

Sayaid Hossain

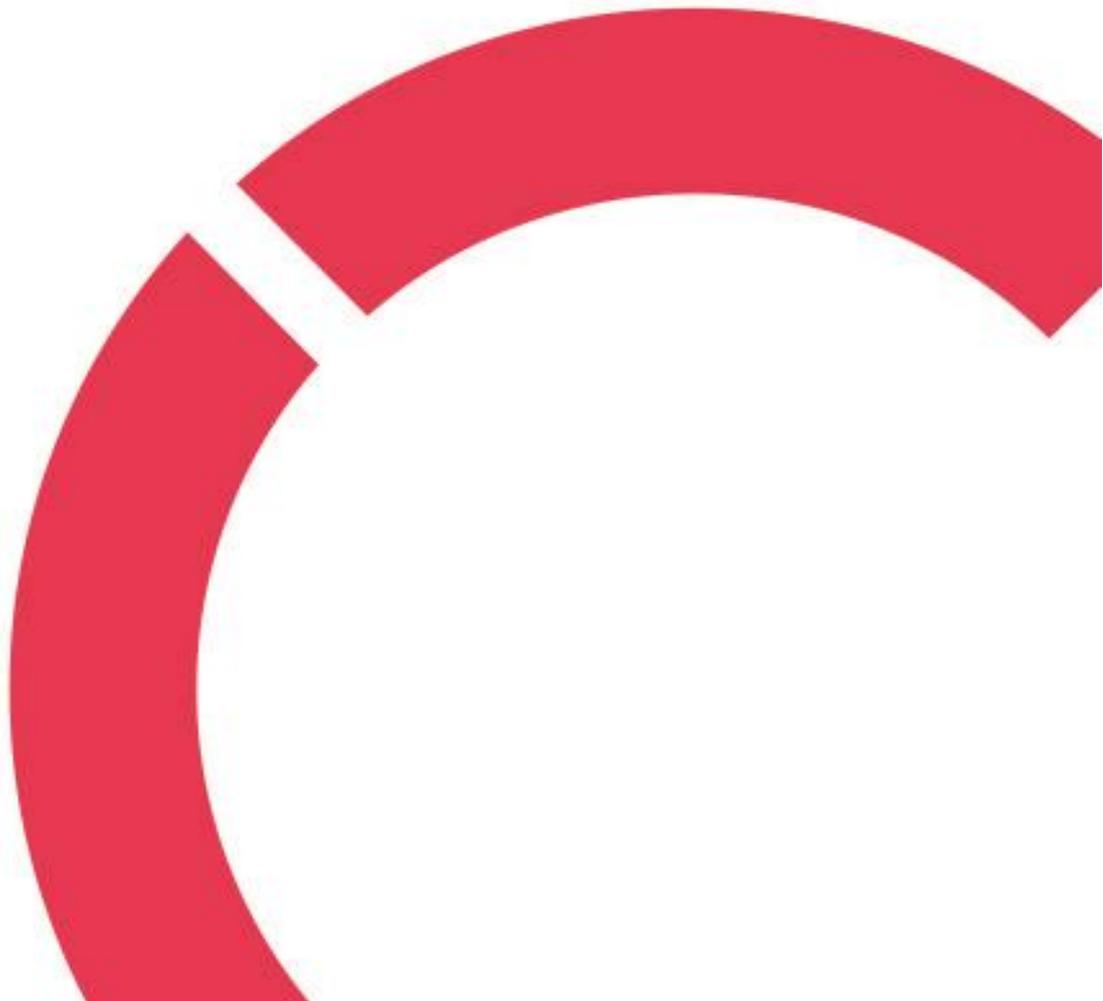
PLASTIC RECYCLING BUSINESS IN BANGLADESH

Thesis

CENTRIA UNIVERSITY OF APPLIED SCIENCES

International Business

November 2023



ABSTRACT

Centria University of Applied Sciences	Date November 2023	Author Sayaid Hossain
Degree programme International Business		
Name of thesis PLASTIC RECYCLING BUSINESS IN BANGLADESH		
Centria supervisor Leena Jungner	Pages 39 + 2	
Instructor Commenting commissioning institution or company:		
<p>Globally, the problem of plastic pollution has an impact on ecosystems and public health. Bangladesh's limited financial resources pose significant obstacles to its ability to effectively manage plastic remains. This thesis primarily aimed at exploring the existing practices of the plastic recycling industry in Bangladesh, with a focus on assessing the current state of the industry and identifying business prospects and opportunities. The study also examined the ecological and social advantages of recycling plastic, such as its capacity to reduce waste from plastics, provide employment, and advance sustainable development.</p> <p>This thesis provides important new perspectives on the benefits and limitations concerning plastic recycling in Bangladesh. Using a quantitative survey study with a sample size of 52 from a recycling and waste management, company x in Bangladesh was chosen to give comprehensive insights. This thesis revealed that recycled plastic products are becoming increasingly valuable in both domestic and foreign markets. This is because people are becoming more concerned about sustainability and the environment. Government actions, like offering tax breaks and policy support, have made it easier for businesses to invest money on improving and building recycling infrastructure. Even so, there are still challenges in this area, such as failed waste management methods, limited technology, and a lack of precise regulations.</p> <p>The thesis addressed how important it is to take a strategic approach and how consumers need to be aware to enhance the opportunities and eliminate the challenges of plastic recycling businesses in Bangladesh.</p>		
Keywords Feasibility, plastic consumption, recycling, recycling process, sustainability, waste management		

**ABSTRACT
CONTENTS**

1 INTRODUCTION.....	1
2 CURRENT STATE OF PLASTIC RECYCLING INDUSTRY IN BANGLADESH.....	3
2.1 Global plastic recycling industry	5
2.2 Plastic manufacturing and recycling process in Bangladesh	7
2.3 Plastic waste management practices in Bangladesh	9
2.4 Market analysis of plastic consumption in Bangladesh.....	11
3 BUSINESS OPPORTUNITIES AND CHALLENGES IN THE PLASTIC RECYCLING INDUSTRY OF BANGLADESH	14
3.1 Business opportunities in the plastic recycling industry of Bangladesh	14
3.2 Business challenges in the plastic recycling industry of Bangladesh.....	16
4 RESEARCH METHODOLOGY	18
4.1 Methodology	18
4.2 Data collection	19
4.3 Data analysis.....	20
5 RESEARCH RESULTS	22
6 RESEARCH ANALYSIS	33
6.1 Key findings	33
6.2 Discussion.....	34
7 CONCLUSION	36
REFERENCES.....	37

APPENDICES

FIGURES

FIGURE 1. Current status of plastic pollution in Bangladesh (adapted from Hossain, Rahman, Ahmed Chowdhury, & Kumar Mohonta 2020).....	3
FIGURE 2. Plastic waste mismanaged on a global perspective (adapted from Hopewell et al. 2009)	6
FIGURE 3. Mechanical recycling process (adapted from EUBIO Admin n.d.)	8
FIGURE 4. Recycling Process of Plastic.....	10
FIGURE 5. Plastic waste and consumption in Bangladesh (adapted from Debnath et al. 2023)	11
FIGURE 6. Booming plastic industry of Bangladesh (adapted from Noyon, & Ahmed 2021)	12
FIGURE 7. Pie chart representing gender demography	22
FIGURE 8. Pie chart representing age in years demography	23

FIGURE 9. Pie chart representing respondent’s job position.....	23
FIGURE 10. Pie chart showing survey responses about current plastic recycling industry.....	24
FIGURE 11. Pie chart showing survey responses about the economic contribution of the plastic recycling industry.....	25
FIGURE 12. Pie chart showing survey responses about government initiatives for the plastic recycling industry.....	25
FIGURE 13. Pie chart showing survey responses about the current technologies of the plastic recycling industry.....	26
FIGURE 14. Pie chart showing survey responses about the current waste management practices	27
FIGURE 15. Pie chart showing survey responses about the demand of the plastic recycling industry .	28
FIGURE 16. Pie chart showing survey responses about quality products of the current plastic recycling industry.....	29
FIGURE 17. Pie chart showing survey responses about the regulatory framework.....	30
FIGURE 18. Pie chart showing survey responses about public awareness of plastic recycling industry	31
FIGURE 19. Pie chart showing survey responses about the stakeholder collaborations	32

1 INTRODUCTION

The thesis is focuses on measuring the existing plastic recycling business in Bangladesh and its challenges and opportunities due to its detrimental effects on both ecological systems and human well-being. At present, consumers are becoming more aware of the environmental impact of the goods that they purchase or consume. Consequently, businesses are converting their operations to be as environmentally friendly as feasible. Given that plastic waste management has emerged as a concerning development during the year 2023, businesses are attempting to allocate a significant portion of their capital in order to eliminate plastic waste from their operations. For this, developing countries like Bangladesh with limited funding need appropriate plastic waste management practices which will help them to optimize their operations.

This thesis primarily aims to explore the existing practices of the plastic recycling industry in Bangladesh, with a focus on assessing the current state of the industry and identifying business prospects and opportunities. This thesis additionally aims to provide insights that can contribute to the establishment of a viable plastic recycling sector in Bangladesh by thoroughly investigating the present state of the plastic recycling businesses along with its waste management practices and analyzing market dynamics.

The large amount of plastic waste has a negative influence on the environment, manifesting as soil contamination from landfilling, marine pollution from waste discharge into the ocean, and air pollution from open dumping (Kibria et al. 2023). Furthermore, these problems will compound during the lifetime of the plastic, posing a threat to the natural equilibrium. Plastic production and its use have risen globally due to its low cost and versatility (Abbing, 2021). In this case, plastic waste management presents both challenges and opportunities in a densely populated country like Bangladesh. Exploring the current state of plastic recycling is critical since environmental degradation threatens the country's survival. The thesis is driven by the need to eliminate plastic pollution and discover long-term solutions in a financially strained society. A plastic recycling firm in Bangladesh could help to minimize waste materials, create jobs, and support long-term development for the country. In addition to that, the thesis brings a significance to the individuals seeking to establish a plastic recycling business with a view to promoting waste management.

In terms of assessing limitations, this thesis might come across a few obstacles that could undermine the credibility of its conclusions. For example, since the findings of the thesis will be based on the perspectives and experiences of Bangladeshi professionals and experts in the field of plastic recycling, certain businesses may be hesitant to disclose information about their business operations in relation to the adoption of plastic recycling practices. Furthermore, it is worth noting that the government of Bangladesh has not released any statistics available or established a legal framework for the development of firms promoting plastic waste management. This lack of knowledge and regulatory structure may result in a plan that is unreliable. Despite these drawbacks, the thesis has the potential to provide a preliminary business model for a plastic recycling operation in Bangladesh.

To conduct the thesis based on the plastic recycling business development in Bangladesh, there are a total of eight chapters that have been constructed sequentially. In this process, the concept of the recycling business should be known first from both the global and local view tailored to Bangladesh. Following that, organizational business and waste management systems should be explored for Bangladesh to assess the best practice of the manufacturing, collection, designing, processing, and repeating the process to create reusable plastic products. For this, a recycling and waste management company of Bangladesh has been selected who will be denoted as X, since the company prefers to be anonymous. This approach can add value in preserving the ecological balance resulting in no harmful effects on the environment. Furthermore, the thesis will evaluate the prospects and obstacles associated with Bangladesh's plastic recycling business, with a particular emphasis on providing an extensive comprehension of the country's plastic recycling landscape. However, it is crucial to recognize and address certain constraints associated with this research. The research is undertaken under certain time-based and resource limitations, hence potentially preventing a comprehensive analysis of all the aspects of the recycling industry which intends to provide a strategy for the businesses that intend to promote plastic waste management in the domain of Bangladeshi plastic industry. However, the results of this thesis will provide valuable insights for the potential plastic recycling businesses in Bangladesh.

2 CURRENT STATE OF PLASTIC RECYCLING INDUSTRY IN BANGLADESH

The plastic recycling market in Bangladesh is a flourishing industry saturated with both potential customers and limitations. Plastic pollution has developed as a major global concern threatening both the environmental ecosystems and human well-being (Hossain, Rahman, Chowdhury, & Mohonta 2021). The recycling of used plastics is very important for protecting the environment and resource conservation. The abundance of cheap labor in Bangladesh has made recycling much easier to practice in a developing country like Bangladesh. A global comparison with Bangladesh's manufacturing, recycling, and waste management practises can provide a market analysis for advanced technology and new solutions. The waste management practices in Bangladesh need to be active and they should practice the entire verification of the plastic waste management in terms of recycling plastic technique. (Shent, Pugh, & Forssberg 1999, 87.) This section of the thesis will discuss about the current trends and regionalized practices that influence this industry.

