017; Kirchherr et al., 2018; Grafstrom and Aasma, 2021; Obersteg et al., 2019; Marsh et al., 2022; Galvão et al., 2018; Jaeger and Upadhyay, 2020) and developed a further finetuned PESTEL analysis framework, which is appropriate for the research of factors relating to the circular plastic economy (see Table 1).

Factors	Elements of Challenges of Circular Plastic Economy	Justification
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Political	Lack of political stability (Bianchini et al., 2019)	<i>Political instability directs collisions among different political parties and hinders to implement any regulations given by one party in power.</i>
	Lack of regulations and supports from international governing bodies (Ritzen and Sandstrom, 2017)	<i>Without enough inspection and governance of international organizations, there is no pressure to implement sustainable regulations or circular economy to maintain healthy regional and trade relations with the governing organizations or may lose memberships</i>
Economic	Lack of structural changes in business (Kirchherr et al., 2018)	<i>The lack of structural changes makes industries inflexible to change business models to a circular plastic economy.</i>
	Lack of financial incentives (Grafstrom and Aasma, 2021)	<i>Many small and medium firms need more financial support to employ a circular plastic economy because of developing recycling projects and technologies.</i>
Sociocultural	Lack of change in the mentalities of consumers regarding sustainable products (Bianchini et al., 2019)	<i>Lack of change of consumer mentality can be problematic to implement a circular economy because if consumers are not aware, they will not prefer to use more sustainable products with more price.</i>
	Lack of data privacy in cross-sharing materials	<i>If There is no trust between firms regarding data privacy, they will not share their waste management plans and</i>

	between firms (Obersteg et al., 2019)	<i>processes as well as used products to help implement a circular economy.</i>
Technological	Lack of technological infrastructure (Kirchherr et al., 2018)	<i>Lack of technology and innovation infrastructure, producers are unable to implement a circular economy is due to lack of technologies required for recycling and demolishing of plastic and lack of innovative plans and processes.</i>
	Lack of design of sustainable products (Marsh et al., 2022)	<i>Lack of initiative to design sustainable products can hinder the implementation of circular plastic economy because sustainable products have low materials like plastic that can cause waste and pollution.</i>
Environmental	Exclusion of environmental costs in product pricing (Galvão et al., 2018)	<i>Consumers will not be sensitive to product circulation if environmental costs are not added to product pricing.</i>
	Lack of environmental regulations and frameworks (Kirchherr et al., 2018)	<i>There needs to be more environmental regulations and frameworks in the economy to help to implement a circular plastic economy</i>
Legal	Lack of legal framework and maintenance (Jaeger and Upadhyay, 2020)	<i>A strict legal framework is necessary to bind industries, companies, and individuals to act in the circular plastic economy.</i>

	Lack of inspection by international organizations (Marsh et al., 2022)	<i>A circular plastic economy can only be implemented with legislative inspection by international organizations.</i>
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Table 1. Conceptual Framework

Chapter 4: Analysis and Findings

In this chapter, I will analyze the current status quo regarding the circular economy of Norway and Bangladesh through Pestel analysis and compare the actions to transition to a circular economy in Norway and Bangladesh. So, the PESTEL analysis will show a detailed analysis of the current political, economic, sociocultural, technological, environmental, and legal factors of Norway and Bangladesh to identify how these factors can create challenges to a transition toward a circular plastic economy; moreover, how the actions taken for transitioning to a circular economy are distinct in these two contexts.

4.1 Political Factors of Norway and Bangladesh

Political forces imply the form of government, its stability, and government policies that can impact any decision of the industry or organization. New policies can only be fruitful if the country's government or political structure is solid and disciplined (David, 2022). Political factor analysis for Norway and Bangladesh is given below.

Norway: In political sense and policy sense Norway is closely following the European Union (EU), European Commission (EC), and European Free Trade Association (EFTA) and follows (i.e., adapts similar versions) the regulations and legislations of these supranational entities (David, 2022). Because Norway is a part of European Economic Area (EEA), it implements similar interventions as the EU states. Several platforms, both formal and less formal try to ensure this, such as for example the Circular Economy Conference arranged by the EU “**Circular Economy Stakeholder platform**” to ensure a more efficient circular economy among the member countries and non-EU countries (George and Broberg, 2023).

So, the aim is for the governing bodies at the national or international level to even further increase communication and reporting agendas, supportive measures, and guidance to ensure the transition to circular economy, which in turn effects the political and policy agendas of participating states.

Bangladesh: In Bangladesh, the political system is a democracy. However, the political system is unstable due to the diplomatic ties between two large governing parties of Bangladesh, including the Bangladesh National Party (BNP) and Awami League (AL). It is a good trading partner with the neighboring country India and the USA regarding developing countries' trade, commerce, and cross-border disputes (Roy and Chowdhury, 2021).

With such an unstable political system and lack of integration with an international governing body, Bangladesh still needs to catch up in implementing the circular economy.

In this modern sustainability era, countries need sustainable economic measures to create an international image regarding sustainability (Hassan et al., 2020).

However, it was posited, that in order to maintain a good relationship with developed countries like the USA and emerging countries like India, it is mandatory to ensure sector-specific decoupling, recycling, as well as reusing of plastic in manufacturing, fast moving consumer goods, pharmaceuticals, RMG industry etc. of Bangladesh (Tabassum and Rezwana, 2021).

4.2 Economic Factors of Norway and Bangladesh

Economic forces imply the interest rate policies, foreign exchange rate policies, unemployment rates, raw materials costs, etc., that impact the decisions of the industry or organization crucially because if there is any negative impact of these forces, it may disrupt the profitability (George and Broberg, 2023). Economic factor analysis of Norway and Bangladesh is given below.

Norway: The country's top resources are oil, fish, energy, and aluminum, and the living cost is very high here. It is also a mixed economy, including industrial and non-industrial sectors, that helps to increase employment opportunities (Karsrud and Rugsveen, 2020).

There are some economic benefits of a circular economy (George and Broberg, 2023). The industries or companies adopting a circular economy business model are earning more revenues, but that requires structural changes in the industries and companies. The lack of initiative of Norwegian industrial companies to move from a linear to a circular economy is a significant challenge for sustainability (Nurmi and Niemelä, 2018). So, companies must be flexible to redesign the business model to ensure sustainability through a circular economy.

