Evaluating the Role of Industry in Economic Development in Advancing SDG 9: A Study on Cumilla Export Processing Zones (EPZs), Bangladesh

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ABSTRACT

A vital precondition for every nation's progress is achieving the Sustainable development Goals (SDG). This research examined the role that Bangladesh's EPZ plays in the economy of the nation in terms of investment, employment, and exports. It also assesses how industries in these zones contribute to sustainable industrialization, innovation, and infrastructure development, and explores the challenges and opportunities associated with their growth. Using a survey-based approach, the study gathers insights from industry stakeholders, including business owners, workers, and policy experts, to understand their perspectives on key factors such as investment, poverty alleviation, reliance on foreign and local investments, public-private partnerships, women empowerment, product quality, and the creation of new industries. It asserts that developing nations may capitalize on the opportunity afforded by EPZs to acquire advanced technology, upgrade labor and management skills, and gain access to global markets. The study then investigates to determine the present scenario of industrial growth in Bangladesh. It also investigates how the challenges of industrialization in Bangladesh are eliminated. This study also attempted to analyze the role of EPZ in the national economy, product branding, export incentives, infrastructures, investments, and possibilities, of EPZs in Bangladesh.

Keyword: Industry, EPZ, National Economy, SDG, Prospect and Restriction, Investment, Bangladesh

INTRODUCTION

Industrialization is an ongoing economic process that provides money and jobs, stimulates commerce, and encourages resource efficiency. Despite the world's climate change issues, industrial expansion continues to be a primary source of poverty reduction and shared prosperity. It helps to achieve environmental goals, such as increased resource and energy efficiency, via innovation and technical advancement. The use of innovative technology and intelligent manufacturing processes is crucial for industrial development in developed nations (Kynčlová, 2020**).** The Agenda for 2030 for Sustainable Development was endorsed in 2015 by leaders representing 193 nations. This ambitious agenda integrates the economic, social, and environmental aspects of sustainable development through 169 goals and 17 Sustainable Development Goals (SDGs). The objectives include eradicating poverty and hunger, safeguarding the environment, and fostering peace with an emphasis on international cooperation. Building resilient infrastructure, advancing equitable and sustainable industrialization, and encouraging innovation are the specific goals of SDG 9. In that regard, new technology can help create jobs as more ecological and energy-efficient procedures are developed (Vardanega, 2022). Because of their importance to society, firms face more pressure to address global issues. Creating sustainable innovation is one method that businesses are finding more and more useful in addressing these issues (Klewitz, 2014). In terms of goal and direction, sustainable innovation is different from conventional innovation since it encompasses a wider variety of concerns and requires integrated thinking (Adams et al., 2012).

Sustainable innovation takes a wider approach by including social and environmental factors into innovative processes, whereas traditional innovation only focuses the financial aspect (Hansen, 2009). Thus, the process of

integrating social, ecological, and financial sustainability concerns into an organization's structure as it relates to goods, services, technology, and business models is known as sustainable innovation (Charter, 2007). In recent years, this has been a significant increase in study on sustainable innovation, enhancing our understanding of how new technology and social behaviors help societies to grow more sustainable via innovation (Boons, 2013).

To survive in continually evolving industries and environments, firms are obliged to innovate and adapt how they think about goods, processes, and business models, which can enable them to establish competitive advantages and create sustainable development (Waite, 2013). As a result, industries are adopting sustainable innovation at more quickly. Designing sustainable goods and services at the product level, improving the sustainability of value chains at the process level, or adopting innovative management styles, organizational structures, and business approaches at the organizational level are all examples of how it might happen (Klewitz, 2014).

The goal of this study is to explore the role of these industries in fostering inclusive and resilient industrial growth in Bangladesh. It also examines the problems of industrialization in Bangladesh. It is intended that the study will also contain measures to alleviate identified bottlenecks and give some beneficial recommendations for the effective implementation of industrial growth in Bangladesh.