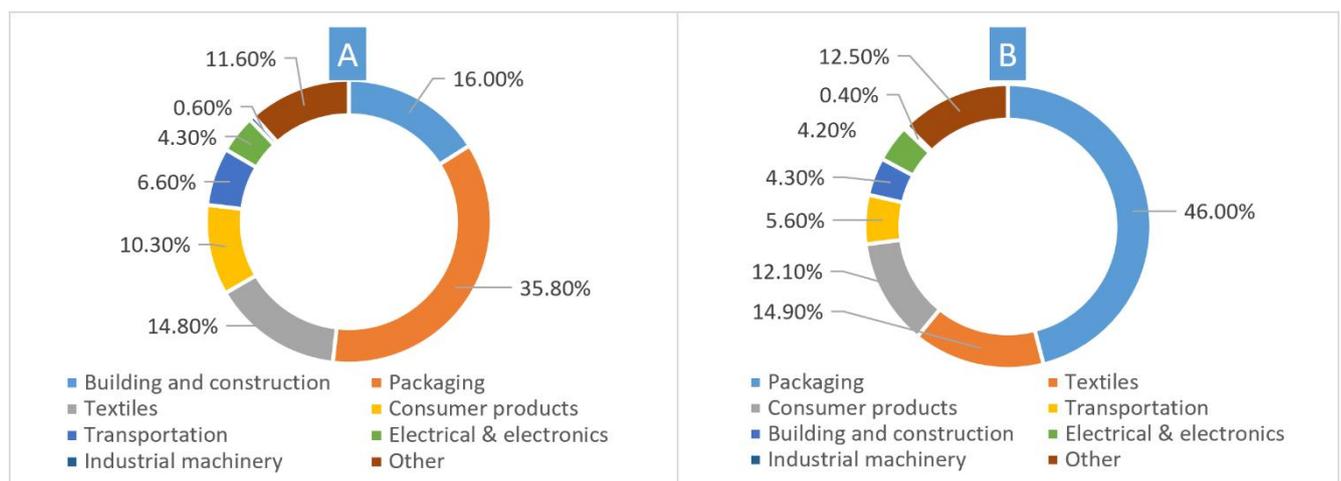


FIGURE 1. Current status of plastic pollution in Bangladesh (adapted from Hossain, Rahman, Ahmed Chowdhury, & Kumar Mohonta 2020)

Figure 1 reveals that over the last two decades, the plastics industry in Bangladesh has developed into a prospering sector. According to Islam (2012, 77), as of now, 98% of the 3000 plastic manufacturing facilities are classified as Small and Medium Enterprises (SME). The domestic market for plastic is estimated to be worth BDT 7,000 crore, supporting a workforce of 500,000 individuals, and contributing 1% to the national GDP. Approximately \$337 million is also generated through the direct and deemed

exports of plastic products to other countries. According to Hopewell, Dvorak, & Kosior (2009), recycling is considered a viable approach for managing plastic items at the end of their life cycle. The economic and environmental foundation for focusing on the recovery and recycling of plastic wastes is becoming more apparent. Recent trends indicate a significant upsurge in the rate of plastic waste recovery and recycling that include environmental awareness, sustainable production, and demand for recycled plastic products. For this, it can be concluded that the prospect of establishing a business focusing on plastic recycling is estimated to be a huge success for its growth (Evode, Qamar, Bilal, Barcelo, & Iqbal 2021, 3).

For this, understanding these aspects is vital to global recycling efforts, and development. Plastic recycling uses mechanical, chemical, and refined methods (Mourshed, Masud, Rashid, & Joardder 2017, 27022). A more detailed look at these approaches shows their global applicability which will help Bangladesh to enrich its recycling, manufacturing, and waste management practices. Also, modern technology has improved plastic recycling efficiency and sustainability over time whereas modern recycling technology and computerized sorting systems have improved the disposal of waste. These technological advances correlate with industrial growth. For this, sustainable plastic recycling requires energy and environmental considerations in terms of formulating a viable business strategy.

The industry must recognise that organisational advantages must be environmentally friendly to control corporate management practises to compete globally (Van der Vegt, Velzing, Rietbergen, & Hunt, 2022). Industrialists should prioritise plastic management business opportunities above branding the reusable sustainable plastic industry to improve the lives of stakeholders like business owners, volunteer workers, and plastic product customers affected by Bangladesh's plastic recycling practises. Despite this increased enthusiasm to address plastic waste, there is no international aim in identifying the sustainability in relation to plastics to offer a solution to the businesses (Marel 2018). Several issues have arisen in the plastic recycling industry throughout time. It has the ability to significantly enhance employment opportunities, minimize plastic pollution, and coordinate worldwide plastic business mechanism solutions (Milios, Esmailzadeh Davani, and Yu 2018). The recycling industry is cost-effective and has numerous advantages, including reduced fossil fuel consumption, employment creation, and crude oil reserve. Promoting a circular plastics economy is growing across authorities and worldwide despite the lack of a clear goal or uniform strategies to make the plastics sector more sustainable. The national policy promotes the circular economy concept, which is not limited to plastics and may aid in achieving the 2030 Sustainable Development Goals (Marel 2018).

2.1 Global plastic recycling industry

According to Kibria, Masuk, & Safayet (2023), the plastic is primarily manufactured with highly disposable materials creating serious concerns for an ecological balance. For this, plastic is considered to be the most harmful particle to the environmental balance and it should not be consumed vigorously. Plastic recycling is essential across the world as a long-term solution to plastic pollution. On a global scale, the plastic recycling industry is a significant and critical sector that addresses the pressing environmental issue of plastic pollution. This undertaking, operating on a large scale and involving a large number of people, plays a critical role in the preservation of resources, the production of economic opportunities, and the advancement of technological advancements. Various variables influence the sector's growth, including market dynamics, regulatory frameworks, and international cooperation. Despite challenges associated with pollution and recycling rates, this issue offers opportunities for technological innovations, industrial expansion, and environmental effect reduction. With nations and numerous sectors increasingly emphasizing sustainable plastic use, the global plastic recycling sector has emerged as a vital participant in driving this revolutionary initiative. Hopewell et al. (2009) argued that, its key goals include reducing environmental consequences and encouraging the adoption of a circular economy.

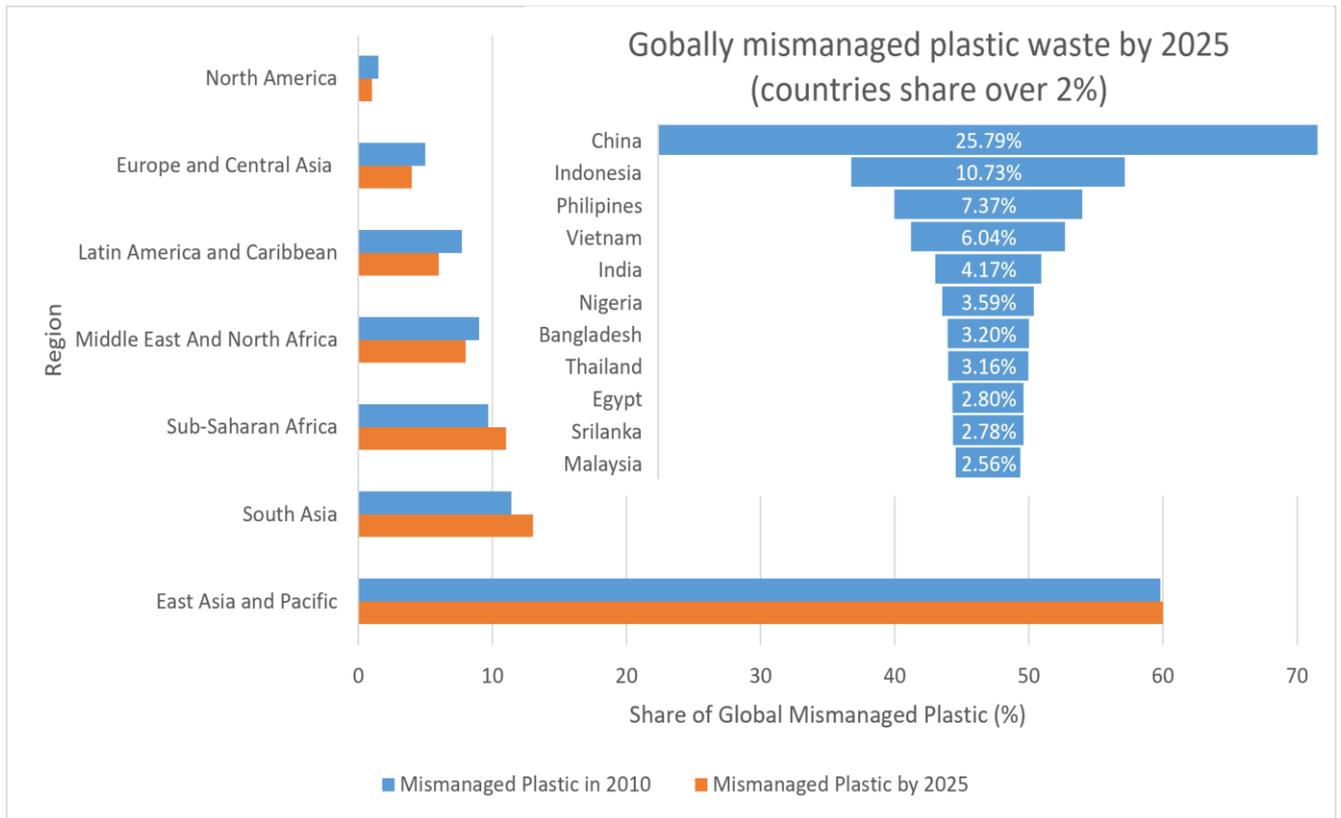


FIGURE 2. Plastic waste mismanaged on a global perspective (adapted from Hopewell et al. 2009)

According to Hopewell et al. (2009), plastic waste production in Western Europe is increasing at a rate of roughly 3% per year, in accordance with long-term economic growth, whereas mechanical recycling is increasing at a rate of about 7%. In 2003, this accounted for only 14.8% of total garbage plastic. This, in combination with feedstock recycling (1.7%) and energy recovery (22.5%), recovered 39% of the 21.1 million tonnes of plastic waste produced in 2003. Despite increased waste generation, mechanical recycling, and energy recovery rates are increasing.

Figure 2 supports the claim that, in terms of future trends of future recycling trends, recycled garbage needs to grow from 363 Mt to 740 Mt by 2030 to reduce unsustainable waste creation from 519 Mt. (Chen, Bodirsky, Krueger, Mishra, & Popp 2020). As the authors also pointed out that organic waste will drop from 47% to 39% globally from 2015 to 2050, whereas all other waste types, especially paper tend to rise, there more sustainable recycling, composting, and energy recovery grow as disposal waste drops from 28% to 18%.

2.2 Plastic manufacturing and recycling process in Bangladesh

According to Moniruzzaman, Bari, & Fukuhara, (2011), the implementation of a solid waste recycling strategy is an integral component of the sustainable and efficient waste management systems adopted by numerous cities worldwide. The local authorities in Bangladesh have historically overlooked the recycling component of garbage disposal. However, numerous individual waste collectors and dealers have engaged in recycling practises as a means of generating cash for an extended period. According to Saifullah, Ahammad, & Satter (2008, 142), reusing a component signifies placing it to use multiple times. Reusing has been performed for centuries for different elements including clothes, toys, cutlery, crockery, and other tools that were passed down through families. Although second hand and antique stores make use of reuse the poor tend to make a living by sorting and selling rescued products from garbage dumps in cities such as Dhaka, Chittagong, and Khulna. In this nation, there are many recyclable items and thus recycling waste might earn extra income. Separating plastic, paper, metal, and glass from other garbage, including kitchen green waste, results in commodities being sold to recycling firms.

There are different methods that have been developed because of the continuous innovation, and technological advancement for the plastic recycling practices. According to Kalali, Lotfian, Shabestari, Khayat-zadeh, Zhao, & Nezhad (2023), plastic recycling involves several phases, including processing, disposal, sorting, distribution, and usage. Mechanical recycling is impossible due to the intricacy of plastic waste combinations, hence most plastic garbage is burned. Because of its speed and efficacy, it is the most commonly used plastic recycling method. Breaking polymer chains into monomers can be used to replace virgin raw materials in the chemical recycling of plastic waste. Thermal recycling, on the other hand, melts plastic waste and casts or injects it into molds. The study also investigated the recycling of essential plastic materials of the industry including PP (Polypropylene), PVC (Polyvinyl chloride), HDPE (High-Density Polyethylene), PET (Polyethylene Terephthalate), and PS (Polystyrene). They discovered that the fundamental characteristics of polymers may influence recycling. According to studies, this category's plastics may be sorted and reprocessed at a rate of more than 50%. PET (Polyethylene Terephthalate) which is mostly used for manufacturing plastic bottles is particularly difficult to recycle. Polyethylene and polypropylene recycling which are mostly used for packaging, textiles, and fabrics manufacturing benefit energy management systems (Kalali et al 2023).

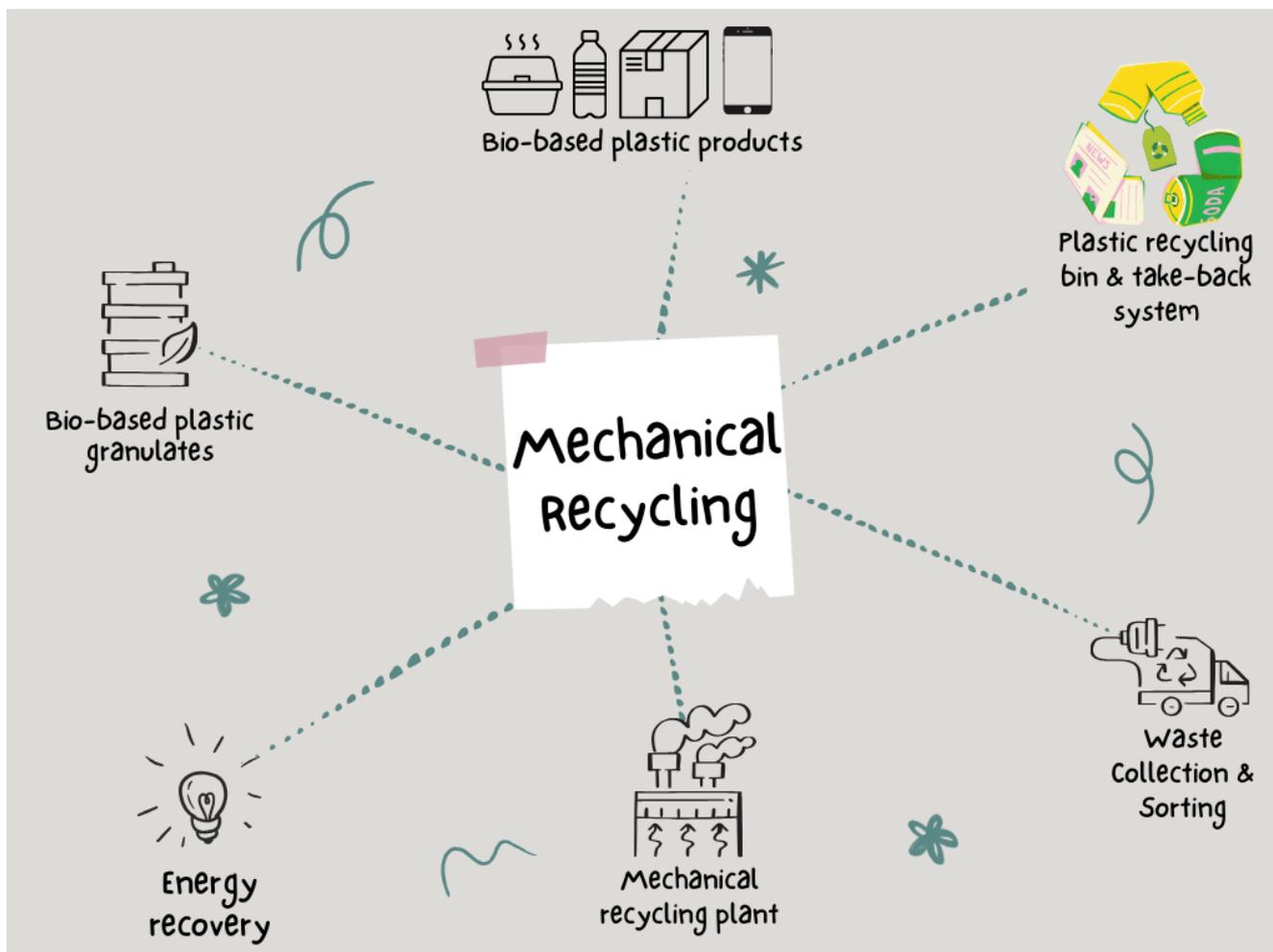


FIGURE 3. Mechanical recycling process (adapted from EUBIO Admin n.d.)