Bangladesh: Bangladesh is in the 35th position regarding GDP and 135th position regarding per capita income globally. The primary earning source of the economy is foreign remittance. The topmost revenue-generated industries are RMG, cotton, and agriculture. It has foreign investment opportunities for cheap labor (Islam and Pattak, 2017).

Due to being a developing country, there need to be more supportive funds to change the existing business model to a more circular economy model because, in Bangladesh, most business types are small and medium enterprises (Hanumante et al., 2019). So, government funds and international financial incentives are required to implement a circular economy model for further growth of the economy.

4.3 Sociocultural Factors of Norway and Bangladesh

Sociocultural or social factors imply the impact of changes in a social setting, such as demographics, culture, education, lifestyle, attitude, social class, religion, etc., on potential or upcoming trends (George and Broberg, 2023). It is more consumer-focused, and it helps to determine whether consumers will accept or reject the new goods or services of the new business model. The sociocultural factor analysis of Norway and Bangladesh is given below.

Norway: Norway as a society is very prestigious and full of heritage that attracts foreign tourists. The standard of living is excellent, and the average working hours are less than in most other countries (Frost et al., 2020).

Social values like individualism in Norway direct the industries not to share raw materials between companies of the same or different industries, sell the by-products, and not share used items due to data privacy concerns. This may hinder the circular economy (Obersteg et al., 2019).

An increase in data and strong intellectual protection systems can however ensure low data theft, more general trust, and thus potentially higher circulation of materials in the economy.

Bangladesh: It is one of the most populous countries in the world, and around half of its population lives in cities. Plastic has become a common packaging and further increases in population mean more plastic use and more pollution (Jaeger and Upadhyay, 2020). The demand for plastic for a growing population is increasing daily (Jaeger and Upadhyay, 2020). On the other hand, collectivism is a part of the Bangladeshi culture that implies a collective action can reduce the curse of plastic pollution (Marsh et al., 2022).

In Bangladesh, as the literacy rate is meagre, people have a mindset that they will purchase, use, and make it a waste after consumption, but should the literacy rate increase, people could be more aware of sustainability, circular plastic economy, and other similar concepts and their related practices. This can in turn reduce the plastic pollution in the economy.

So, to change the current linear mentalities of Bangladeshi customers, an environmental consciousness should be increased in the primary education sectors and through voluntary programs.

4.4 Technological Factors of Norway and Bangladesh

Technological factors are the technological development and the rate of innovation that may impact an upcoming trend such as digital technological solutions of distribution, automation, manufacturing, mobile technology, research and development, and logistics (George and Broberg, 2023). The technological factor analysis of Norway and Bangladesh is as follows.

Norway: In Norway, the technological environment is in full bloom, and for that reason, many foreign investors and technology companies are entering the Norway market with high and satisfactory expectations (Grafström and Aasma, 2021). The technology service-oriented SMEs are increasing exponentially, which directs the country will lead over the world regarding technology and innovation (David, 2022). Also, technology courses are also very inspirable in Norway for secondary and higher studies that help to develop the future generation more expert in technological knowledge and practices (Obersteg et al., 2019).

Although there is a high-end technological opportunity to implement a circular economy in Norway, there are still some barriers, such as the products not being designed well to be recycled because designing a product by keeping sustainability in mind requires high costs that may increase the price as well (Obersteg et al., 2019).

So, not only the consumers should be aware of the positive benefit of sustainable products (social factor), but also the products (and processes) should be designed to be better fitted, to be environmentally friendly (technological factor).

Bangladesh: In Bangladesh, the technological environment is relatively poor. There is a need for more universities, research institutions, and technological infrastructure, which is a significant reason foreign investors ignore the country. Bangladesh has realized the importance of tech innovations and working on them, and it is also exporting technology services to foreign countries like Finland, Netherlands, Etc. Recently, a science park model has been established in Bangladesh to boost innovation in every aspect (Roy and Chowdhury, 2021).

Due to the lack of technological infrastructure, the circular economy is taking time to be implemented in Bangladesh (Jaeger and Upadhyay, 2020). Technology, like advanced recycling, science materials, machine learning, Etc., is required to ensure a great industrial circular economy model (Ritzén and Sandström, 2017).

So, the government should increase technology investments to support the research units and science park themes to operate and innovate fluently.

4.5 Environmental Factors of Norway and Bangladesh

Environmental factors are the surroundings of the living being and the ecological system that directly impacts business decisions and the economic and societal realities. On the level of organizations, these fulfil environmental demands through sustainable business practices and CSR activities. The concerned factors are climate, waste reduction, carbon footprint, recycling system, and sustainability reserving resources (Islam and Pattak, 2017). The environmental factor analysis of Norway and Bangladesh is below.

Norway: The government of Norway puts very close attention to environmental factors because it has an abundance of nature resources. It has adopted many environmental protectionism commitments, such as being a carbon-neutral country by 2050 and making electric cars to reduce gas and petrol emissions. Therefore, many environmental committees have been established already (David, 2022).

Although, In Norway, the environmental regulations and rules are prospering, there is a barrier to implementing a circular economy such as the industries excluding environmental costs from the pricing, which makes the measurement, benchmarking or control exceedingly difficult. Also, as mentioned above, the customer products become waste quickly (Grafström and Aasma, 2021).

So, the environmental cost should be added to the value chain activities of a product to make the customers sensitive to their products after consumption and think about reusing.

Bangladesh: Severe pollution is causing climate change, and it is expected that by 2030, climate change will affect every seven people in Bangladesh (Roy and Chowdhury, 2021). The capital of Bangladesh, Dhaka, is more polluted than other cities of Bangladesh and has the 2nd position in the world regarding pollution, with the water and air pollution at extreme levels (Jaeger and Upadhyay, 2020).

There needs to be more than the limited infrastructure and environmental rules and regulations to save people from pollution and make the industries follow a circular economy model replacing the linear model (Kirchherr et al., 2018).

So, government regulations should be increased to reduce carbon footprint, recycling, and pollution reduction in every industry. However, many RMG companies in Bangladesh have taken some of the green approaches including waste management, LEED certification, water recycling system, etc. that has a great potential that circular plastic economy can also be implemented if the regulations are strict.