Statement of the Problem

Many people continue to suffer from a dearth of access to modern technology that may raise their standard of life and enhance their livelihood throughout much of the world's developing nations, particularly in rural regions. For instance, almost 2.6 billion individuals in developing nations still struggle to get power permanently, and many of them lack access to basic hygiene services or water (Sumeep Bath, 2018). Conversely, industrialization is expected to remain a crucial route for economic development, especially for low-income nations (Haraguchi et al., 2019). Nevertheless, the benefits of the information technology-driven third industrial revolution were uneven. While the services sector benefited greatly from IT and ITeS, e-commerce, and e-governance, the manufacturing sector was less fortunate because industrial production was still organized in an inefficient and antiquated manner (Singh N., 2016).

The dynamic nature of manufacturing demand and industrial growth demonstrates that the drop in manufacturing's nominal proportion of global GDP is due to quicker productivity improvements, which translate into falling relative prices. It goes on to say that when the proportion of manufacturing is measured in actual terms, there is no indication of global deindustrialization. Industrial growth is also impacted by variations in manufacturing possibilities and variations in specialization as necessitated by the numerous industrial revolutions (Nayyar, 2018).

Rationality of the Study

The effects of climate change, humanitarian problems, and shortage of natural resources are among the world's most pressing issues. By this, several nations have embraced the United Nations (UN) 17 objectives to eradicate poverty, safeguard the environment, and secure prosperity as a component of an updated sustainable development approach. Each objective is a development target, and the UN asserts that governments, civil society, and the business sector must engage together (UN, 2016). The Sustainable Development Goals defined in the resolution changing Our World. The 17 Sustainable Development Goals are meant to assist countries in achieving long-term economic and social progress while also protecting the environment from negative consequences. Goal 9 of Agenda 2030 is one of its most essential objectives: "Build resilient infrastructure, foster inclusive and sustainable industrialization, and foster innovation." Sustainable industrial growth, taking into mind the financial integration of this process, requires the engagement of all citizens who can benefit from its results (Brodny, 2023).

It is anticipated that the industrial sector's production processes would undergo significant modifications as a result of new age technology. The industry is thought to be in a better position to gain from the impending digital revolution in terms of its engagement in the worldwide supply chain and technological intensity. An additional benefit comes from the presence of skilled people and an edge in technology exports (Jadhav, 2019).

In many nations, the advancement of economic growth and community empowerment has been largely dependent on investments in transportation, irrigation, energy, and technology for communication and information. Because employment in manufacturing produce jobs in other sectors, the industrialization effect of job multiplication benefits society. Companies can earn greater income and profits by lowering expenses (Nidumolu 2009). With about 14.2% of the 2.9 billion workers worldwide employed in the manufacturing industry, it is a significant employer. It has long been known that a robust physical network supporting industry and communication may raise incomes and productivity while also enhancing welfare, health, and education. Technological growth improves our national well-being and has the potential to improve the status of the world by increasing the efficiency of energy and resources. The proliferation of jobs caused by industrialization benefits society. Every job associated with manufacturing generates jobs in other industries. Economic liberalization facilitated technical collaboration with international enterprises while also relaxing restrictions controlling technology introduction in the industrial sector (Bhat, 2020).

In many nations, infrastructure investments are essential to attaining sustainable development and empowering people. This includes investments in transportation, irrigation, electricity, and information and communication technology. The cornerstone of initiatives to accomplish environmental goals, such improved resource and energy efficiency, is technological advancement. The rapid expansion of manufacturing in Asia is the primary reason for the rise in the manufacturing value added share of the global GDP from 15.2% in 2005 to 16.3% in 2017. A nation's ability to effectively use technological advancements is contingent upon several factors, including the level of industrial technology at the moment, the rate and scope of new technology acquisition, and the demographic composition of the population, with an emphasis on quality over quantity (WTO, 2020).

Merely thirty percent of agricultural output in emerging nations is processed industrially. Ninety-eight percent is processed in high-income nations. This implies that emerging nations have a lot of chances in As a vital source of development, economic diversification, and value addition, the SDG Agenda pledges to support industrialization in poor nations. Industrialization is still gaining popularity since it is thought to be a sector that, when it is there, consistently improves economic diversification and aids in nations maintaining and fostering the circumstances necessary for economic growth and development. Industrialization has been linked to some of the greatest advancements in development (Nayyar, 2017).