The plastic manufacturing and recycling operations in Bangladesh exemplify the wider difficulties and opportunities associated with the management of plastic waste. Although the sector is seeing growth, the efficient recycling of plastic waste remains an ongoing struggle. The landscape is being steadily transformed by innovations, government restrictions, and heightened awareness, hence presenting the prospect for a more sustainable and environmentally conscious approach to plastic consumption inside the nation. The plastic manufacturing industry in Bangladesh has witnessed significant expansion, resulting in the production of a diverse array of products encompassing packaging materials and consumer goods such as polyethylene (PE), polypropylene (PP), and polyvinyl chloride (PVC) (Ahmed, & Moniruzzaman 2018). The manufacturing procedure initiates with the acquisition of petrochemical-derived polymers, which subsequently undergo conversion into diverse plastic commodities utilizing techniques such as injection and injection molding. The plastics produced within Bangladesh cater to the substantial

demand in many areas like packaging, construction, textiles, and consumer products, serving both domestic and international markets.

Bangladesh is seeing an increase in the recycling of plastics, despite the difficulty in putting effective waste management strategies into place. This challenge manifests in difficulties related to the collecting, sorting, and processing of plastic waste, ultimately contributing to environmental contamination. The nation has advantages from a significant informal recycling sector, which consists of waste pickers who fulfil a crucial function in gathering and categorizing recyclable goods, such as plastics. These individuals typically operate under difficult circumstances, obtaining materials from both landfills and public thoroughfares. Ahmed, & Moniruzzaman (2018) also argued that, the government has implemented measures to tackle the issue of plastic waste management, including the introduction of programs such as the Extended Producer Responsibility (EPR) framework and the Plastic Waste Management Rules in 2018. These initiatives aim to establish accountability among producers for the management of plastic waste. Significantly, there is a visible emergence of local ideas aimed at addressing these difficulties. Businesses and organizations are actively engaging in the exploration of sustainable solutions, including the recycling of plastic trash into construction materials and its use in local crafts. The demand for recycled plastic items in Bangladesh is experiencing an upward trend due to a combination of heightened environmental consciousness and economic motivations (Ahmed, & Moniruzzaman, 2018). This indicates a positive transition towards adopting a more circular approach to plastic consumption within the nation.

2.3 Plastic waste management practices in Bangladesh

Recycling plastic is inexpensive and produces enough natural gas to reduce energy consumption. For this, costs and environmental consequences must be taken into account. Because it uses reusable and renewable fundamental ingredients, recycling plastic lessens environmental damage. Also, recycling plastics minimizes soil, air, and water pollution because they are not disposed of in landfills. It reduces greenhouse gas emissions by regulating the extraction of artificial production resources (Dvorak 2022, 2122). However, several opportunities are being misused as a result of complex corporate rules and management legislation (Chen 2021, 488). Developing countries, such as Bangladesh, face the greatest logistical support, and financial needs. Poor planning, insecure infrastructure, complicated technological implementation, unskilled labor, unrealistic corporate plans, and a lack of funding threaten Bangladesh's

recycling plastic industry (Brouwer 2018, 437). Ahmed & Moniruzzaman (2018, 4277-6) highlighted the following waste management practices in Bangladesh.



FIGURE 4. Recycling Process of Plastic

According to Ahmed & Moniruzzaman (2018, 4277-4), recycling companies in Bangladesh primarily gather recyclable plastic rubbish, which workers then sort where they manually sort recyclable plastics. Typically, they are visually inspected through a process as seen in figure 4. Ahmed & Moniruzzaman (2018, 4277-4) explained the process where clear PET (Polyethylene Terephthalate) and HDPE (High-density polyethylene) bottles are frequently identified and removed from the stream. Hard, soft, rubber, and shoe are common categories. Sorting is also done by colour. It is vital for the financial effectiveness of the recycling process. Improving this method will boost recycling efficiency and profitability and then sent for cutting after sorting. This approach uses a cutting machine reducing sorted polymers to a desired size. This machine has a motor and cutter within. Additionally, it contains a half-conical basket for plastics. Plastic pieces are washed in a washing machine following the cutting process. The washing process is also done manually. An open area is utilised to dry cutting plastic. The drying procedure is generally done manually. Plastic items that have been washed in a washing machine are naturally dried in the sun. They are dried by an electric fan during the wet seasons. That completes the moulding. Recycling comes to an end here. In this method, plastics are manually moulded into the desired shape in a bag (Ahmed & Moniruzzaman 2018, 4).

According to Debnath, Bari, Ali, Ahmed, Ali, & Kabir (2023), governmental and private sectors have recently prioritized waste management. Lack of social support and understanding makes waste-management systems difficult to create and maintain. Few emerging-market companies recycle or manage waste sustainably. Sustainable Waste Management (SWM) has not employed RFID or GIS to track recycled products whereas environmental legislation in Bangladesh is insufficient to regulate waste. The

authors also indicated that the country lacks circular waste minimization, recycling, and reuse standards. Single-use plastic bags have been outlawed in India, Bhutan, and Bangladesh, however, implementation is inadequate. Thus, Bangladesh struggles to handle the massive plastic waste from industry, homes, and agriculture (Debnath et al. 2023).

2.4 Market analysis of plastic consumption in Bangladesh

People from Bangladesh's underprivileged communities tend to make a life by recycling plastic. Plastics are inexpensive, durable, and lightweight. Over the last 30 years, Bangladesh's plastic sector has grown significantly. There are currently 5000 plastic manufacturing facilities, with 95% of them being SMEs and Tk 10,300 crore (US\$ 1425 million) is the size of the domestic market. Bangladesh consumes 5kg of plastic each year per inhabitant (Sultana 2018). The plastics industry accounts for around 1% of GDP and employs approximately 500,000 people. Total direct and deem (RMG accessories) export revenues are roughly \$537 million. Bangladesh has a competitive advantage in the global market because of its low labor costs and quickly expanding plastic waste recycling industry. The majority of the plastic produced each year is used to make disposable packaging and other products that are discarded within a year.

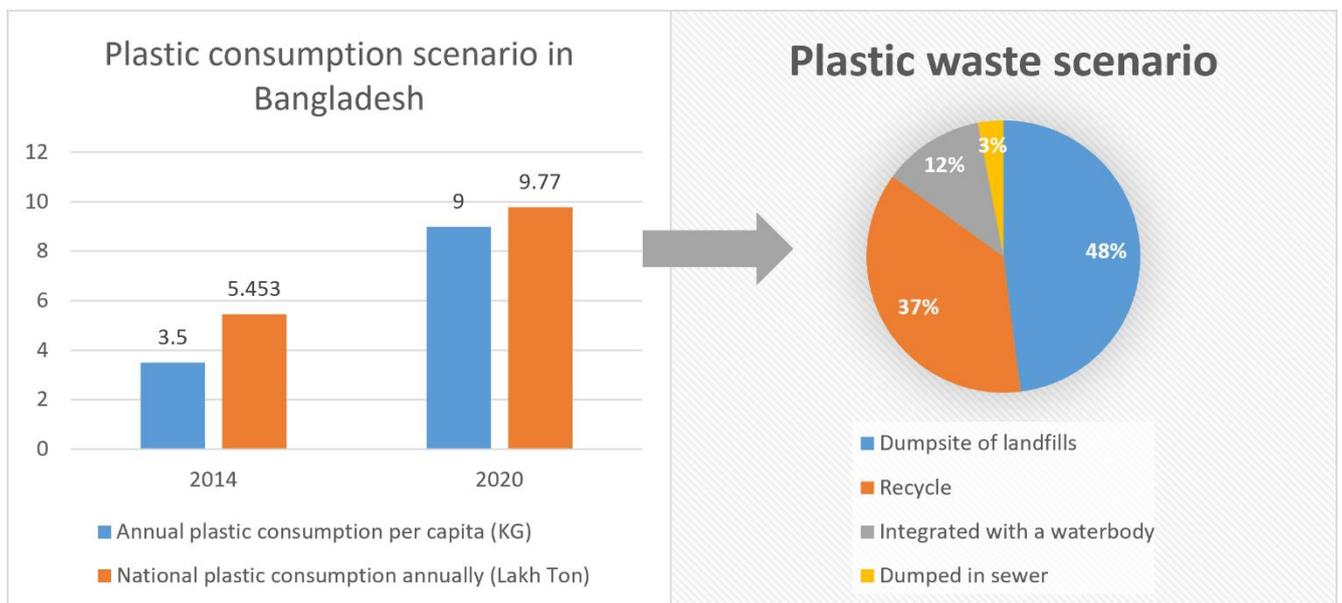


FIGURE 5. Plastic waste and consumption in Bangladesh (adapted from Debnath et al. 2023)

As a result, the use of plastic is unsustainable which is also reducing environmental implications through recycling is an important and growing element of the plastics industry. Recycling can help to reduce oil use, CO₂ emissions, and garbage disposal (Debnath et al. 2023). Recycling of packaging materials has expanded dramatically in numerous countries over the last few decades. With the help of individuals, industry, and government, new technology and processes for collecting, sorting, and re-processing recyclable plastics are opening up new recycling opportunities.

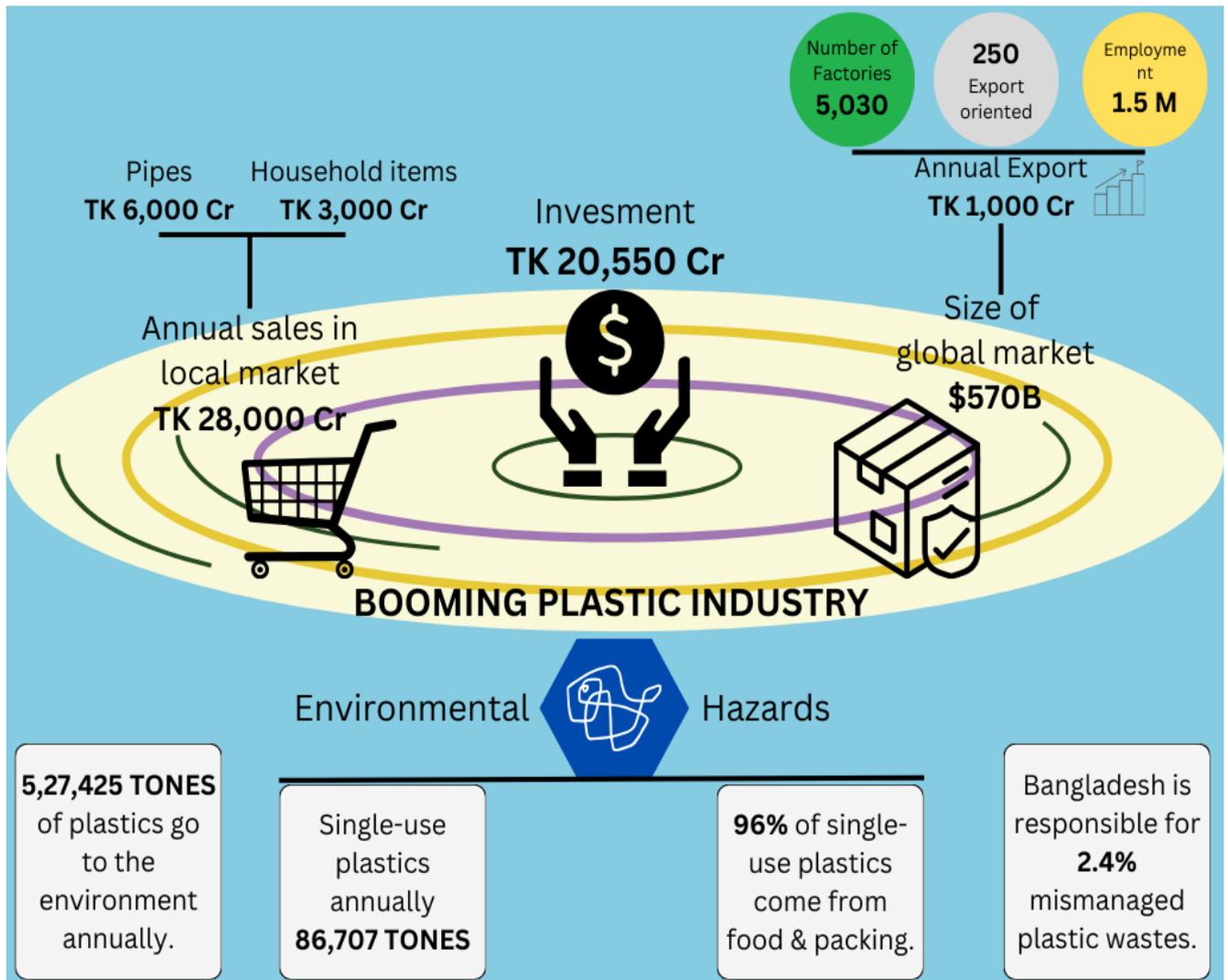


FIGURE 6. Booming plastic industry of Bangladesh (adapted from Noyon, & Ahmed 2021)

According to Yousuf (2023), Bangladeshi per capita plastic use increased from 3kg in 2005 to 9kg in 2021. Dhaka has 24kg, about three times more than comparable urban places. And in 2020, the Environmental and Social Development Organisation (ESDO) found that the country produces 87,000

tonnes of single-use plastics (SUPs) (Yousuf 2023) 96% of SUPs contained food or personal care. According to Noyon et al., (2021), according to the Bangladesh Investment Development Authority (BIDA), the country currently hosts a total of 5,030 plastic industries, with small and medium businesses accounting for 98% of this figure. According to industry experts, the aggregate investment in this particular sector amounts to approximately Tk 20,550 crore. The estimated yearly sales of plastic products in the local market amount to predicted over Tk 28,000 crore. Among these sales, PVC pipes constitute a significant portion, surpassing Tk 6,000 crore, while household items contribute nearly Tk3,000 crore. In addition to that, the plan, which addresses public agency and stakeholder concerns, follows Bangladesh's 8th Five-Year Plan and emphasizes plastic product reduction, reuse, and recycling aims to recycle 50% of plastics by 2025, reduce virgin material consumption by 50% by 2030, and phase out targeted single-use plastic by 90% by 2026. It has been estimated that most landfill plastic waste is single-use thin shopping bags, packs, wrappers, and multi-layered plastics and 48% of plastic trash is thrown in landfills, 37% is recycled, 12% is in water, and 3% is in sewers and unserved places in Bangladesh (The Business Standard, 2021).