4.6 Legal Factors of Norway and Bangladesh

Legal factors reflect the regulatory structure of a territory that may often interact with political factors. However, the critical difference is that the government lays political factors. Legal factors must comply with them: the employment act, consumer act, business act, environmental act, international trade regulations, legislations, and restrictions (Islam and Pattak, 2017). The legal factor analysis of Norway and Bangladesh is given below:

Norway: The legal environment of Norway is rigorous and flexible, which indicates that the citizens of the country abide by the legal terms strictly, and the laws and acts are very flexible to update them from time to time (Obersteg et al., 2019). The transparent legal system creates 2-way accountability and responsibility (David, 2022).

For example, in terms of circular plastic economy, Norway has the Pollution Control Act that reduces marine plastic waste and ensures an environmental tax system on plastic bottles and cans that reduces plastic waste by 88% because consumers are bound to return plastic bottles (Grafström and Aasma, 2021). Organizations are also obligated to ensure a sound plastic waste control and management mechanisms in line with issues pointed out by Kirchherr et al. (2018).

So, these regulations should be followed by the industries and at the individual level, and government should inspect them from time to time.

Bangladesh: In Bangladesh, foreign investments are increasing industrialization due to flexibility in legal terms, and foreign companies find it more attractive with lesser demands to abide by the legalities (Jaeger and Upadhyay, 2020). Such an opportunity creates a problem for the country because industries must be more attentive to environmental and sustainability legislation. Although, many companies are taking a green business approach to attract foreign markets and are inspired by international sustainability regulations in line with Roy and Chowdhury (2021)

Because of the lack of sustainability and environmental legal framework, companies need to allow their business to think about circular economy and make the environment pollution-free (Bianchini et al., 2019).

So, the country's legal environment should be stricter, and enforcement amplified, as well as the governing body should monitor the progress from time to time.

4.7 A Comparative View of Key Findings between Norway and Bangladesh

In this section, I will present the common challenges to transition to a circular plastic economy in Norway and Bangladesh, which the above PESTEL analysis of both countries has found.

Table 2 shows the comparison of impact of various challenges on the economy between Norway and Bangladesh based on the above PESTEL analysis and the conceptual framework and justification given in Table 1. The comparison has been done using 3 levels: high, medium, and low. High indicates that the challenges under each force severely hinder the implementation of circular plastic economy, medium hindrance to circular plastic that they do hinder, but to a lesser extent, and low hindrance that they do not pose such a significant challenge to the circular plastic economy.

Factors	Common Challenges of Circular Economy	Degree of Comparison <i>(High, Medium, and Low)</i>		Implication
		Norway	Bangladesh	
Political	Lack of political stability (Bianchini et al., 2019)	<i>Low</i>	<i>High</i>	<i>Political instability directs industries and individuals to be indifferent to environmental regulations.</i>
	Lack of regulations and supports from international governing bodies (Ritzen	<i>Medium</i>	<i>High</i>	<i>With enough inspection and governance, international organizations face less difficulties to implement circular plastic economy regulations.</i>

	and Sandstrom, 2017)			
Economic	Lack of structural changes in business (Kirchherr et al., 2018)	<i>High</i>	<i>High</i>	<i>The lack of structural changes makes industries inflexible to change business models better fitting to a circular plastic economy.</i>
	Lack of financial incentives (Grafstrom and Aasma, 2021)	<i>Medium</i>	<i>High</i>	<i>Lack of sufficient financial support to small and medium firms to employ a circular plastic economy.</i>
Sociocultural	Lack of change in the mentalities of consumers regarding sustainable products (Bianchini et al., 2019)	<i>High</i>	<i>High</i>	<i>Lack of change in consumer mentality can be problematic to implement a circular plastic economy</i>
	Lack of data privacy in cross-sharing materials between firms	<i>High</i>	<i>High</i>	<i>There needs to be more trust between firms regarding data security to help implement a circular plastic economy.</i>

	(Obersteg et al., 2019)			
Technological	Lack of technological infrastructure (Kirchherr et al., 2018)	<i>Medium</i>	<i>High</i>	<i>Lack of technology and innovation, hinders implementing a circular plastic economy.</i>
	Lack of design of sustainable products (Marsh et al., 2022)	<i>High</i>	<i>High</i>	<i>Lack of initiative to design sustainable products and processes can hinder the implementation of circular plastic economy.</i>
Environmental	Exclusion of environmental costs in product pricing (Galvão et al., 2018)	<i>High</i>	<i>High</i>	<i>Consumers will not be sensitive to product circulation if environmental costs are not added to product pricing.</i>
	Lack of environmental regulations and frameworks (Kirchherr et al., 2018)	<i>Medium</i>	<i>High</i>	<i>There needs to be more environmental regulations and frameworks in the economy to help to implement a circular plastic economy.</i>
Legal	Lack of legal framework and maintenance (Jaeger and	<i>Low</i>	<i>High</i>	<i>A strict legal framework is necessary to bind industries, companies, and</i>

	Upadhyay, 2020)			<i>individuals to act in the circular plastic economy.</i>
	Lack of inspection by international organizations (Marsh et al., 2022)	<i>Medium</i>	<i>High</i>	<i>A circular plastic economy can be more easily implemented with legislative inspection by international organizations.</i>

Table 2. Comparison of Challenges to Circular Economy

Source: (Self-made)

According to Table 2, the PESTEL forces allow to pinpoint some common challenges in Norway and Bangladesh that hinder the implementation of a circular plastic economy. The comparison is made based on the severity of these challenges in the two compared countries.

There are two political challenges including a lack of political stability that is high in Bangladesh and low in Norway, as well as a lack of regulations and support of international organizations that is high in Bangladesh and medium in Norway. There are two economic challenges including a lack of financial support that is high in Bangladesh and medium in Norway, but there is a lack of structural changes that is high in both Bangladesh and Norway.

Next, there are two sociocultural challenges including a lack of change in consumer mentality that is high in both Bangladesh and Norway, as well as there is an issue with the lack of data confidentiality between firms that is high in both countries. There are two technological challenges including a lack of technological infrastructure that is high in Bangladesh and low in Norway, but a lack of sustainable product design that is high in both countries. There are two environmental challenges; including a lack of environmental regulations that are high in Bangladesh and low in Norway, but again a joint challenge related to the exclusion of environmental costs to product price which is high in both countries. And finally, there are two legal challenges; including a lack of a strict legal framework that is high in Bangladesh and low in Norway as well as a lack of interference

of international governing organizations that is high in Bangladesh and medium in Norway.