LITERATURE REVIEW

In the section that follows, we review at the literature on sustainable innovation, with a focus on conceptual perspectives that address the notion of sustainable innovation and propose elements that may impact it.

In the past few years, companies have begun to view sustainability as a frontier for innovation. Indeed, more organizations are focused on sustainability, forcing them to reconsider their goods, technology, processes, and operations (Nidumolu et al., 2009).

As a result of its potential to revolutionize technology, markets, and products, sustainable innovation is also on the rise and is viewed as a significant driver for improvements in business and society (Larson, 2000).

The growing interest and understanding of sustainable innovation has transformed the way companies create and function. Historically, innovation has tended to focus solely on the economic component, but sustainable innovation incorporates environmental and social views (Hansen et al. 2009).

Over the past ten years, the area of study has grown quickly, which has improved our comprehension of sustainable innovation. However, there remains a lack of conceptual agreement about sustainable innovation in the literature (Adams et al., 2012).

The term "sustainable innovation" has been referred to by a variety of terms, including eco-innovation, eco-friendly innovation, innovation for the environment, environmentally conscious innovation, green innovation, ecological sustainability driven innovation, long-term viability strengthening innovation, sustainability focused innovation, and sustainability-oriented development (Adams et al., 2012).

Regulations commonly referred to as the "regulatory push," appear to be a significant external element influencing the implementation of sustainable innovation (Bossle et al., 2015).

The implementation of laws and regulations addressing social and environmental concerns might raise the demand for innovation. Higher oversight from government regulatory authorities increases the likelihood of investments in new technology and machinery, and hence the likelihood that sustainable innovations will flourish (De Medeiros et al., 2014).

The perceived demands from regulatory stakeholders promote sustainable innovation and play an important role in promoting R&D strategies and generating leading markets for sustainable innovation (Bossle et al. (2015).

Companies have limited influence over external issues, but they may be more proactive about internal factors. As enterprises respond to regulatory processes, sustainable innovation represents not only a desired but also a required capacity (Ketata et al., 2015).

Recognizing new commercial prospects pushes companies to pursue sustainable innovation. Firms might significantly reduce their operating expenses as a result. This is due to better procedures and less inputs and resources needed (Arnold, 2011).

Despite the fact that manufacturing employment worldwide is growing at an average yearly pace of 0.4%, the proportion of manufacturing employees in overall employment is declining. However, it is thought that this is because of advancements in technology and the automation of industrial processes, which may have decreased the demand for labor in the manufacturing sector (Ghodsi, 2020).

According to Hallward-Driemeier and Nayyar (2017), growing technology is one of both trends that will have the greatest influence on how and where commodities are produced.

METHODOLOGY OF THE STUDY

In order to fully complete our study, we have gathered data and carried out surveys to obtain sufficient information. We have employed primary and secondary sources of information for the research. The variable tool is being used in order to enhance the reliability of our study and obtain more relevant and accurate information. The majority of the data was gathered from secondary sources, which are sources other than primary ones. Data from primary sources were gathered through personal observation and respondent interviews. Published papers, documents, and studies; published product specifications on websites; and Cumilla EPZ statistics were the secondary sources of data. There are one hundred responders. MS Excel was employed to analyze the data.

LIMITATIONS

Time constraints and a lack of appropriate publications were the study's biggest obstacles. Due to their hectic schedules, the majority of respondents expressed no interest in participating in any surveys. Even though they were able to give us very little time, several responders nonetheless participated with us. In addition, concerns are raised regarding the respondents' honesty and methodology when completing the primary study questionnaire. Access to the information was restricted, making it less likely that one could access that section for research purposes.

DISCUSSION AND ANALYSIS

To increase infrastructure, investment in innovation and basic drivers of economic growth and development is difficult, especially in a developing country like Bangladesh. However, the disease is improving dramatically. People now have more access to information and technology, and their knowledge of both has grown over time. Technological growth is the answer to both economic and environmental issues. Promoting sustainable industries and investing in research and innovation are the most effective strategies to simplify sustainable development.