3 BUSINESS OPPORTUNITIES AND CHALLENGES IN THE PLASTIC RECYCLING INDUSTRY OF BANGLADESH

The plastics industry has flourished since petrochemical polymer synthesis paths which involves the production of various plastic materials were found. Plastics are mostly created from fossil oil and gas petrochemicals and are lighter, stronger, and cheaper than other materials (Hopewell et al. 2009). Because of the nation's expanding industrial sector and rising environmental consciousness, Bangladesh offers a plethora of excellent chances for the plastic recycling industry. In order to deal with the growing need for recycled plastic items, there is an enormous opportunity that can be presented to business, jumping at the chance to expand into an area that is growing quickly because of a growing global trend toward sustainable practices. This has created a need for environmentally friendly goods. Businesses are coming up with creative ways to use recycled plastics to make long-lasting building materials or change them so they can be used in packaging, meeting the needs of both local and international markets. On the contrary, there are some potential challenges that such a potential industry could face because of its inefficient waste collection and segregation systems (Hopewell et al. 2009).

3.1 Business opportunities in the plastic recycling industry of Bangladesh

According to Hossain (2020, 12), in an environment characterized by a focus on sustainable business practices, the use of plastic has emerged as an area of significant concern. Bangladesh, as a country in the process of economic development, is opposed with a substantial volume of plastic waste. The recycling industry in Bangladesh has the opportunity to grow into becoming the most lucrative if the public and private sectors work together to support it. Along with other important businesses like the RMG (ready-made clothing) business sector, the automotive, electronics, and telecommunications sectors, Bangladesh has a number of potential opportunities to develop the plastic recycling sector. Bangladesh has a significant potential to effectively use its plastic wastages in order to promote economic growth and safeguard the environment against pollution. The utilization of plastic trash for the production of exclusive and sustainable products and energy sources could be a viable approach (Hossain 2020, 13).

Bangladesh is home to a significant number of plastic companies, encompassing both small-scale and large-scale enterprises with a considerable amount of revenue stream. The industry is experiencing significant growth up until now. Moreover, the plastic industry is primarily responsible for the production of numerous household items, including hardwood things that can be manufactured using plastic materials, such as plastic furniture (Hossain 2020, 14). The restoration of nature can be achieved by the replacement of wooden furniture with recyclable plastic materials. There is also a potential to sell them as export materials because of the increasing demand of recycled goods on a global scale. Additionally, plastic is also utilized in the production of numerous construction products. Therefore, the utilization of plastic waste for the production of diverse products, which are in great demand domestically and internationally, would be advantageous for Bangladesh. It is limited and getting harder to get rid of all the plastic waste that comes from trade operations because certain materials are not allowed. This process, on the other hand, could increase the amount of recycling around the world, which would be good for both the economy and the environment. It is important to keep in mind, though, that the amount of plastic trash that is traded around the world is very small compared to the overall amount of plastic trash that is made.

According to Hossain, Kabir, Islam, and Kirtania (2022, 17), in Bangladesh, recycled waste plastics are used a lot, mostly to make cheap goods where the process is termed as downcycling. It also limits the range of products that may be manufactured using recycled plastics. Recently, well-known companies have started using recycled material in their production because some customers, mostly in Europe, have asked them to. These customers have asked for recycled plastics to be included in their orders. There is a big chance for improving the recycling of plastic waste and turning it into goods with extra value in Bangladesh. Bangladeshi companies that recover plastic mostly send recycled plastic flakes to other countries to be used in their own production. There might be a chance to make money by starting businesses that only make products out of these recycled plastic flakes. This untapped potential could be very important for building a strong market in the United States for goods made from recycled plastic for Bangladesh.

In addition to that, Hossain (2022, 15) claimed that it seems to be a positive factor that PET or Polyethylene Terephthalate which is a kind of polymer used for producing recycled materials, recycling is getting more attention, especially for bottle and container packing. There are businesses that recycle PET bottles and send the chips they make to China. But since China is not processing as much plastic waste anymore, Bangladeshi exporters can grow their world market share by meeting the demand for recycled plastics in other places. Bangladesh's plastics business has grown a lot, but consumers still

need to be more certain of the products they buy. Making a well-thought-out plan to provide consistent, dependable, and high-quality recycled plastic products could build trust among customers and improve the industry's image. Furthermore, Bangladesh is also a great place to build plastic recycling centres because its operating costs are relatively low. The low cost of recovered plastic items makes them a good investment for business owners and investors who want to get into the industry and take advantage of the growing demand for these kinds of products around the world. Additionally, business possibilities are created by government efforts to encourage recycling and support environmentally friendly practices. To get people to spend on recycling infrastructure and technologies, different kinds of incentives are used, such as tax breaks, subsidies, and policy help. According to (Hossain 2022, 15) businesses that put recycling, waste gathering, and waste management at the top of their list of priorities will benefit from these efforts.

3.2 Business challenges in the plastic recycling industry of Bangladesh

Despite the various potentials available, the plastic recycling business in Bangladesh encounters numerous hurdles that hinder its progress and long-term viability. One of the main challenges lies in the ineffective collection of waste and processing methods. The presence of insufficient infrastructure and inefficient waste management methods is a significant factor in the development of environmental degradation, hence posing considerable obstacles in the acquisition of recyclable materials of superior quality. According to Matter, Ahsan, Marbach and Zurbrugg (2015, 321), the improper management of waste in Dhaka, Bangladesh, is a well-known example of a market failure that can be summed up as waste not being used properly as a valuable resource. There is a need for recycled materials in the industry sector, which can be met by using inorganic materials like paper or plastic.

Technological limitations and outdated recycling methods pose hurdles. Insufficient investment in modern recycling technologies leads to inefficiencies in processing and affects the quality of recycled materials, impacting their marketability (Matter et al. 2015, 321). Moreover, there's a lack of standardized regulations and enforcement mechanisms. Inconsistent policies and weak implementation create uncertainties for businesses, hampering long-term planning and investment in the sector. According to (Matter et al. 2015, 321), the absence of comprehensive extended producer responsibility (EPR) frameworks limits accountability among manufacturers and hampers effective waste management

There are significant issues with recycling because of limitations in technology and the use of old methods. Not enough money is being put into modern recycling technology, which leads to operating inefficiencies throughout the processing stage. This lowers the quality of recycled materials, which makes them less marketable. It is also hard to enforce the law because there are not many set rules and procedures. The business environment is unclear because policies are not always followed and are not always put into action properly. This makes it hard for companies to make long-term plans and raise money for investments in the sector. Moreover, the lack of complete extended producer responsibility (EPR) models lowers the level of responsibility among producers and makes waste management less effective (Matter et al. 2015, 321). Another important problem is that the public knows about the need to change people's behavior. Even though many people are working together to do it, there is still a significant need to spread information about the benefits of recycling and the adoption of proper plastic usage habits. Getting people to prioritize recycled items is an immense challenge in a market where price and convenience are still the main factors that are important.

4 RESEARCH METHODOLOGY

The methodology used in a thesis tends to serve as the fundamental framework which ensures the organized, ethical, and precise execution of the study. The execution technique has a substantial impact on the quality and credibility of research findings, making it a vital component of the research process. Quantitative studies primarily generate numerical data that must be interpreted before any conclusions can be drawn (Watson 2015, 10) which improves the reliability of the findings. For this, the research methodology employed in this thesis adopts the quantitative approach. The research approaches undertaken for executing this thesis will be discussed briefly in this section.

4.1 Methodology

This thesis applies a quantitative research method to examine the current plastic recycling businesses in Bangladesh and learn more about their operational practises, issues, and possibilities. Both primary and secondary sources will be used to carry out this thesis and address the predetermined concerns. The selection of a research methodology is critical for credible findings, and a reliable conclusion. For this, the research approach undertaken for this thesis has been in accordance with the research objectives, which focus on the evaluation of plastic recycling firms in Bangladesh and the comprehension of the challenges and opportunities they face. The study intends to use a quantitative methodology because it will provide a systematic and empirically-based evaluation that will produce significant insights for the plastic recycling industry of Bangladesh (Watson 2015, 1). The primary approach of data collection comprises distributing a structured questionnaire to one selected plastic recycling organization and waste management firm, company x in Bangladesh. The presence of these participants is critical to the research because they offer a distinct perspective on their operating strategies, the challenges they confront, and the opportunities they see in the plastic recycling business. Individuals chosen for data collection include prominent members of this organisations, such as employees, plant and operations managers, waste collection supervisor, sustainability analyst, public relations managers and corporate social responsibility strategists of the company, who have a thorough understanding of their company's activities and involvement in plastic recycling.

According to Watson (2015, 9), surveys exhibit issues showing that one event leads to another, but they serve the purpose for gathering an extensive amount of information about the population. A characteristic that makes cross-sectional studies stand out is that they are easy to do because they only need

one event. The survey used in this research study is an important tool for data collection. The survey questions will be adopting a Likert scale format to analyse participants' thoughts, attitudes, and opinions about the relevant aspects of the plastic recycling business in Bangladesh. The survey questionnaire includes 10 closed-ended questions, each with a Likert scale that allows participants to indicate their level of agreement or disagreement with specific statements or propositions. Participants will be asked to express their opinions by selecting the level of agreement or disagreement that best represents their point of view for each topic. The responses to the Likert scale will be examined in order to have a better understanding of the participants' viewpoints and attitudes towards the plastic recycling business in Bangladesh. The incorporation of this data will be an important component in the research's conclusions, improving overall understanding of the potential and issues within the specific field. This approach will result in reaching a wider and diverse demographic portfolio to acquire credible findings to formulate a viable business strategy.

In addition to the primary data, the researcher also acquires secondary data from reliable resources, such as peer-reviewed scholarly articles and newspaper publications. For this, the relevant keyword terms such as "recycling practices," "waste management," "challenges and opportunities of the plastic recycling industry," and "prospects of the recycling industry" will be used to obtain pertinent secondary data.

4.2 Data collection

As mentioned earlier, the thesis will use both primary and secondary data to increase the validity of the result conclusion. For this, a variety of distribution methods are used to improve the efficacy and comprehensiveness of the data collection process. Since the thesis has been conducted for the home country, there one of the most common and widely used digital platform, Google Forms will be used to distribute the survey questionnaire. In addition, the most commonly used professional media platforms such as LinkedIn is used to distribute the survey to the target sample. Since there is the possibility many of the employees might not be reached through LinkedIn. As a result, the questionnaire will also be distributed by email, allowing them to share their valuable insights for the survey during the data collection process. Many individuals and businesses already have an online presence, which can be used to quickly spread the study questionnaire to a wide range of people.

The chosen data collection methodology effectively matches with the stated goal of the thesis, which is to get complete insights into the plastic recycling business in Bangladesh. The research can obtain primary information about the current state of the sector, the problems it faces, and the prospective opportunities it offers by direct engagement with specialists and notable individuals in the field. To ensure a comprehensive and representative dataset for analysis, a sample size of 52 participants is justified. The questionnaire primarily comprises close-ended questions related to the subject matter, aiming to acquire precise and quantitative data. This approach enhances the diversity of the demographic portfolio and contributes to the credibility of the findings, which are essential for formulating a viable business strategy.

4.3 Data analysis

The data analysis approach is critical to this thesis since it employs a quantitative methodology with the goal of providing substantial insights into the plastic recycling business in Bangladesh. This methodology allows for the generation of significant and dependable results to address the thesis objectives. The study is based on primary data sources, including comments acquired through survey responses which will provide valuable perspectives to the study findings. The relevance of survey responses in acquiring a complete picture of the numerous opportunities and issues encountered by Bangladesh's plastic recycling industry cannot be overstated. Participants' survey responses, which were structured using the Likert scale approach, will be thoroughly analysed and studied in the results section, and later on be discussed while highlighting the existing findings. The use of Likert scale responses allows for a multifaceted evaluation of participants' views, opinions, and attitudes, allowing for a complete understanding of their viewpoints on plastic recycling issues. Charts and graphs will be used as excellent visual aids for representing survey findings which will also enhance comprehension and analysis of the collected data.

The study employs a methodical approach to ensure the validity of its findings. The Likert scale is a key component of this methodology because it allows participants' attitudes and opinions about plastic recycling in Bangladesh to be measured and quantified. The process of assigning numerical values to response possibilities serves to standardize the data, allowing statistical analysis techniques to be applied. Graphical representations are used alongside with the Likert scale to visually portray the distribution of responses, supporting the finding of trends and patterns within the data. The incorporation of

these components within the methodology serves to validate the research findings, ensuring impartiality, dependability, and consistency with the research objective.