We can clearly see from above that there are some challenges that are more paramount only in one of the compared countries, but then several common challenges. These are especially: the lack of structural changes making industries inflexible to change business models better fitting to a circular plastic economy; lack of change in consumer mentality; lack of trust between firms regarding data security; lack of initiative to design sustainable products and processes; and the lack of environmental costs being added to product pricing which is leading to a lack of consumers' sensibility.

4.8 Comparison Between Actions Taken by Norway and Bangladesh for Circular Plastic Economy

This section presents a comparative view of the actions that Bangladesh and Norway already take. Actions here mean the mechanisms or strategies to implement a circular plastic economy and a more sustainable economy adopted by the respective countries. The rows of table show the comparison between measures taken by Bangladesh and Norway to implement a circular plastic economy where the measures are far different from each other, but ultimately reflect the purpose of plastic waste reduction and control. Consequently, some are highly comparable, but the comparability of others is low.

Measures	Description	
	Norway	Bangladesh
Zero-waste Circular Plastic Economy- 2040	Zero-waste Circular Plastic Economy- 2040 plan reflects that the consumption of plastic will be reduced by 64kg per capita per year by 2040, implementation recycling standards for plastic products and packaging, and development of plastic-to-plastic chemical conversion (David, 2022).and almost 12% of plastic	Plastic Product and Cloth Recycling Plan- 2015 reflects the government of Bangladesh has taken the initiative to recycle plastic and jute cloths recently, but the results could be more satisfactory (Roy and Chowdhury, 2021).

	waste is already reduced under this policy from 2019 to 2022 (Karsrud and Rugsveen, 2020).	
Green Competitiveness Plan	Norway has adopted green competitiveness among its various industries and branches, like manufacturing, retailing, wholesaling, waste management, and packaging, to make a low-emission society in terms of eco-innovation in plastic recycling and waste control (George and Broberg, 2023).	Not Applicable
Circular Fashion Partnership (CFP)- 2021	Not Applicable	In Bangladesh a narrower initiative is present: this is an initiative for the RMG sector of Bangladesh that indicates less than 1% of materials will be used that are not recyclable (Tabassum and Rezwana, 2021).
Bio-based Sectors Plan	The government of Norway has taken the initiative to build bio-based sectors that indicates production from renewable and biological resources to ensure sustainability (Karsrud and Rugsveen, 2020).	Not Applicable
National Action Plan for Sustainable	Not Applicable	In Bangladesh action plan reflects that 50% of plastic will be recycled by 2025, 90% of

Plastic Management- 2025, 2026, 2030		single use plastic will be eliminated by 2026, and 30% of plastic waste will be reduced by 2030 (Hassan et al., 2020).
Sustainable Production and Product Design Plan	To ensure circularity and sustainability, the government of Norway has taken the initiative of the Eco-design Directive and expansion in production and products (Nurmi and Niemelä, 2018).	This policy ensures a sustainable awareness of a lifestyle that is not harmful to nature and the environment, is more toxic-chemical-free, has fossil-fuel consumption, and discourages wasteful consumption (Marsh et al., 2022).
Reduction of marine plastics	A vision given by UNEA-3 is elimination of micro-plastics that is why Norway has spent almost 200 million USD to eliminate microplastics and marine litter by 2024 (Karsrud and Rugsveen, 2020).	High court (in 2020) of Bangladesh declared to ban single use plastic in coastal areas as well as hotels and motels around the country (Hassan et al., 2020).

Table 3. Comparison of actions taken by Norway and Bangladesh to achieve a circular economy

Source: (Self-made)

From the actions taken by both countries, Norway has more robust sustainable and circular plastic economy policies and measures than Bangladesh, which can also be attributed to having membership in international organizations and the vicinity to the European union, who is a circular economy frontrunner (George and Broberg, 2023). That notwithstanding, Bangladesh is on the way to promoting itself in developing countries by 2030 and has taken initiatives for this agenda, focusing on a circular plastic economy by establishing plans and regulations in this regard.

Norway and Bangladesh must act on the policies or action plans developed for ensuring a circular plastic economy that requires a robust legal environment for environmental safeguards. As Norway has a stable political system, individuals and organizations are more likely to act within the legal frameworks, hence the development of a circular plastic economy can be easier than in Bangladesh. Because in Bangladesh the political and legal environment is still poor, this can make the individuals and organizations take time to implement a CPE. So, at first, political stability and a robust legal system are required here.

Chapter 5: Discussion on Key Findings

The comparative PESTEL analysis between Norway and Bangladesh reflects significant Political, Economic, Social, Technological, Environmental, and Legal challenges to implementing a plastic circular economy. This section discusses the key findings for each research question in detail based on the secondary data study.

Q1: What is the present status quo (current state) of the plastic circular economy in Norway and Bangladesh?

According to Table 2, there are two political challenges in the economy that are common for both Norway and Bangladesh, but the intensity of the challenges is different and the challenges are lack of political instability and lack of regulations and support from international organizations or trade blocs (Islam and Pattak, 2017). Political instability reflects that there is more than one ruling party and frequent collisions between parties. If any party in power formulates new regulations, another party resists it with strikes and lockout, so the acts or rules cannot come to light. Regulations related to the circular economy or sustainability cannot be implemented in such high political collisions in Bangladesh (Bianchini et al., 2019). Again, if the country is not a part of any international governing organizations or regional trade blocs like as the EU, EFTA, NAFTA, Etc., and has no pressure to implement sustainable regulations or circular economy to maintain healthy regional and trade relations with the governing organizations (or face the potential to lose memberships), this can also be a hindrance for introducing efficient circular plastic economy measures. Proper regulations and support of the trade blocs are necessary for sustainability measures or a circular plastic economy to be implemented. This challenge of lack of supports are medium in Norway and high in Bangladesh (Ritzen and Sandstrom, 2017).