Table 1: Views of the Respondents

Topics	Excellent	Good	Average	Little	Very Little	Mean	Standard Deviation
Essential of Investment	35%	25%	30%	5%	5%	4.00	0.77
Function of Industries to Eliminate Poverty	30%	40%	30%	0%	0%	3.80	1.12
The Level of Reliance of Investments	33%	20%	25%	14%	8%	3.56	1.29
The Level of Partnership with the Public Sector and NGOs	27%	27%	23%	10%	13%	3.38	1.22
The Level of Development of New Industries	30%	14%	37%	13%	6%	3.34	1.23
Role of Industries in Women Empowerment	15%	36%	30%	14%	5%	3.12	1.13
The Level of Quality of Product	30%	20%	40%	5%	5%	3.20	1.12

Source: Field survey 2024

Essential of Investment: A majority (60%) of respondents rated investment as Excellent or Good, indicating a strong belief that investment in infrastructure, innovation, and technology is crucial for economic development. The mean score of 4.00 suggests that, on average, respondents place a high value on the importance of investment. It is close to Excellent, meaning that most respondents see investment as a major catalyst for growth. The standard deviation of 0.77 indicates that the responses are fairly consistent, with little variation. This means the respondents largely agree on the importance of investment, with few differing opinions. Investments are seen as necessary to drive economic development, infrastructure, and technology, which create jobs and stimulate growth. This consensus aligns with development theories and strategies that emphasize investment as a key driver of progress.

Function of Industries to Eliminate Poverty: 70% of respondents rated the role of industries in poverty alleviation as Excellent, and 30% rated it as Good, meaning 100% of respondents believe industries significantly contribute to eliminating poverty. The mean score of 3.80 indicates strong agreement that industries help reduce poverty. The score is closer to Excellent, showing that most respondents consider industries to be crucial for economic and social development. The standard deviation of 1.12 suggests that while there is strong agreement, there is a slight variation in the strength of that agreement. Some respondents may have a more cautious view of industries' role in poverty reduction. Industries contribute to economic growth by creating jobs and income opportunities, which directly impact poverty alleviation. Industries in Bangladesh, such as textiles and manufacturing, are key sectors driving job creation and income generation, particularly in rural areas.

The Level of the Reliance of Investments: 53% of respondents rated the importance of investment reliance as Excellent or good, while 22% rated it as little or Very little, indicating that there is a significant variation in how people perceive the reliance on investments. The mean score of 3.56 suggests moderate agreement on the importance of investments. While most respondents recognize the need for investments, there is some disagreement on their actual effectiveness. The standard deviation of 1.29 indicates that opinions are spread out more widely on this topic. Some respondents may be optimistic about investments, while others may be skeptical, potentially due to concerns over inefficiencies or previous underperformance. Investments are key drivers of growth and development, but their impact is not always guaranteed. Some respondents may have seen investments in previous years that failed to meet expectations, which explains their cautious stance. Furthermore, the reliance on foreign or large-scale investments can sometimes raise concerns about local economic sustainability.

The Level of Partnership with the Public Sector and NGOs: 54% of respondents rated the partnership with the public sector and NGOs as Excellent or Good, reflecting a general belief that such collaborations are beneficial for sustainable development. However, there is a notable portion (23%) who rated it as Average and

23% who rated it as little or Very Little, indicating skepticism about the effectiveness of public-private partnerships. The mean of 3.38 reflects moderate agreement that partnerships with public institutions and NGOs are effective, but the standard deviation of 1.22 shows that respondents have mixed opinions. Public-Private Partnerships (PPP) and NGO involvement are important for pooling resources, expertise, and efforts to tackle development challenges. However, past experiences of mismanagement, lack of transparency or failure to achieve goals may lead to skepticism. Some respondents may believe that these partnerships do not always deliver the intended outcomes or are hampered by inefficiencies.

The Level of Development of New Industries: 27% rated the development of new industries as Excellent or Good, but 50% rated it as Average or lower, showing a more neutral or cautious view on the impact of new industries. The mean score of 3.34 suggests that while there is a moderate belief in the importance of new industries, there is no overwhelming consensus that they are leading to significant improvements in living standards. The standard deviation of 1.23 indicates a wider range of opinions some see the potential of new industries, while others are unsure about their long-term benefits. New industries can provide job opportunities and economic growth, but their full impact on living standards may not be immediate or obvious to all respondents. Concerns over the environmental impact, labor conditions, and sustainability of new industries could contribute to the mixed reactions.

