Research Report on

Role of CMSME Sector in Building SMART Bangladesh: Fourth Industrial Revolution Perspective

BSCIC Training Institute (BTI)

Bangladesh Small & Cottage Industries Corporation

Ministry of Industries

Uttara, Dhaka-1230

June, 2024


শিক্ষক প্রশিক্ষণ ইনস্টিটিউট (বিশেষ) রাজশাহী
লাইব্রেরি

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List of Abbreviations

AI	Artificial Intelligence
BSCIC	Bangladesh Small and Cottage Industries Corporation
BTI	BSCIC Training Institute
CAD	Computer-aided Design
e-Commerce	Electronic- Commerce
ERC	Export Registration Certificate
ERP	Enterprise Resource Planning
FGD	Focus Group Discussion
ICT	Information and Communication Technology
IE	Industrial Estate
Industry 4.0	Fourth Industrial Revolution
IoT	Internet of Things
IRC	Import Registration Certificate
IT	Information Technology
KIIs	Key Informant Interviews
MIS	Management Information System
MoU	Memorandum of Understanding
OSS	One-Stop Service
SCITI	Small and Cottage Industries Training Institute
SME	Small and Medium Enterprise
4IR	Fourth Industrial Revolution

Abstract

Bangladesh would have to develop a map to establish a linkage between 4IR technologies [potential for attaining SDG targets and indicators]. Bangladesh is well-attempted to transform into a smart nation in the rapidly evolving context of the Fourth Industrial Revolution (4IR), with its Cottage, Micro, Small, and Medium Enterprises (CMSMEs) playing a crucial role. This study investigates the readiness of CMSMEs (Cottage, Micro, Small, and Medium Enterprises) in adopting Fourth Industrial Revolution (4IR) technology to advance the Smart Bangladesh Vision 2041.

The introduction provides a framework for understanding Bangladesh's goals in the face of global technological changes, highlighting the importance of CMSMEs as the foundation of its economy and the key driver of equitable growth and innovation. Although CMSMEs are important, they encounter difficulties in adopting 4IR technologies, which are necessary for achieving the country's goals of becoming a technologically advanced society.
The literature analysis highlights the crucial significance of CMSMEs in economic progress and their difficulties in adapting to the environment of the Fourth Industrial Revolution (4IR). The text explores both worldwide and regional efforts, emphasizing areas where information is lacking and the urgent need for customized approaches to enhance the technological capabilities of CMSMEs.

The study utilizes a mixed-methods approach, incorporating surveys, interviews, and focus groups in 11 industrial estates in Bangladesh, following a systematic methodology. Data collection is centered around evaluating the technological capability, recognizing obstacles to adoption, and measuring the influence of Fourth Industrial Revolution (4IR) technologies on the productivity and sustainability of CMSMEs.

The findings indicate that CMSMEs exhibit different levels of technological readiness, with significant obstacles such as disparities in digital literacy, budgetary restrictions, and infrastructure constraints. The study highlights the importance of implementing specific measures to improve the technological capabilities of CMSMEs, in line with the objectives of Smart Bangladesh. Using empirical data, we suggest solutions to enhance the integration of CMSMEs into a technologically advanced Bangladesh. These programs encompass efforts to improve people's ability to use digital technology, offer financial rewards for adopting technology, encourage the development of innovation centers, and reinforce governmental frameworks that facilitate the integration of the Fourth Industrial Revolution (4IR).

This research provides significant insights to policymakers, industry stakeholders, and academics, helping them in their efforts to develop a strong and technology-driven CMSME sector that is essential for Bangladesh's goal of being a Smart Nation by 2041.

1.0 Introduction

Bangladesh stands on the edge of transformation in the swiftly changing Fourth Industrial Revolution world. Empowerment is integral to the country's journey toward becoming a Smart Nation, as technology reshapes industries and societies worldwide. In addition to serving as the foundation of Bangladesh's economy, these grassroots enterprises are also instrumental in promoting innovation, promoting inclusivity, and promoting sustainable growth.

The country's progress towards becoming a Smart Nation is closely tied to the empowerment of its Cottage, Micro, Small, and Medium Enterprises (CMSMEs) as technology continues to transform industries and communities globally (a Smart Nation aims to put its citizens at the heart of improving how their nation functions. It aims to improve the way that technology is used to solve problems and address existential challenges. That means empowering its citizens to build the nation. This empowerment must be the technological empowerment of the citizens. To become a Smart Nation, we need to transform the nation into a digitally conversant first and then Smart nation which is the SMART Bangladesh Vision 2041. A Smart Nation means Smart Citizens, Smart Government, Smart Economy, and Smart Society. But the question is whether we are digitally conversant now? If not, we need to empower the citizens technologically or digitally. From this perspective, Bangladesh (i) needs technologically empower its Cottage, Micro, Small, and Medium Enterprises. Technologically developed means Technical empowerment means, (ii) the capability to use machines, data-processing equipment, and computer (e.g. use of digital technology, data analytics, and digital connectivity) at work to optimize planning and management of work. The purpose of technological development is (iii) to free man from the performance of many labor-intensive activities, and (iv) to reduce expenditures by using administrative and managerial equipment which requires the creation of new and customized technologies through (v) research and innovation.