Two economic challenges, including a lack of structural changes in the business industries and a lack of financial support, refrain the countries from implementing a plastic circular economy (George and Broberg, 2023). The industries where waste materials are the core thing to do business, like manufacturing, RMG, retailing, and wholesaling and these industries are large and make bulk productions and sales; hence, the business models and structures are resistant to sudden changes without in front and flexible planning. Their primary concern remains profitability, not sustainability (Kirchherr et al., 2018). So that is why the circular plastic economy model cannot be implemented and faces difficulties or need more time to process, and this challenge is very high in both Bangladesh and Norway. Then, small and medium enterprises contribute more to the economy than large ones in developing countries. That is why not implementing sustainability in those countries is also caused by a lack of financial incentives

(government or international donations or subsidies in this regard), since small firms cannot favour sustainability and circularity over profitability (Grafstrom and Aasma, 2021). This challenge is more intense in Bangladesh and medium in Norway.

There are two socio-cultural challenges, including a need for more change in the mentalities of the customers and a lack of trust between firms regarding sharing materials and things for those countries cannot implement a circular plastic economy (Roy and Chowdhury, 2021). The countries where the literacy rate is low, living standards are low for maximum, the income level of people is low, most of them are living in poverty, etc. lack of knowledge about sustainability and the circular economy model, and consumers believe in the tradition of 'purchase-use-waste' process. Their mentality cannot be mitigated early, yet it is only possible to implement a circular economy with consumers' sustainable acts (Obersteg et al., 2019). This challenge is thus high both in Bangladesh and Norway. Again, in individualistic countries, businesses are more competitive and lack cooperation and collaboration because they do not want to leak any business secrets to industry competitors. Hence, they need more trust in sharing and using materials to ensure a circular economy. Consequently, this challenge is high in Bangladesh and Norway (David, 2022).

Two technological challenges, including a lack of technological infrastructure and a lack of sustainable product design, prevent the countries from implementing a plastic circular economy (Hanumante et al., 2019). Countries with poor technological (and research) infrastructure, like lack of universities, research units, and innovative firms, etc. cannot implement sustainable business practices because technology and automation can reduce waste. Furthermore, automation in waste management can provide a real-time solution to how the waste will be sourced, collected, and converted to new users to make material circulation in the economy (Marsh et al., 2022). When we compare Bangladesh and Norway, the first we can determine as having a high challenge with this, while the other medium. Again, countries where there is a lack of technological and innovative infrastructure cannot design products and packaging in a sustainable way that will refrain consumers from throwing them after waste, as well as this type of innovation, is very expensive to make and sell to consumers whose income level is low. Such a challenge is high in Bangladesh and medium in Norway (Nurmi and Niemelä, 2018).

There are two environmental challenges, including the exclusion of environmental costs in product pricing and the lack of environmental regulations that impede a country from implementing circular plastic economy (Karsrud and Rugsveen, 2020). Although business industries, governments, state organizations, and regional and international governing organizations are aware of sustainability and taking various measures, circular plastic economy can be implemented with steps for the business companies. Because

companies exclude the environmental costs that will occur after consumers' consumption, the product pricing can hinder consumers from reducing waste and reusing the products for new users as it was expensive to purchase (Galvão et al., 2018). This challenge is high in both Norway and Bangladesh. After that, a lack of environmental safeguards in developing business regulations and laws in the economy makes the companies indifferent to sustainability and reduces waste-making processes over profitability, as many organizations do it only as a CSR activity (Kirchherr et al., 2018). When we compare Bangladesh and Norway, the first we can determine as having a high challenge with this, while the other medium.

Two legal challenges include the need for more legal framework and maintenance and the lack of inspection of international organizations that can resist the implementation of a circular plastic economy in Bangladesh and Norway (Frost et al., 2020). The legal framework is critical to implement any changes that will benefit people, society, the environment, and the economy. But when the legal framework is fragile, any new regulations and changes take years, like the circular economy model, which can bring well-being to the environment and people but has yet to be implemented in many countries (Jaeger and Upadhyay, 2020). This challenge is high in Bangladesh and low in Norway. Again, when a country is a member of any regional or international bloc to make collaboration in international relations and trade, the regulations and pressures from the governing authority must be implemented by the member countries, but when there is a lack of pressure from the governing parties or the country is not a member of any strong bloc, changes cannot be implemented. Hence, circular economy implementation is facing challenges in Bangladesh to a high degree, but is low in Norway (Grafstrom and Aasma, 2021).

Q2: What are the differences between measures Bangladesh and Norway took to implement a transition toward a circular plastic economy?

Regulations regarding the Plastic circular economy and sustainability, like the European Green Deal and the theme of the European Circular Economy Action Plan 2015 and 2020 should be implemented by Norway (George and Broberg, 2023). To implement this deal, Norway has taken many acts like a green competitiveness plan where the companies of every industry compete regarding green initiatives and circular economy models, a bio-based sector plan where biological and renewable resources are used in production, sustainable product design through Eco-design directive and expansion, and toxic-free materials cycle plan where the government limits the use of chemicals in every stage of manufacturing, packaging, and waste management, to make the environment cleaner and pollution-free and make it more living worthy for the future generation (David, 2022).

Bangladesh on the other hand is an underdeveloped country, however with a plan that within 2024, the country would be promoted to a developing country. However, due to the covid pandemic, this is now seen as not viable and the deadline thereof has been moved to 2030 (Hassan et al., 2020). But to achieve this, among others, it has to fulfil the Sustainable Development Goals (SDGs) where some goals regarding environmental safeguards and some are relating to the circular economy, such as SDG-11, SDG-12, and SDG-13. These indicate the development of nations, cities and communities that are pollution-free, clean, and sustainable, ensuring safe and responsible production with fewer toxic-chemicals and using biodegradable materials, and responsible consumption by the consumers for not to make waste and climate actions that represent waste should be minimized to make the climate stable and normal, respectively (Roy and Chowdhury, 2021). Bangladesh has taken two more sustainable measures, including plastic and cloth recycling, that reduce waste and landfills and CFP-2021 in the RMG sector to ensure circulation in the fashion business to attract foreign buyers and investors (Tabassum and Rezwana, 2021).

Hence although it cannot be seen as (highly) successful, some preliminary steps have been taken. But this is also somewhat in line with the notions that socio-technical transition requires several periods and multiple phases to be implemented and to tackle the political, economic, social, technological, environmental, and legal challenges to build a circular plastic economy and to reach the sustainability goals of the economy (Jaeger and Upadhyay, 2020).