Role of Industries in Women Empowerment: 51% rated the role of industries in women empowerment as Excellent or Good, showing that a majority recognize industries as a positive force for empowering women, particularly in the workforce. However, a significant portion (30%) rated it as Average, and 19% rated it as Little or Very Little, suggesting that while industries provide jobs for women, there may be concerns about the quality of those jobs and the level of true empowerment. The mean of 3.12 reflects moderate agreement with the statement, and the standard deviation of 1.13 indicates there is some variation in how respondents perceive women's empowerment in industrial sectors. Industries, particularly in export-processing zones, have provided employment opportunities for women, allowing them greater financial independence. However, these jobs may be low-wage, temporary, or lack long-term career growth, which could limit the true empowerment that industries can provide.

The Level of Quality of Product: 50% of respondents rated the quality of products as Excellent or Good, indicating that a majority believe the products are of reasonable quality. The company manufactures the majority of textile products, garments, sweaters, metal products, and accessories. Other products that are produced and maintained at a high standard include LED lamps, selection buttons, furniture, mobile parts, slapping beads, electronic products, batteries, cameras and lens, bicycles, and cosmic items. However, a large portion (40%) rated the product quality as Average, suggesting that while products may meet basic standards, there is room for improvement in terms of quality. The mean of 3.20 reflects moderate satisfaction, and the standard deviation of 1.12 indicates some dissatisfaction or recognition that product quality is not consistently high. The Comilla EPZ produces a wide range of goods, and while they may be sufficient for local markets and exports, respondents may feel that some products do not meet the highest global standards. Quality control issues or production inconsistencies may be contributing to the mixed perceptions of product quality.

Key Challenges of Industrialization in Bangladesh

Road transport improvement faces challenges from complexity of land acquisition along with resettlement and compensation complexity. Other pertinent issues which need to be aligned properly include road construction technology, adequate finance, proper data, and axle load. Road safety maintenance requires proper and adequate roads, accurate road accident data, and awareness of users as well as special attention from traffic police. A major challenge in project implementation in transport and communication sector is capacity constraint often leading to delays in project completion. Delays and underfunding result in cost escalation and lower rate of return on investment. Inadequate maintenance affects reliability and quality of infrastructure services with negative effect on growth. Bangladesh is mainly an agricultural country. Agriculture has always been given priority and as a result industries have been ignored. Recently some agro-based industries have been set up. There are some reasons for which the country has lagged behind in heavy and medium-level industries. Industrialization in Bangladesh faces some challenges due to some structural constraints that hindered industrial growth.

FINDINGS OF THE STUDY

The study evaluated various aspects of the role of industries. Based on the data, key findings can be summarized as follows:

Investment in Industries: There is a strong acknowledgment of the importance of investment in driving industrial growth within Cumilla EPZs. However, the investment level shows variability. While 35% of respondents viewed investment as essential, there were gaps in the practical implementation of investments, especially in innovation-driven sectors.

Role of Industries in Poverty Alleviation: 40% of respondents indicated that industries play a good role in eliminating poverty, reflecting the job creation and economic opportunities industries provide in EPZs. However, there is room for improvement in reaching deeper poverty alleviation goals, such as inclusive growth for marginalized communities.

Reliance on Investments: There is a moderate reliance on foreign and local investments to sustain growth in EPZs, but many industries still struggle with consistent access to financing. This limits their capacity for expansion and technological upgrades.

Partnerships with the Public Sector and NGOs: The level of partnership with the public sector and NGOs is moderate (27% good). Public-private collaborations are emerging, but their full potential is yet to be realized in terms of infrastructure development, skill-building programs, and sustainability initiatives.

Development of New Industries: Industries are developing, but the pace of new industry creation is slow. There is significant potential for diversifying into newer, higher-value-added industries, but this requires investments in innovation and skills development.