5 RESEARCH RESULTS

In this chapter, the survey responses will be interpreted to address the thesis aim and identify the key findings. The former questions include the demographic segment of the survey respondents which have been collected from the employees of company x. The later part of the questions primarily has been asked to analyse the current scenario, opportunities, and challenges of the plastic recycling industry of Bangladesh from the practitioners' point of view.

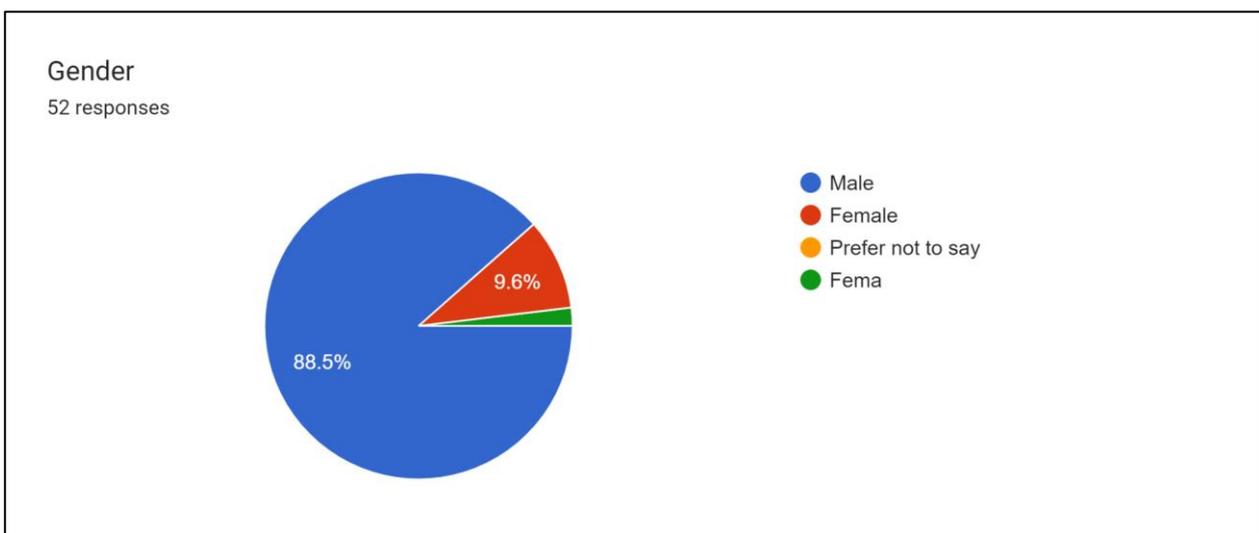


FIGURE 7. Pie chart representing gender demography

As seen in figure 7 a majority of the employees accounting 88.5% of the respondents are male, and only 9.6% of them are female. The variation among the responses in terms of their gender portfolio, indicates that, the conclusion of the thesis might represent a uniform perspective of one particular segment to highlight the opportunities, and challenges of the plastic industry. This also indicates that the identified findings can be addressed based on the dominant segment of the demography which is currently working in the industry acquiring more knowledge, expertise, and experience about the market trends, and patterns.

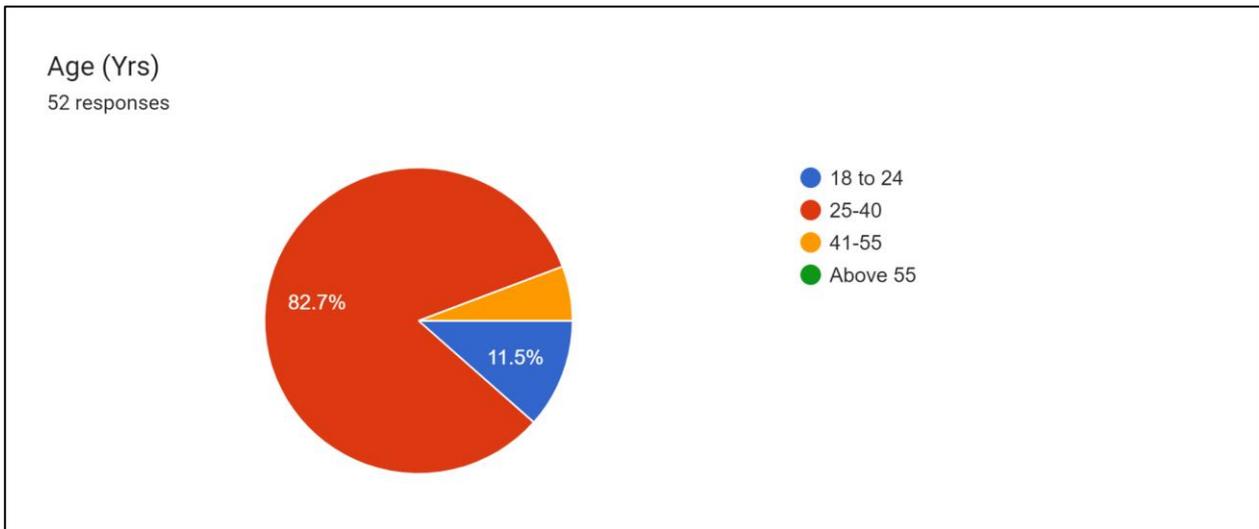


FIGURE 8. Pie chart representing age in years demography

As figure 8 shows that a majority of the survey respondents belong to the age group of 25-40 years accounting for 82.7%, and only a few of them belong to the age group of 18 to 24, and 41 to 55 years comprising the other 11.5%. This indicates that the employees of company x are mostly young adults who tend to have a fundamental knowledge about the sustainability, feasibility, and recycling processes for an industry like plastic manufacturing, and reselling. Since Bangladesh has a potential plastic blooming industry, the responses of these diversified demographic have the potential to identify the credible, and reliable findings to address the thesis objectives.

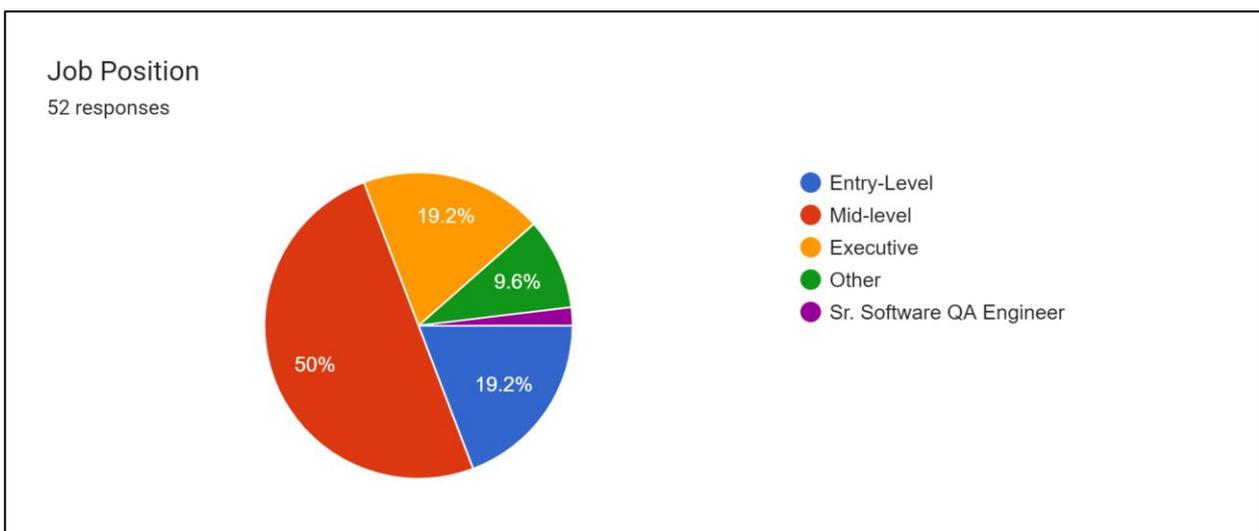


FIGURE 9. Pie chart representing respondent's job position

As seen in figure 9, a significant portion of the employees of company x accounting for 50% responded to survey are managers, supervisors, or the mid-level management personnel. And around 40% of them belong to the entry level management, and the top-level management of the hierarchy. And a few of them are senior software QA engineers. This indicates that a majority of the employees who shared their opinions belong to the mid-level of the hierarchy chain referring that, they have the knowledge about the industry from the both the upper, and bottom level experiences, since they work as the intermediaries among the two levels. So, it can be assumed that this variety range of responses will provide strong support to address the thesis aim.

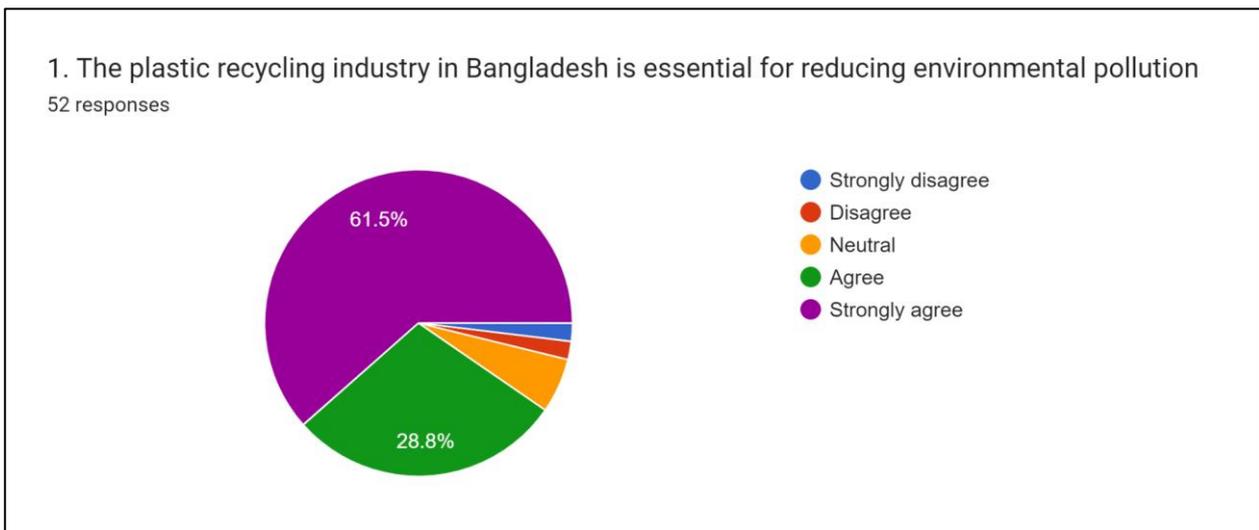


FIGURE 10. Pie chart showing survey responses about current plastic recycling industry

Figure 10 primarily starts to explore the perceptions of the experts of the chosen company. The statistics indicate that 61.5% and 28.8% of the employees agreed that the current plastic recycling industry of Bangladesh possesses an opportunity to reduce environment pollution since one of the major concerns arise for protecting environment comes from the existing practices current Bangladeshi plastic manufactures, and resellers are currently using. It suggests that individuals are becoming more aware of how bad plastic is for the environment. Environmental advocacy efforts, a lot of media coverage, and educational efforts that stress the effects of plastic pollution are just a few of the elements that may be responsible for people becoming more aware of the impact of plastic recycling in improving environment.

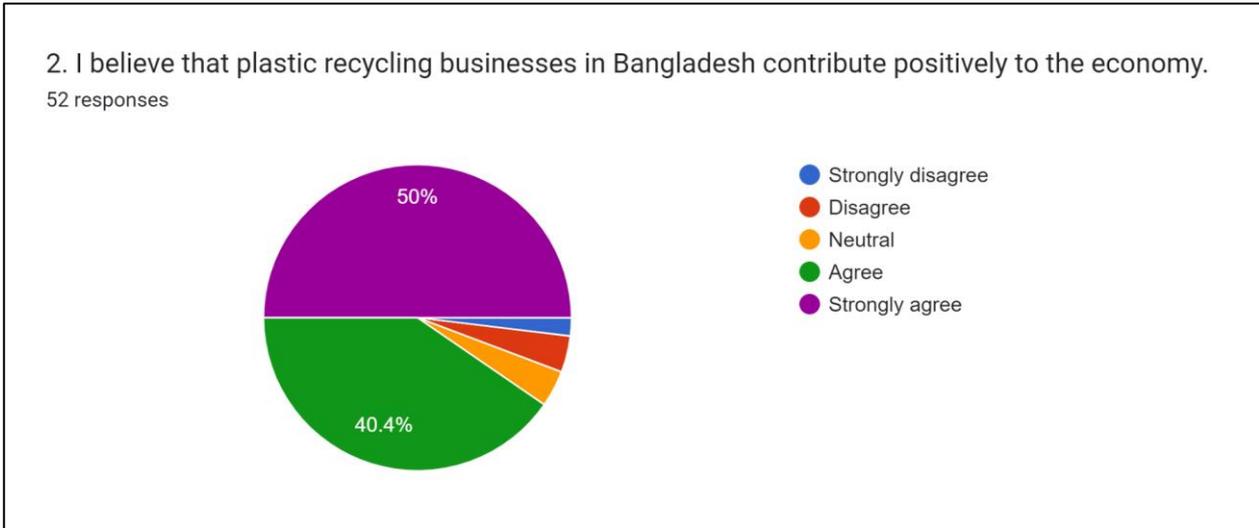


FIGURE 11. Pie chart showing survey responses about the economic contribution of the plastic recycling industry

Figure 11 indicates that the majority of the survey respondents (combining 40.4% and 50% of them) agreed that the recycling businesses in Bangladesh do contribute positively to the economy. Since Bangladesh is a developing country, there the employees of company x believe that the income they are generating in their respective working field tends to contribute favourably to the economic condition of Bangladesh improving its financial wealth. It is possible that these positive benefits come from these businesses generating jobs, making the best use of resources, and supporting the use of recycled materials. The respondents are likely to be aware that reducing waste is good for the economy, helps local markets grow, and gets support from the government for recycling businesses.