Chapter 6: Conclusion and Recommendations

6.1 Conclusion

The circular plastic economy can increase the possibility of reducing waste, pollution, wildlife destruction, climate change, and greenhouse gas emission, which can lead to a healthy and clean environment for living. The circular economy is not an action taken only by the government and businesses in the country; rather, there must be a close cooperation of all stakeholders: the individuals, corporations, municipalities, and government to make it happen.

But some challenges faced by the countries to implement a circular plastic economy are exacerbated by contingent on the macroeconomic forces of the economy as discovered by applying the PESTEL analysis considering Norway and Bangladesh. This is in line with the notions from the literature on regional disparities (Boschma et al., 2017; Gong and Hassink, 2020). But understanding these, can also help to understand which of the regional concerns need to be more at the forefront when thinking of adaptations that enable more sustainable and circular economies and societies, which is in line with previous assumptions (Seah et al., 2021).

I have shown, based on finetuning of the PESTEL analysis to fit the analysis of the circular plastic economy, that the political environment of an economy raises two types of challenges, including the unstable political system and lack of regulation from the international governing bodies that can hinder an economy from implementing a circular economy. The economic environment of a country raises two types of challenges, including a lack of financial support and a lack of structural changes in business industries that hinder the economy from implementing a circular economy model in the business that would support the circular plastic economy. The social environment can raise two challenges, including a need for change in consumer mentalities and a lack of trust between firms regarding data privacy and confidentiality. The technological environment of an economy raises two challenges, including a lack of technological infrastructure and the need to design products with sustainability that reduce the chance of implementing a circular plastic economy. Environmental conditions can also raise two challenges, including not including environmental costs to product pricing and lack of environmental regulations that hinder in particular businesses and individual customers not to maintain sustainability regulations and implementing a circular plastic economy. After that, the legal environment raises two challenges, including a need for a national legal framework and lack of pressure and guidance from international governing bodies that can hinder implementing a circular plastic economy model.

Also, I have shown that some of the challenges faced and being intensive are common to Norway and Bangladesh. These being in particular: the lack of structural changes making industries inflexible to change business models fitting to a circular plastic economy; lack of trust regarding data security; lack of initiative to design sustainable products and processes; inflexible consumer mentality; and the lack of environmental costs being added to product pricing which is leading to a lack of consumers' sensibility.

But some measures are taken by Norway and Bangladesh to implement and sustainable circular economy, green competitiveness initiatives, bio-based sector design, sustainable product, and production process design, etc. On the other hand, Bangladesh has adopted some sustainable development goals to promote its environmental stability through Circular Fashion Partnership, plastic recycling, cloth recycling, climate change actions, responsible production, and consumption measures, and developing sustainable cities to ensure a zero-pollution and environmental degradation to head up in the world's economy as a sustainable nation.

There are some limitations of my research. At first, this study is limited by its scope that it considers a comparative study between two countries only and more countries could be added to add more value to it. Then, this study was focused to find out the common challenges but there might be some diverse and important ones. This research is based on secondary data and qualitative analysis but primary data from human participants and quantitative analysis can add more statistical evidence to its findings to make it more reliable to the readers. Lastly, the analysis is done through PESTEL framework that cannot give a long-lasting result that the factors are ever-changing and the challenges may also change within a short time.

6.2 Recommendations

According to the challenges faced by both Bangladesh and Norway, regardless of their level of intensity, some recommendations are given below so that the countries can better implement a circular plastic economy early to make a better environment. The recommendations are given below.

- Implementing sustainable international regulations such as ECEAP or the European green deal needs the proper framework for every country and better inspection by the authorities (Ahmed et al., 2022). Such a national framework requires consistent and robust data that must cover the national supply chain system or the materials like plastic flow in the economy to develop a standard reference of a framework for resource efficiency and opportunities. If the data is not collected in a diligent manner,

the framework can be non-encompassing or with missing priorities and areas, as well as the inspection will also be restricted and can resist the progress of the policies (George and Broberg, 2023).

- The regulations regarding the circular plastic economy developed by the European green deal and the national regulations must reflect the main agenda. However, they should be feasible and relevant goals according to the conditions of the member-state (Kirchherr et al., 2018). Because all countries are not equally able to implement the same goals in the same timeframes, reflecting the temporality issues (Geels, 2011), so the goals should be defined short-term, medium, and long-term with specific and with clear indicators and values, which might differ as related to different nations - which would allow to measure and capture progress more accurately and to set further targets for the countries to set them on a progression trajectory (Roy and Chowdhury, 2021).
- Businesses should understand the policies of plastic circular economy and must develop a plan to convert waste into resources that will prevent waste in the environment, especially plastic waste. For that, some actions must be taken (Grafstrom and Aasma, 2021). These include data and information to be collected, as well as monitored correctly to identify the measures that can reduce plastic waste and development of plans for reducing waste in every stage of the value chain. The value chain starts from materials sourcing and the end of the product life cycle, such as implementing measures as foreseen by example by the eco-design directive and minimalizing the (planned) obsolescence of (plastic) products as well as to increase the link between consumers and repair and reuse centres (Tabassum and Rezwana, 2021).
- The policy of making waste into a resource requires a waste management system that will help exploit waste's economic value when it is converted to resources after the end of the product life cycle (Ahmed et al., 2022). This is especially important for the plastics, especially in connection to plastic products with very short life spans. This requires some actions such as bans on landfills or taxation that businesses should provide higher taxes for landfills, increasing the responsibilities of the producers, developing markets for second-hand or old products or for secondary materials, increase post-purchase services to the customers, and eco-design in every aspect of business as much as possible and these measures can help to develop a circular economy (David, 2022) and the circular plastic economy.
- Another strategy to develop a circular plastic economy can be promoting the best and most sustainable model-fit practices through seminars and programs (Kirchherr et al., 2018). Moreover, these programs and promotions can be better utilized by regional integration or trade blocs. Each regional bloc, like the EU, can implement some changes to the member economies, such as setting up policies like exchange

programs and platforms between countries that will increase the opportunity for mutual learning and increase the mutual exchange of experience that will help to consider and implement the best practices (Frost et al., 2020).