Role in Women Empowerment: The role of industries in empowering women is relatively underdeveloped (only 15% of respondents rated it as excellent). There is significant room for improvement in gender equality, leadership development for women, and equal employment opportunities in these industries.

Quality of Products: There is a moderate focus on the quality of products, with 30% of respondents indicating good performance in product quality. However, the overall focus on quality improvement is inconsistent, with some industries lagging in maintaining international standards.

RECOMMENDATIONS

Based on the findings above, the following recommendations are made for enhancing the role of industries:

Promote research and development (R&D) and incentivize industries to adopt advanced manufacturing technologies and sustainable practices.

Focus on creating more inclusive economic growth by providing vocational training, skills development, and access to finance for marginalized communities and workers.

Explore a variety of investment sources, including domestic investments to reduce reliance on a limited number of investors.

Build stronger collaborations between public sector, NGOs, and private industries to create a synergistic ecosystem for industrial development, sustainability, and community welfare.

Focus on industry diversification by encouraging investment in emerging sectors such as green technologies, and digital industries.

Implement gender equality policies, including equal pay, leadership training programs for women, and safe work environments. Empowering women is key to achieving social and economic equality. Creating an environment where women can thrive in leadership and technical roles will enhance overall industry performance.

Promote the adoption of international quality standards and encourage continuous quality improvements to remain competitive in global markets.

BPAZA should prioritize vocational training and skills development initiatives to ensure that the workforce in Cumilla EPZs is equipped with the skills required for modern, high-tech industries.

CONCLUSION

Goal 9 focuses on three key areas of sustainable development: resilient infrastructure, inclusive and sustainable industrialization, and research and innovation. Infrastructure offers the essential physical facilities and services required for economic growth. In a world confronted with a variety of shocks, including climate change and natural catastrophes that are becoming more frequent and intense, infrastructure must be made robust to adapt. Manufacturing has been a major driver of economic growth and decent job creation and hence has contributed to reduction of income poverty. However, a barrier to sustained growth is national disparities in the value contributed in the manufacturing sector. Innovation, or the launch of new goods, procedures, and business plans, will promote the expansion of manufacturing while maintaining environmental sustainability. Consolidating national and international efforts to support industrialization, innovation, and infrastructure development is the goal of the goal. To do this, there must be a greater mobilization of financial resources both domestically and internationally, as well as scientific and technical assistance, research and innovation, and enhanced accessibility to ICTs.

The study's findings lead the researcher to suggest that create and put into place a favorable investment environment to encourage foreign direct investment. Here, investment rises. Maintaining a suitable industrial environment will boost productivity. Create additional export processing zones to upgrade the available infrastructure. Ensuring political stability is crucial. It is necessary to increase the expertise and training of the human resources. A technical institute ought to be established to train human resources. The introduction of a scientific management approach is necessary. Industries ought to search for equipment with higher levels of technology. The government ought to do a great deal of work to develop the industry sector. Building a city just for industry will make it easier for individuals to get employment. In order to increase the sustainability of the impacts of industrialization, Bangladesh must also meet criteria for labor and environmental compliance. According to SGD-9, the market must provide distributional fairness while simultaneously operating effectively. The high cost of doing business, poor infrastructure, creating a one-stop shop, managing land constraints, a shortage of skilled labor, difficulties luring foreign direct investment, accessibility to utility services, and open and reliable institutions are among the issues facing the implementation of SDG-9. Bangladesh must thereby lower the cost of doing business, increase transparency by digitalizing a variety of commercial procedures and processes, and promote economic diplomacy in order to bolster intergovernmental initiatives for technology access and best practices. Serious consideration should be given to both technology transfer and research & development investments. In order to accomplish the SDG-9 and advance Bangladesh's industrial growth, well-crafted policies and their execution are essential. A conducive environment for industrial growth might be created by implementing the vast range of concerns covered by the policies intended for industrial development. However, it is challenging for different policies to play the anticipated role due to a lack of coordination across the organizations responsible for implementing each policy. Bangladesh will successfully achieve SDG-9 for industrial growth with the help of the private sector, government institutions responsible for policy implementation, and appropriate policy coordination.

DECLARATIONS

Author contribution statement

Mosammat Nargis Akter: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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