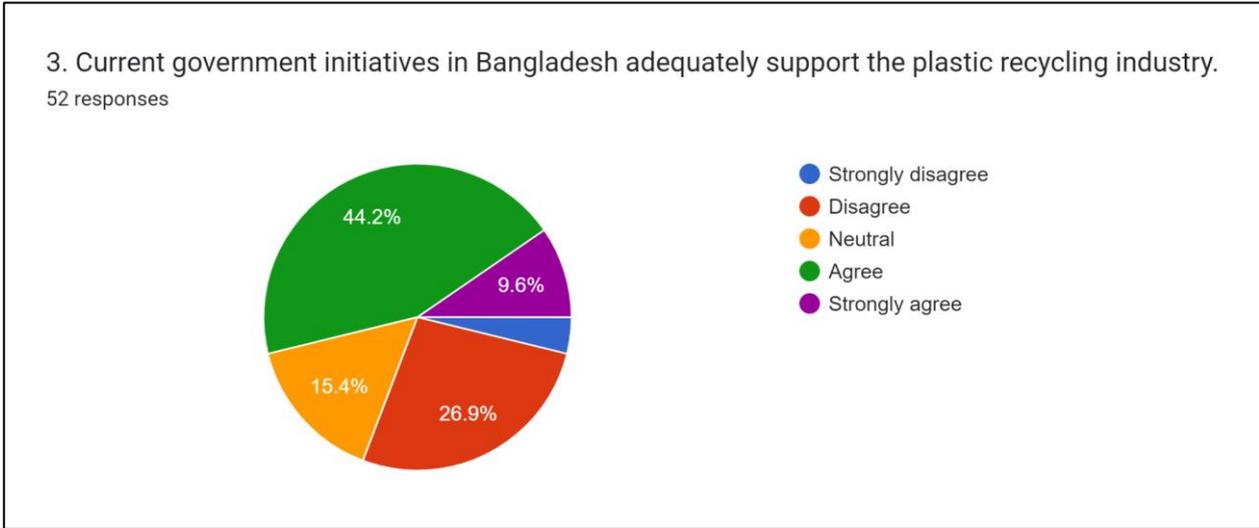


FIGURE 12. Pie chart showing survey responses about government initiatives for the plastic recycling industry

As figure 12 highlights mixed responses in terms expressing their opinions on the current government initiatives in Bangladesh that has been formulated to support the emerging plastic recycling industry. The pie chart shows that the majority of around 44.5% and 9.6% respondents agreed to have a proper framework, and government aid to tap into this new industry for the businesses. On the other hand, a considerable number of respondents with 26.9% expressed unfavourable responses to not have such assistance taken by the government. Additionally, 15.4% respondents tend to be neutral in terms of expressing their perception on using such measurements taken by Bangladeshi government for the recycling industry. People have a range of opinions about how effective, necessary, and trustworthy government help is. Positive views mean that people expect good rules and financial help, while negative perceptions may come from being dubious in the past or seeing how inefficient the government is.

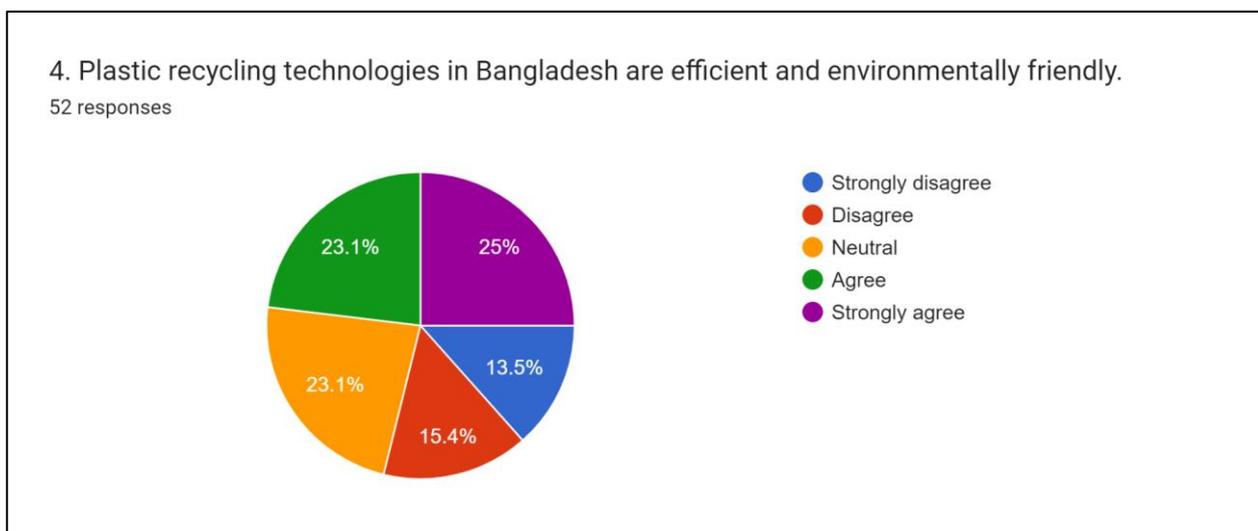


FIGURE 13. Pie chart showing survey responses about the current technologies of the plastic recycling industry

Figure 13 indicates that the majority of the respondents (23.1% and 25% collectively) expressed favourable responses to the questions which suggest that plastic recycling technologies that have been currently used by Bangladesh are efficient, and environment friendly. On the other hand, more than 40% of the respondents expressed their inconvenience in using efficient and environment friendly technologies in the plastic recycling industry for their company. There are several possible reasons for these different points of view. It could mean that people are unaware of or uncomfortable with these technologies, that they might cause problems in the workplace, that they are worried about the initial costs of investing, or that they are having trouble putting them into practice and integrating them into

current business models. The difference may also show that respondents in the industry have had different situations or different amounts of exposure to these technologies.

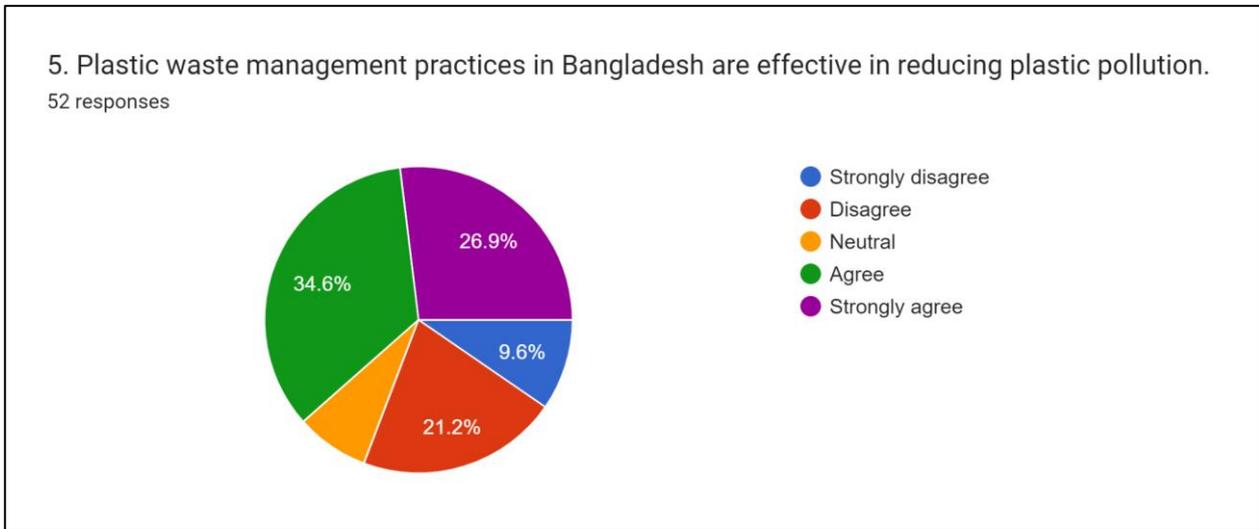


FIGURE 14. Pie chart showing survey responses about the current waste management practices

As seen in figure 14 more than 60% (34.6% and 26.9%) of the respondents believe that plastic waste management practices in Bangladesh are effective in reducing plastic pollution. Although 21.2% and 9.6% of the survey respondents collectively disagreed with the statement, indicating that there are still some scopes in the existing waste management practices for Bangladesh to improve. The majority's positive view could come from noticing changes for the better or from specific efforts that have shown promise in lowering plastic pollution. On the other hand, people who disagree might say so because they see problems or shortcomings in the present waste management infrastructure. The different responses could mean that, even though there are some good aspects about the current waste disposal methods, there are still distinct factors that could be done to make them better and help solve the problem of plastic pollution more effectively.

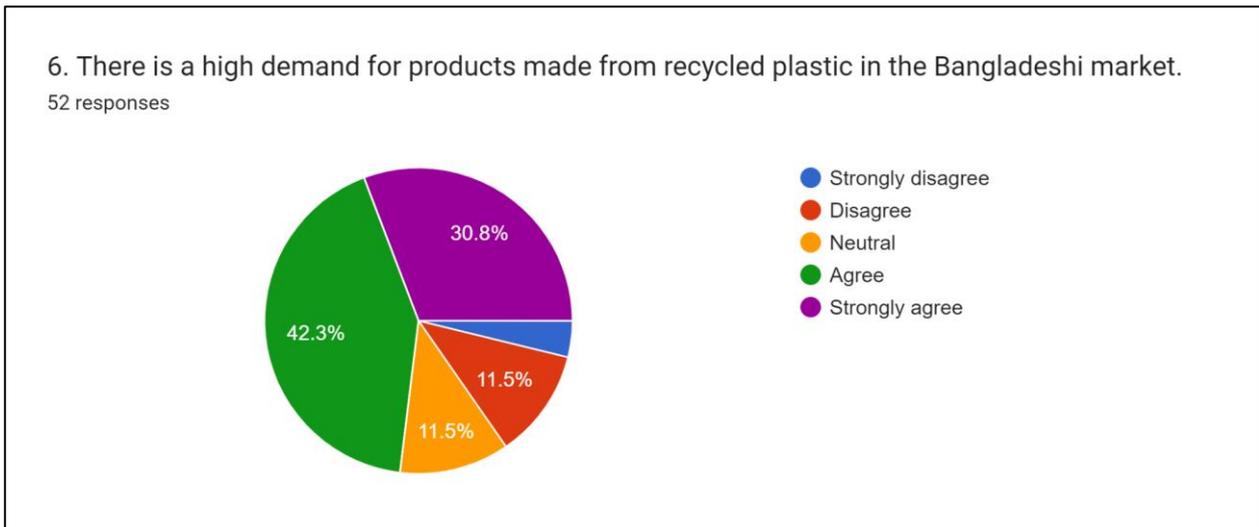


FIGURE 15. Pie chart showing survey responses about the demand of the plastic recycling industry

As seen in figure 15, that majority of the survey respondents with (42.3% and 30.8%) of them agreed that there is a high demand for products made from recycled plastic in the Bangladeshi market. One factor worth considering could be the changing perceptions influencing the consumer buying pattern, and the globalization socio-economic impact on recycled plastic good buyers. On the other hand, around 20% of the survey respondents expressed dissatisfaction with the statement indicating that although the plastic recycling industry is evolving but the end-products might not meet with the expected demand of the businesses. Initially, people may be choosing more recycled plastic goods because they think these products are better for the environment. The social and economic effects of globalization may also be changing the way people buy things, making them more likely to be sustainable and reusable. Additionally, individuals might also think that even though the plastic recycling industry is changing, it might not be able to meet the needs of businesses. These different points of view could be because the market lacks a lot of different or high-quality recovered plastic products, which might not meet the needs of businesses and customers.

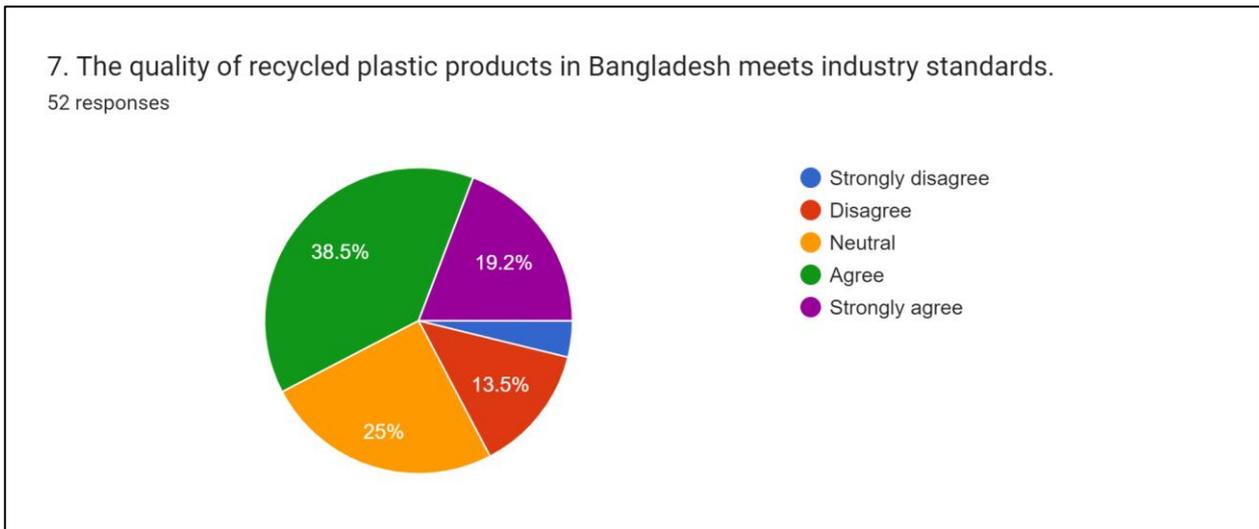


FIGURE 16. Pie chart showing survey responses about quality products of the current plastic recycling industry

As seen in figure 16 a significant portion of the survey respondents (accounting for 38.5% and 19.2%) agreed that the quality of recycled plastic products in Bangladesh meets industry standards. Although a considerable amount of the respondents (comprising 13.5%) disagreed, and 25% of them expressed their opinion as neutral. This indicates that the businesses, and manufacturers of the recycled goods are not able to meet with the benchmark of the standard quality to enhance the industry to a global level. This shows that a lot of the people who responded think that companies that make recycled goods are not able to meet the standards that are needed to make the industry a global standard right now. This difference in opinion could be caused by a number of factors, such as different manufacturers having different quality standards, different manufacturers using different quality raw materials in the recycling process, or problems with the production methods used, all of which affect the quality of the recycled plastic products on the market in the end.