- Producers or businesses can also develop a responsible consumption agenda among consumers through eco-labelling, transparency of information, and traceability (Jaeger and Upadhyay, 2020). This will increase knowledge of materials used in the product of the consumers. They can watch out for the materials and ingredients used in the product through labelling and realise whether any harmful materials or chemicals are used. Technologies can help them in this regard, such as using QR codes, they can immediately view the transparent and relevant information of the product to reduce harmful consumption and to perform better decision-making (Grafstrom and Aasma, 2021).
- A big challenge to implementing plastic circular economy is more financial support. The governments and international or regional blocs should increase the funding of the related mechanisms and solutions, so that developing or underdeveloped countries can also implement the plastic circular economy model (Jaeger and Upadhyay, 2020).
- Governments can transfer tax policies from labour use to materials used in the businesses and limit or make the businesses avoid harmful chemicals (Jaeger and Upadhyay, 2020). One way of this action can be the resource taxation policy that will provide an incentive for the producers to source efficient resources, and this will also reduce the use of EHS or Environmentally Harmful Subsidies. Such an initiative to transform labour tax to material taxation will help businesses to measure and consider environmental costs and to internalise them properly to include the human effects as well (Kirchherr et al., 2018). Such policies seem needed in both developed and not developed countries.
- The governments should increase exchange between firms regarding know-how, and the best practices are essential to implement plastic circular economy. The circular economy model is more important for supporting businesses such as SMEs, and they need to be more energy efficient. However, they need to do so due to a need for more resources and capital (Tabassum and Rezwana, 2021). So, there requires an exchange of know-how with large companies, and some policies can be applied there, including innovative business models such as leasing properties without taking ownership, efficient and sustainable procurement system, and can extend the producer responsibilities to implement a circular economy model in the small and medium enterprises (Jaeger and Upadhyay, 2020). For less developed countries such knowledge and resources can come from multinational firms – providing they give (either voluntarily or due to some home government push) proper a focus to this.

- Lastly, some mechanisms exist to increase or extend the producer's responsibilities (Tabassum and Rezwana, 2021). The circular economy model is not only developing recycling, reusing, and responsible consumption of products. Instead, recycling and reusing activities must ensure higher quality, so government certifications and standards should be developed. Information systems and technology must undertake the value and supply chain systems, and opportunities must be increased for resource efficiency (Ahmed et al., 2022).

This is how the countries can further develop their mechanism to implement plastic circular economy model replacing the linear economy model to ensure sustainability in every aspect.