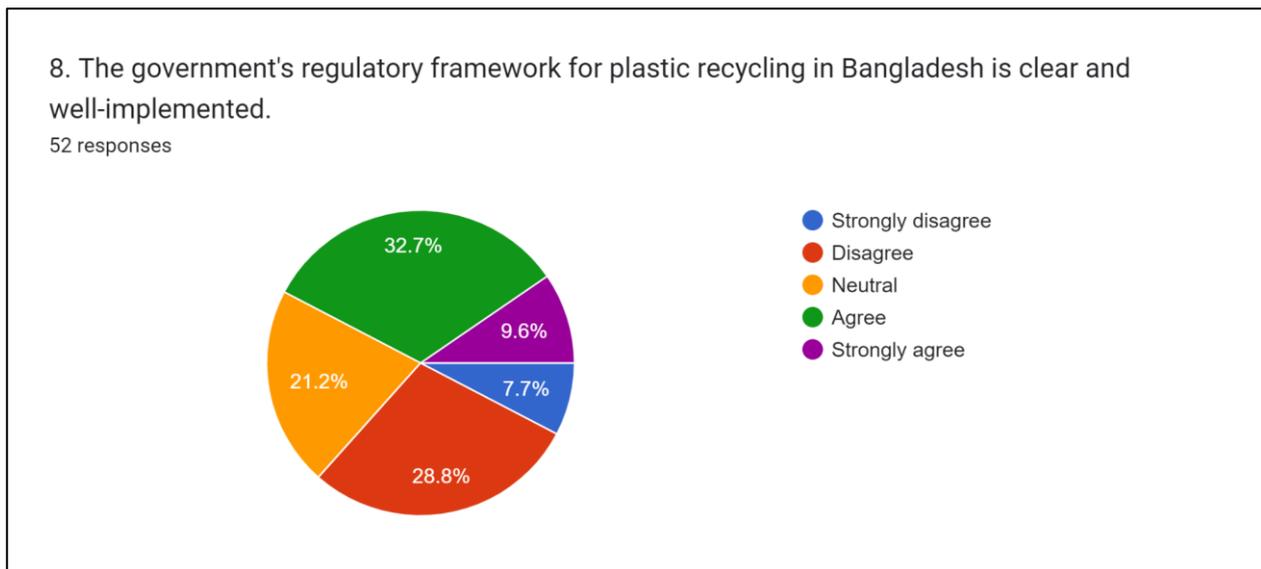


FIGURE 17. Pie chart showing survey responses about the regulatory framework

As seen in figure 17, more than 40% of the survey respondents favourable accepted that the government's current regulatory framework for plastic recycling in Bangladesh is clear, and well implemented for the company. On the other hand, 28.8% and 9.6% disagreed about the efficient implementation of the framework. This indicates that there might be some potential domains that are deprived of such facilitation offered by the government in the plastic recycling industry of Bangladesh. The variation suggests that there may be gaps or focuses in the industry where the government's help might not be best used. There could be differences in how regulations are enforced across areas, problems with how information about changes to regulations is shared, or problems with following the rules because they are hard to understand or have a lot of different parts. These issues could be causing respondents to have different ideas about how well the government's rules are working in the Bangladeshi plastic recycling business.

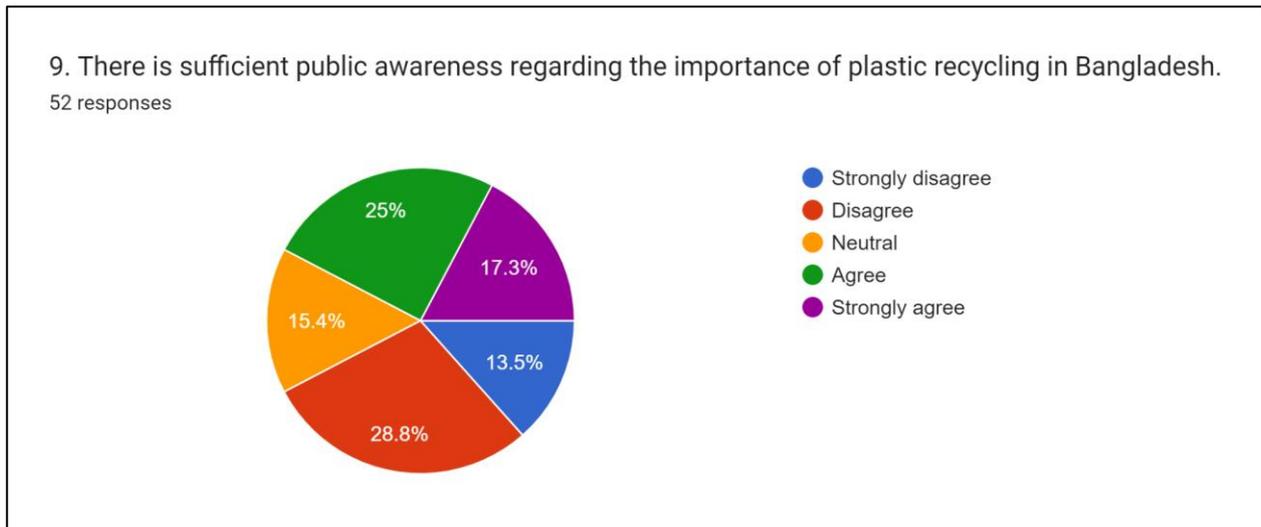


FIGURE 18. Pie chart showing survey responses about public awareness of plastic recycling industry

The pie chart shown in figure 18 indicates that around 30% (combining 25% and 17.5%) of the survey respondents agreed that there is sufficient public awareness regarding the plastic recycling industry in Bangladesh indicating that such awareness has a big impact on changing the practices adapted by the plastic recycled businesses. Contrarily, the majority of the survey respondents (comprising 28.8% and 13.5% employees) disagreed suggesting that one of the most considerate challenges or the drawbacks of the industry results in such ineffective practices, and non-productive legislative frameworks. It might also suggest that there is a major problem or challenge in the business, such as bad practices or laws that make it harder to raise public awareness. This difference might be because of insufficient public education programs, insufficient outreach efforts by recycling businesses, or ineffective communication strategies meant to make more people in Bangladesh aware of how to recycle plastic and how important it is to do so.

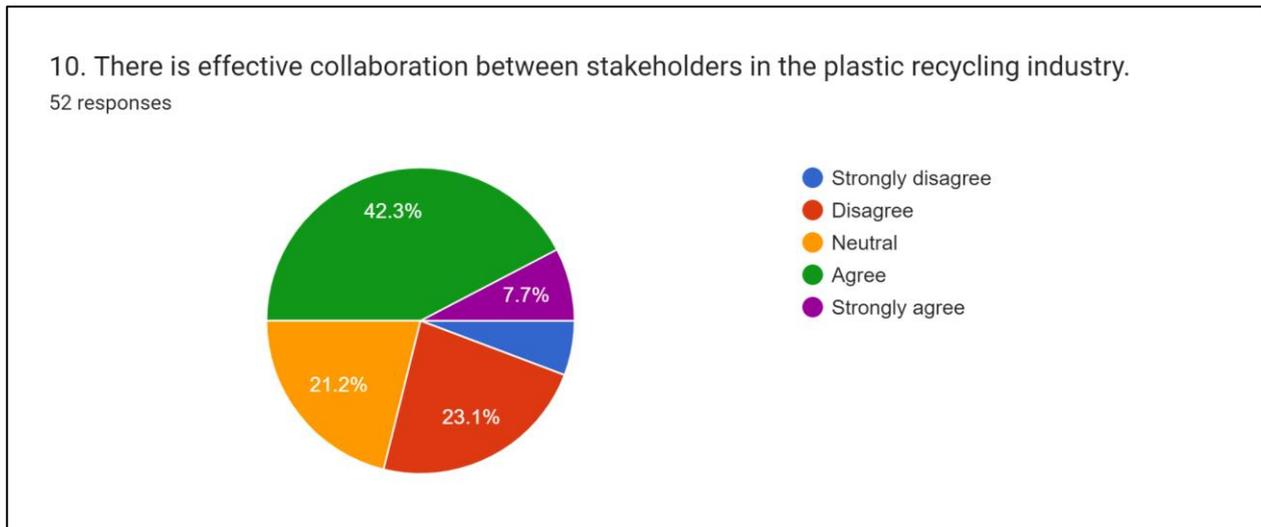


FIGURE 19. Pie chart showing survey responses about the stakeholder collaborations

Figure 19 indicates that more than 40% (accounting for 42.3% and 7.7%) agreed that there is existence of effective collaboration between stakeholders in the plastic recycling industry indicating that one of the major factors of being a blooming industry in Bangladesh is because such presence of collaborative approaches taken by the direct and indirect stakeholders including suppliers to the end-user of plastic recycled products. On the other hand, 23.1% of them disagreed with having such collaboration among the stakeholders indicating a major barrier for the plastic recycling industry of Bangladesh. Some of the reasons for this difference could be disrupted communication lines, stakeholders not working together, different parts of the industry having competing interests, or not having any incentive to work together. These factors might make it harder for people in the business to work together and make progress toward more sustainable and effective ways to recycle plastic.

6 RESEARCH ANALYSIS

In this section, the key findings from the results will be highlighted in the former part, and a discussion to address the thesis objective will be conducted by comparing, and contrasting the business opportunities, and challenges in the plastic recycling industry of Bangladesh.

6.1 Key findings

The survey responses inform us well about the plastic recycling industry in Bangladesh. Firstly, 88.5 percent of those who participated are men, which shows a bias in views and representation. Most of the people who answered the survey (82.7%) are between the ages of 25 and 40, which suggests that they value the environment more. Half of the jobs in the companies that were surveyed were mid-level management roles. This gives a view from both the top and bottom of the organization. This wide range of responder profiles shows a full picture of the business.

The survey revealed that between 61.5% and 28.8% of employees are aware of the environmental benefits of the plastic recycling industry. Promoting environmental issues, getting the news out about them, and teaching people about them may raise understanding. More than 90% of people in Bangladesh think that recycling businesses are good for the economy because they create jobs and make money. The local economy and market are both boosted when waste is reduced. Some respondents (54%) agree that the plastic recycling industry needs effective frameworks and government help. Others (27%) are hesitant or neutral, citing ineffective government in the past or doubts about its ability to do its job.

Over 40% of those who answered are hesitant or uncomfortable using recycling methods that are good for the environment. This could be due to a lack of knowledge, worries about the workplace, worries about the initial investment, or problems with merging. About 61.5% of people in Bangladesh think that the way they handle plastic waste is good at reducing plastic pollution, while 31% are not sure or think they could be better. Over 70% of those who responded think that Bangladeshi consumers are becoming more interested in recycled plastic goods because of globalization and a desire to be environmentally friendly. Approximately twenty percent are dissatisfied which could be because there are not enough products or the quality is bad.

About 57.7% of those who answered think that products made from recycled plastic meet industry standards, while 38.5% disagree or are not sure. The difference could be due to different quality standards or production methods used by the manufacturers. About 51% of people or respondents think that the current regulatory system is clear and well-implemented. However, 38.5% have doubts or objections, pointing out that there may be gaps or differences in how regulations are enforced in different areas. About 42.5% of those who participated think that people in Bangladesh know enough about plastic recycling, while 42.3% disagree. This suggests that there are not sufficiently effective programs to teach or reach out to the public. Over half of the people who have an interest in the business think that collaboration is working well. However, 23.1% disagree, which could mean that there are problems with communication, competing interests, or not enough reasons to work together. These results show that Bangladesh's plastic recycling business is complicated, with positive as well as negative perceptions and challenges that need to be fixed for long-term growth.

6.2 Discussion

The findings of the thesis support the argument that Bangladesh's plastic recycling industry is ready to grow because more people around the world prefer goods that have positive implications for the environment. The establishment of innovative companies that turn recycled plastics into long-lasting building materials and packaging is an example of a proactive response to the growing need for eco-friendly options. This statement corresponds with the thesis goal because it addresses the possible business opportunities that come with meeting the market's demand for recycled products. This is similar to the opportunities that businesses in garbage management, collection, and recycling have.

The adoption of the reusable economy model as a growth strategy aligns with the primary goal of promoting sustainable practices. Companies that implement systems to reuse or recycle items effectively mitigate waste generation and achieve cost savings, while fostering the principles of sustainability. The discussion provides evidence to support the key challenge identified in the thesis, which refers to the inefficiency of waste collection and segmentation. Inadequate infrastructure and suboptimal waste management practices contribute to environmental pollution and impede the acquisition of recyclable materials of superior grade. The aforementioned statement highlights the necessity for enhanced waste management protocols and supports the major argument of the thesis, which centers on industry-re-

lated concerns. The thesis acknowledges that technological limitations and outdated recycling processes provide significant obstacles to the progress of the industrial sector. The implementation of modern recycling technology is necessary in order to mitigate processing inefficiencies and enhance the marketability of recycled materials.

The discussion provides support for the thesis's claim regarding the shifting character of regulations and enforcement. Due to the fact that policies are seldom implemented effectively and remain unclear, it is difficult for businesses to strategize and allocate capital. This regulatory issue encourages the problem-solving approach of the thesis by emphasizing the necessity for a comprehensive and consistent methodology. The issue raised in the discussion regarding individuals' knowledge and the way in which they alter their conduct is consistent with the thesis's aim for comprehensive recycling education. Convincing consumers to purchase recycled products is difficult due to the market's concerns with price and convenience. This demonstrates the importance of targeted awareness campaigns.

In conclusion, business possibilities and problems in Bangladesh's plastic recycling industry give an exhaustive overview that supports the thesis aim. The fact that the thesis aims are in line with the industry's opportunities and challenges shows how important it is to deal with both of them for the long-term growth of Bangladesh's plastic recycling industry. The findings from the thesis convey an in-depth overview of the plastic recycling business in Bangladesh, which aligns with the thesis's main goal to gain insight into current practices and find business opportunities and potential. The study sheds light on the industry's potential growth areas and barriers by comparing and contrasting these opportunities and challenges. It emphasizes the need for strategic interventions, technological advances, regulatory frameworks, and widespread public education to help the plastic recycling industry in Bangladesh expand and remain effective.

7 CONCLUSION

Bangladesh's plastic recycling industry is intricate, with a lot of opportunities and problems. The comprehensive research looked at the methods, current state, business opportunities, and issues in the industry. The figures show that Bangladesh's plastic recovery business has room to grow. As the world moves toward sustainability, more people want eco-friendly goods. This means that businesses can make money in this area. Recycling technology, efforts to protect the environment, government rewards, and models of a circular economy all present interesting chances. Startups that use recovered plastic to make building and packaging materials show that people are willing to buy environmentally friendly options. Even with these opportunities, the industry faces major challenges that make it hard to grow and stay in business. Problems include collecting waste and sorting systems that don't work well, limited technology, and rules that are not always followed. Lack of fully expanded frameworks for producer accountability and public knowledge makes these problems worse. These issues need to be dealt with in order to make the most of industrial promise and change.

This thesis focuses on using all-around methods to help Bangladesh's plastic recycling business grow. It is very important to put technology, regulatory reform, education, and habit change at the top of the list. To get past problems, everyone involved needs to work together, government programs need to be proactive, and infrastructure needs to become better. The plastic recycling business in Bangladesh is about to grow and change in significant ways. To reach this potential, it is necessary to work together, come up with innovative concepts, and be committed to sustainability. Stakeholders can build a strong, long-lasting, and profitable plastic recycling business in Bangladesh by seizing chances and getting past problems to enhance the plastic recycling industry of Bangladesh.

REFERENCES

- Abbing, M. R. 2021. *Plastic Soup: An Atlas of Ocean Pollution*. London: Oxford Printing Press. Available at: DOI: 10.22621/cfn.v133i3.2465. Accessed 10 November 2023.
- Ahmed, M.A. & Moniruzzaman, S.M. 2018. A Study on Plastic Waste Recycling Process In Khulna City. *Department of Civil Engg., KUET: Khulna, Bangladesh*. Available at: https://iccesd.com/proc_2018/Papers/r_p4227.pdf. Accessed November 2023.
- Brouwer, H. D. 2018. *Journal of Earth and Environmental Sciences. Business models and sustainable plastic management: A systematic review of the literature*. 890-898. Available at: <https://www.sciencedirect.com/science/article/pii/S0959652620310143>. Accessed 10 November 2023.
- Chen, D.M.C., Bodirsky, B.L., Krueger, T., Mishra, A. & Popp, A., 2020. The world's growing municipal solid waste: trends and impacts. *Environmental Research Letters*, 15(7). 074021. Available at: <https://iopscience.iop.org/article/10.1088/1748-9326/ab8659>. Accessed 10 November 2023.
- Chen, H.L., Nath, T.K., & Chong, S. 2021. The plastic waste problem in Malaysia: management, recycling and disposal of local and global plastic waste. *SN Appl. Sci.* 3. 437. Available at: <https://doi.org/10.1007/s42452-021-04234-y>. Accessed 10 November 2023.
- Dvorak, J. H. 2022. *Journal of Plastic Waste Control. Plastics recycling: challenges and opportunities*. 2115-2126. Available at: <https://royalsocietypublishing.org/doi/10.1098/rstb.2008.0311>. Accessed 11 November 2023.
- Debnath, B., Bari, A.M., Ali, S.M., Ahmed, T., Ali, I. & Kabir, G., 2023. Modelling the barriers to sustainable waste management in the plastic-manufacturing industry: an emerging economy perspective. *Sustainability Analytics and Modeling*, 3. 100017. Available at: <https://www.sciencedirect.com/science/article/pii/S2667259623000036>. Accessed 11 November 2023.
- EUBIO_Admin. n.d. *Recycling*. European Bioplastics e.V. Available at: <https://www.european-bioplastics.org/bioplastics/waste-management/recycling/>. Accessed 11 November 2023.
- Evode, N., Qamar, S.A., Bilal, M., Barceló, D. & Iqbal, H.M., 2021. Plastic waste and its management strategies for environmental sustainability. *Case Studies in Chemical and Environmental Engineering*, 4. 100142. Available at: <https://www.sciencedirect.com/science/article/pii/S2666016421000645>. Accessed 14 November 2023.
- Hopewell, J., Dvorak, R. & Kosior, E. 2009. Plastics recycling: Challenges and Opportunities. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1526). 2115–2126. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2873020/>. Accessed 14 November 2023.
- Hossain, S., Rahman, M.A., Chowdhury, M.A. & Mohonta, S.K., 2021. Plastic pollution in Bangladesh: A review on current status emphasizing the impacts on environment and public health. *Environmental Engineering Research*, 26(6). Available at: <https://www.eeer.org/upload/eeer-2020-535.pdf>. Accessed 14 November 2023.

- Hossain, S., Rahman, M.A., Ahmed Chowdhury, M. & Kumar Mohonta, S. 2020. Plastic pollution in Bangladesh: A review on current status emphasizing the impacts on environment and public health. *Environmental Engineering Research*, 26(6). Available at: <https://www.eeer.org/journal/view.php?number=1245>. Accessed 14 November 2023.
- Hossain, M. & Shams, A., 2020. Export potential of recycled plastic: a study on Bangladesh. *Asian Social Science*, 16(3). 1-17. Available at: https://www.researchgate.net/profile/Mehnaz-Hossain-2/publication/339566483_Export_Potential_of_Recycled_Plastic_A_Study_on_Bangladesh/links/5ffea86f92851c13fe0a19cd/Export-Potential-of-Recycled-Plastic-A-Study-on-Bangladesh.pdf. Accessed 14 November 2023.
- Hossain, I., Kabir, K.B., Islam, M.S. & Kirtania, K., 2022. Recycled Plastic Based Industries of Bangladesh: Current Scenario and Future Prospects. Available at: http://ijsmed.smef.gov.bd/upload/issues/issues_05/articles/2_recycled_plastic_based_industries_of_bangladesh_current_scenario_and_future_prospects.pdf. Accessed 14 November 2023.
- Islam, M.S., 2011. Prospects and challenges of plastic industries in Bangladesh. *Journal of Chemical engineering*, 26(1). 16-21. Available at: http://ijsmed.smef.gov.bd/upload/issues/issues_01/articles/4_Prospects_and_Challenges_of_Plastic_Industries_in_Bangladesh.pdf. Accessed 14 November 2023.
- Marel, E. R. 2018. Journal of Environmental Law. *Trading Plastic Waste in a Global Economy: Soundly Regulated by the Basel Convention?* 477-497. Available at: <https://academic.oup.com/jel/article/34/3/477/6713994>. Accessed 18 November 2023.
- Matter, A., Ahsan, M., Marbach, M. and Zurbrügg, C., 2015. Impacts of policy and market incentives for solid waste recycling in Dhaka, Bangladesh. *Waste Management*, 39. 321-328. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S0956053X15000719>. Accessed 14 November 2023.
- Milios, L., Esmailzadeh Davani, A. & Yu, Y., 2018. Sustainability impact assessment of increased plastic recycling and future pathways of plastic waste management in Sweden. *Recycling*, 3(3). 33. Available at: <https://www.mdpi.com/2313-4321/3/3/33>. Accessed 14 November 2023.
- Moniruzzaman, S.M., Bari, Q.H. & Fukuhara, T., 2011. Recycling practices of solid waste in Khulna city, Bangladesh. *The Journal of Solid Waste Technology and Management*, 37(1). 1-15. Available at: https://www.researchgate.net/profile/S-M-Moniruzzaman/publication/360215558_RECYCLING_PRACTICES_OF_SOLID_WASTE_IN_KHULNA_CITY_BANGLADESH_1_RECYCLING_PRACTICES_OF_SOLID_WASTE_IN_KHULNA_CITY_BANGLADESH/links/6268b69dbca601538b6bf58a/RECYCLING-PRACTICES-OF-SOLID-WASTE-IN-KHULNA-CITY-BANGLADESH-1-RECYCLING-PRACTICES-OF-SOLID-WASTE-IN-KHULNA-CITY-BANGLADESH.pdf. Accessed 18 November 2023.
- Mourshed, M., Masud, M.H., Rashid, F. & Joardder, M.U.H., 2017. Towards the effective plastic waste management in Bangladesh: a review. *Environmental Science and Pollution Research*, 24. 27021-27046. Available at: <https://link.springer.com/article/10.1007/s11356-017-0429-9>. Accessed 14 November 2023.

- Noyon, A. U., & Ahmed, F. 2021. *Bangladesh plastics aim at global market pie*. The Business Standard. Available at: <https://www.tbsnews.net/economy/bangladesh-plastics-aim-global-market-pie-301183>. Accessed 18 November 2023.
- Kalali, E.N., Lotfian, S., Shabestari, M.E., Khayat-zadeh, S., Zhao, C. & Nezhad, H.Y., 2023. A critical review of the current progress of plastic waste recycling technology in structural materials. *Current Opinion in Green and Sustainable Chemistry*. Available at: <https://www.sciencedirect.com/science/article/pii/S2452223623000123>. Accessed 11 November 2023.
- Kibria, M.G., Masuk, N.I., & Safayet, R. 2023. Plastic Waste: Challenges and Opportunities to Mitigate Pollution and Effective Management. *Int J Environ Res* 17, 20. Available at: <https://link.springer.com/article/10.1007/s41742-023-00507-z>. Accessed 13 November 2023.
- Shent, H., Pugh, R.J. & Forssberg, E., 1999. A review of plastics waste recycling and the flotation of plastics. *Resources, Conservation and Recycling*, 25(2). 85-109. Available at: https://www.academia.edu/download/45326265/A_review_of_plastics_waste_recycling.pdf. Accessed 9 November 2023.
- Sultana, N. 2018. Plastic recycling in Bangladesh. *Journal of Pollution Effects & Control*, 06. Available at: <https://www.longdom.org/conference-abstracts-files/2375-4397-C2-014-003.pdf>. Accessed 13 November 2023.
- Saifullah, M., Ahammad, S.M. & Satter, F., 2008. Waste Recycling in Bangladesh- an overview. Available at: https://jst.hstu.ac.bd/assets_vcc/files/vol_6/21_JST_06_21.pdf. Accessed 18 November 2023.
- The Business Standard. 2021. *Bangladesh aims at reducing 30% plastic waste by 2030*. Available at: <https://www.tbsnews.net/bangladesh/bangladesh-plans-reduce-30-plastic-waste-2030-346282>. Accessed 18 November 2023.
- Van der Vegt, M., Velzing, E.-J., Rietbergen, M. & Hunt, R. 2022. Understanding Business Requirements for Increasing the Uptake of Recycled Plastic: A Value Chain Perspective. *Recycling*, 7(4). 42. Available at: [doi:https://doi.org/10.3390/recycling7040042](https://doi.org/10.3390/recycling7040042). Accessed 11 November 2023.
- Watson, R., 2015. Quantitative research. *Nursing standard*, 29(31). Available at: <https://hull-repository.worktribe.com/preview/374667/Nursing%20Standfard%20Quantitative%20research.pdf>. Accessed 18 November 2023.
- Yousuf, M. 2023. *Plastic most lethal among all waste*. The Daily Star. Available at: <https://www.thedailystar.net/environment/news/plastic-most-lethal-among-all-waste-3337746>. Accessed 9 November 2023.

APPENDIX 1

APPENDIX 1/1

Survey Questions

Gender

- Male
- Female
- Prefer not to say

Age (Yrs)

- 18-24
- 25-40
- 41-55
- Above 55

Job Position

- Entry level
- Mid-level
- Executive
- Other
- Sr. Software QA Engineer

To conduct the research study, a survey structured with close-ended questions follows:

On a scale from 1 to 5, where 1 represents "Strongly Disagree" and 5 represents "Strongly Agree," please indicate your level of agreement with the following statements:

1. The plastic recycling industry in Bangladesh is essential for reducing environmental pollution.

1 (Strongly Disagree) | 2 (Disagree) | 3 (Neutral) | 4 (Agree) | 5 (Strongly Agree)

2. I believe that plastic recycling businesses in Bangladesh contribute positively to the economy.

1 (Strongly Disagree) | 2 (Disagree) | 3 (Neutral) | 4 (Agree) | 5 (Strongly Agree)

3. Current government initiatives in Bangladesh adequately support the plastic recycling industry.

1 (Strongly Disagree) | 2 (Disagree) | 3 (Neutral) | 4 (Agree) | 5 (Strongly Agree)

4. Plastic recycling technologies in Bangladesh are efficient and environmentally friendly.

1 (Strongly Disagree) | 2 (Disagree) | 3 (Neutral) | 4 (Agree) | 5 (Strongly Agree)

5. Plastic waste management practices in Bangladesh are effective in reducing plastic pollution.

1 (Strongly Disagree) | 2 (Disagree) | 3 (Neutral) | 4 (Agree) | 5 (Strongly Agree)

6. There is a high demand for products made from recycled plastic in the Bangladeshi market.

1 (Strongly Disagree) | 2 (Disagree) | 3 (Neutral) | 4 (Agree) | 5 (Strongly Agree)

7. The quality of recycled plastic products in Bangladesh meets industry standards.

1 (Strongly Disagree) | 2 (Disagree) | 3 (Neutral) | 4 (Agree) | 5 (Strongly Agree)

8. The government's regulatory framework for plastic recycling in Bangladesh is clear and well-implemented.

1 (Strongly Disagree) | 2 (Disagree) | 3 (Neutral) | 4 (Agree) | 5 (Strongly Agree)

9. There is sufficient public awareness regarding the importance of plastic recycling in Bangladesh.

1 (Strongly Disagree) | 2 (Disagree) | 3 (Neutral) | 4 (Agree) | 5 (Strongly Agree)

10. There is effective collaboration between stakeholders in the plastic recycling industry.

1 (Strongly Disagree) | 2 (Disagree) | 3 (Neutral) | 4 (Agree) | 5 (Strongly Agree)