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Appendix

Publication Year	Types of Paper	Link
2020	Masters Thesis	https://hdl.handle.net/10355/89943
2021	Masters Thesis	https://www.metodista.br/revistas/revistas-metodista/index.php/OC/article/view/1036048
2022	Article	https://doi.org/10.1016/j.heliyon.2022.e09530
2021	Article	https://doi.org/10.3390/su132011455
2021	Article	https://doi.org/10.1016/j.jclepro.2021.126966
2019	Article	https://doi.org/10.3389/fmars.2019.00627
2022	Article	https://doi.org/10.1016/j.jclepro.2022.08.001
2021	Article	https://doi.org/10.1016/j.jclepro.2021.126966
2021	Article	https://iopscience.iop.org/article/10.1088/1755-1315/691/1/012006/meta
2019	Article	https://link.springer.com/chapter/10.1007/978-981-15-1052-6_16
2019	Masters Thesis	file:///C:/Users/ASUS/Downloads/no.ntnu_inspira_253990%20(1).pdf
2019	Article	https://link.springer.com/chapter/10.1007/978-981-15-1052-6_1
2021	Article	https://www.nature.com/articles/543017-021-00223-2
2020	Article	https://www.sciencedirect.com/science/article/pii/S0141391019301727
2020	Article	https://royalsocietypublishing.org/doi/full/10.1098/rsta.2019.0268
2019	Article	https://www.sciencedirect.com/science/article/abs/pii/S0959652619330197
2020	Article	https://pubs.rsc.org/en/content/articlelanding/2020/gc/d0gc02630a/unauth
2018	Article	https://www.sciencedirect.com/science/article/abs/pii/S0959652619330197
2019	Article	https://www.sciencedirect.com/science/article/abs/pii/S0921344917300241
2017	Article	https://www.sciencedirect.com/science/article/abs/pii/S0921344917300241
2020	book review	https://www.sciencedirect.com/science/article/pii/S0959652619330197
2020	book	https://link.springer.com/book/10.1007/978-981-15-1052-6
2020	Article	https://www.sciencedirect.com/science/article/abs/pii/S0959652619338119
2020	Article	https://www.sciencedirect.com/science/article/pii/S092134492030327X
2021	Article	https://www.sciencedirect.com/science/article/pii/S245222361000699
2022	Article	https://www.sciencedirect.com/science/article/abs/pii/S1385894721035087
2020	Article	https://www.sciencedirect.com/science/article/pii/S0921344920303864
2020	Article	https://www.sciencedirect.com/science/article/abs/pii/S0048969720325559
2020	Article	https://www.sciencedirect.com/science/article/pii/S0959652620316498
2019	Article	https://www.nature.com/articles/d41586-019-00017-z
2019	book	https://www.vliz.be/en/catalogue?module=ref&refid=306712
2021	Article	https://www.sciencedirect.com/science/article/pii/S2666682021000633
2019	book	https://link.springer.com/chapter/10.1007/978-3-030-22113-3_20
2016	book	https://books.google.com.bd/books?hl=en&lr=&id=Koe6CgAAQBAJ&oi=fnd&pg=PA19&dq=business+research+methodologies&ots=2C4TY7PWJL&sig=1sGxmUzGvTzV5uBxaTQ_8dP3tw&redir_esc=y#v=onepage&q=business%20r
2019	book	https://link.springer.com/chapter/10.1007/978-3-030-22113-3_9
2021	book	https://books.google.com.bd/books?hl=en&lr=&id=IYsKEAAQBAJ&oi=fnd&pg=PP1&dq=business+research+methodologies&ots=nOCRGGvSF&sig=FX2f6x2KFI6bDuoqmodsj59Vw&redir_esc=y#v=onepage&q=business%20research%20methodologies&f=false
2019	book	https://books.google.com.bd/books?hl=en&lr=&id=ik16EAAAQBAJ&oi=fnd&pg=PA21&dq=business+research+methodologies&ots=CFYscEDyR&sig=8Rd3A_CuWfI-wVf_eGQXvR84&redir_esc=y#v=onepage&q=business%20research%20methodologies&f=false
2022	book	https://books.google.com.bd/books?hl=en&lr=&id=hpYfEAAAQBAJ&oi=fnd&pg=PP1&dq=business+research+methodologies&ots=BgldetQ2Yv&sig=8BpZg32GpP91yB8YaE0TffPM&redir_esc=y#v=onepage&q=business%20research%20methodologies&f=false
2019	book	https://www.taylorfrancis.com/books/mono/10.4324/9780429203374/essentials-business-research-methods-joe-hair-jr-michael-nickel-business-research
2019	Article	https://www.sciencedirect.com/science/article/pii/S0148296319304564
2019	Article	https://www.sciencedirect.com/science/article/pii/S0148296319304564
2015	article	https://d1wqtbxts1xzle7.cloudfront.net/37731458/Research_Paradigms-libre.pdf?1432567745=&response-content-disposition=inline%3B+filename%3DQualitative_and_Quantitative_Research_Pa.pdf&Expires=1678616442&Signature=LDI6ma9dJEm-EKcSve4S2xVFFq4hPkH5t-HKNGQkbc-1DofzPpWNI6D9AScmBYRoAHRRSRiCB2yOToQ6yevWHLMQxq7KwResq9Rg0fe-BucIF2P0Qmhzd8r-HIPM8zP32eNUKInqueuqV60zQvczeVLAcQnQowXhff6D5l-4K3hZpSezNvcMbCubm7fGm6lPpqf65UzomvODR1shsoESd11A5LmqdV9xiXjC3lky1RAzOISfP-u6wGMWwK5xK1CzO7pdd89k3tmeUyy3g3KHXJ9LEXXNADQWzLD7R71F-JfMSGKFXwvEbes4pW9Zlq77V1g_&key-Pair-Id=APKJ1CHFG5G5LRBV4Z2A
2018	Article	https://s1research.org/uploads/3/4/0/9/34097180/riber_7-51_sp_h17-083_91-105.pdf
2021	Article	https://www.sciencedirect.com/science/article/pii/S2352550920313518
2017	Article	https://www.tandfonline.com/doi/abs/10.1080/00343404.2016.1258460?journalCode=eres20
2017	Journal Article	https://journals.sagepub.com/doi/full/10.1177/0969776415596449
2021	Journal Article	https://www.emerald.com/insight/content/doi/10.1108/JEBR-03-2021-0210/full/html
2014	Journal Article	https://www.researchgate.net/publication/289891523_The_European_Economy_From_a_Linear_to_a_Circular_Economy
2011	Article	https://www.sciencedirect.com/science/article/abs/pii/S2210422411000050
2020	Journal Article	https://academic.oup.com/cjres/article/13/3/475/5905684
2018	Article	https://www.diva-portal.org/smash/get/diva2:1388884/fullTEXT01.pdf
2020	Article	https://www.emerald.com/insight/content/doi/10.1108/JEIM-02-2019-0047/full/html
2017	Article	https://www.sciencedirect.com/science/article/pii/S2212827117301567
2018	Article	https://www.researchgate.net/publication/32053295_Social_Topography_for_Sustainable_Innovation_Policy_Putting_Institutions_Social_Networks_and_Cognitive_Frames_in_Their_Place
2021	Survey Report	https://www.iseas.edu.sg/articles-commentaries/state-of-southeast-asia-survey-the-state-of-southeast-asia-2021-survey-report/#:~:text=The%20State%20of%20the%20Asian%20Economy,2019%20was%20worth%202.44%20trillion.English%2C%20Bahasa%20Indonesi%20and%20Vietnamese.
2015	Article	https://www.researchgate.net/publication/339913244_Transition_towards_a_circular_economy_at_a_regional_level_A_case_study_on_closing_biological_loops
2020	Article	https://www.mdpi.com/2071-1050/13/23/6614
2019	Article	https://online.wiley.com/doi/full/10.1111/jiec.13187
2022	Global Business	https://www.howandwhat.net/pestel-analysis-norway/#:~:text=The%20next%20element%20to%20address,2019%20was%20worth%202.44%20trillion.
2020	Article	https://link.springer.com/article/10.1557/mre.2020.21
2018	Article	https://www.gupesa.ub.gu.se/handle/2077/73194?show=full
2023	Article	https://www.sciencedirect.com/science/article/abs/pii/S0959652621002225
2021	Article	https://www.sciencedirect.com/science/article/abs/pii/S0921344919303660
2019	Article	https://link.springer.com/chapter/10.1007/978-981-33-4279-8_9
2020	Article	https://sciendo.com/article/10.1515/sbe-2017-0024
2020	Article	https://www.emerald.com/insight/content/doi/10.1108/JEIM-02-2019-0047/full/html
2021	Master Thesis	https://openaccess.nhh.no/nhh-xmlui/handle/11250/2775392
2020	Master Thesis	https://nordopen.nord.no/nord-xmlui/handle/11250/2720569
2018	Article	https://www.sciencedirect.com/science/article/abs/pii/S0921800917317573
2022	Article	https://www.sciencedirect.com/science/article/pii/S095965262202087X
2017	Article	https://www.researchgate.net/publication/328660145_PESTEL_Analysis_of_Hacktivism_Campaign_Motivations_23rd_Nordic_Conference_NordSec_2018_Oslo_Norway_November_28-30_2018_Proceedings
2018	Article	https://www.sciencedirect.com/science/article/pii/S221282711730149X
2017	Article	https://www.sciencedirect.com/science/article/pii/S221282711730149X
2021	Article	https://link.springer.com/chapter/10.1007/978-981-33-4279-8_9
2023	Article	https://www.mdpi.com/2673-5931/12/1/12
2017	Article	https://ephemerajournal.org/contribution/against-wasted-politics-critique-circular-economy

Framework for circular economy transition in Bangladesh:

Author (Year)	Title
Ahmed, Mahmud, and Acet, (2022)	Circular economy model for developing countries: evidence from Bangladesh
Azizuddin, Shamsuzzoha, and Piya, (2021)	Influence of circular economy phenomenon to fulfil global sustainable development goal: a perspective from Bangladesh
Siddique et al., (2022)	Discerning the circularity of the plastic industry in Bangladesh through the lens of material flow analysis