These small-scale businesses play a crucial role in both the economic development of Bangladesh and the promotion of innovation, inclusivity, and sustainable growth. "SMART Bangladesh Vision 2041" is a strategic plan aimed at transitioning the nation from being a digitally advanced country to becoming a smart country by the year 2041 (Sarkar, 2022). The SMART Bangladesh initiative encompasses the principles of Smart

Citizens, Smart Government, Smart Economy, and Smart Society, with the aim of involving all individuals in Bangladesh. The objective is to narrow the digital divide through the creation and execution of enduring digital remedies that are accessible to individuals and organizations of all socioeconomic backgrounds and sizes. In addition, SMART Bangladesh represents a crucial advancement towards realizing Bangabandhu's vision of a prosperous Bangladesh, known as "Shonar Bangladesh," by leveraging the foundation laid by Digital Bangladesh.

The core of the Fourth Industrial Revolution is the merging of digital technology, data analytics, and connectivity. The advent of Artificial Intelligence (AI) and the Internet of Things (IoT) has brought about significant changes in old business structures, reshaping consumer behaviors, and rethinking governance frameworks.

In order for Bangladesh to fully utilize the opportunities presented by this transformation, it must utilize its CMSME sector as a driving force for development. The CMSME sector in Bangladesh comprises a wide range of firms, spanning from traditional crafts to digital startups. Although these firms are large and encompassing, together they form a powerful entity that promotes economic empowerment, generates employment opportunities, and reduces poverty. CMSMEs can play a crucial role in Bangladesh's shift towards a knowledge-based economy by creating an environment that supports innovation, fosters entrepreneurship, and encourages digital literacy. Furthermore, enabling CMSMEs to adopt the Fourth Industrial Revolution is not just an economic necessity but also a social demand. These firms can promote social inclusion and empower marginalized populations by offering access to technology, training, and resources, thus bridging the digital gap. By doing this, they may tap into the untapped ability and innovation that exist throughout the diverse population of Bangladesh, thus promoting fair and inclusive growth and shared economic success.

However, harnessing the complete capabilities of CMSMEs in the Fourth Industrial Revolution necessitates a collaborative endeavor from several stakeholders. Governments should implement policies that create a conducive climate for innovation and entrepreneurship. This includes simplifying regulatory frameworks, ensuring access to financial resources, and investing in digital infrastructure. Private sector

entities can make valuable contributions by offering mentorship, facilitating market access, and implementing technology transfer efforts.

Civil society organizations and academia have a vital role to play in offering training, enhancing capabilities, and providing advocacy assistance to CMSMEs, so guaranteeing that no individual is excluded from this revolutionary process. Ultimately, the significance of CMSMEs in constructing a technologically advanced Bangladesh in line with the Fourth Industrial Revolution cannot be emphasized enough. Amidst the challenges of a swiftly evolving global environment, these businesses are at the forefront of advancement, creativity, and equitable expansion. By enabling and supporting CMSMEs, Bangladesh has the opportunity to fully realize its capabilities, utilize technology to its advantage for the welfare of its entire population, and establish itself as a symbol of wealth in the era of digitalization. This study focuses on the current technological adaptation scenario of CMSME and its readiness to blend in 4IR.0 technologies to build a smart Bangladesh.

1.1 Critical Issues of this Research:

The CMSME sector is the driving force of our economy, as it comprises 95% of the total industry. The government declared the SMART Bangladesh initiative as part of Vision 2041 in 2012. If we want to achieve a smart Bangladesh, we can't just focus on the big industries for technology adaptation. We can't ignore 95% of the industries. As the initiative is quite new to us, there isn’t enough knowledge about how CMSMEs can use 4IR technologies for their own benefit. The main gap of knowledge is about the current state of technology adaptation and the obstacles and impacts on productivity across industries in the context of smart Bangladesh.

As a result, this research aims to understand the readiness of industries for 4IR adaptation, identify the challenges and opportunities, and provide some suggestions for industries and policymakers in the context of SMART Bangladesh. Without proper knowledge and understanding, policymakers and business owners cannot make proper strategies for integrating new technologies into their existing businesses. The research team hopes that this research will provide valuable insight about the above-mentioned topics, which will support the technological transformation of the CMSME sector in Bangladesh.

1.2 Research Objectives

i. To assess the current state of CMSMEs in Bangladesh.

ii. To identify the level of technological capability development of CMSMEs;

iii. To analyze the impact of 4IR technologies on CMSMEs.

iv. To evaluate the contributions of CMSMEs towards the Smart Bangladesh initiative.

v. To identify the challenges faced by CMSMEs in adopting 4IR technologies.

vi. To recommend strategies to enhance the capability of CMSMEs in building a Smart Bangladesh.

2.0 Literature Review:

The role of Cottage, Micro, Small, and Medium Enterprises (CMSMEs) is vital in Bangladesh's economic development, especially in the context of preparing for the Fourth Industrial Revolution (4IR). The objective of this study is to examine the present condition of CMSMEs in Bangladesh and assess their compatibility with the concepts of a smart economy that is prepared to face the challenges and opportunities brought about by the Fourth Industrial Revolution (4IR). This project aims to identify the gap between the potential of CMSMEs (Cottage, Micro, Small, and Medium Enterprises) and the requirements for a technologically advanced Bangladesh that embraces the fourth industrial revolution. This will be achieved through a thorough examination of existing literature, as well as field surveys and interviews.

2.1 CMSME

The term construction cottage, micro, small, and medium enterprises (CMSMEs) or micro, small, and medium enterprises (MSMEs) encompasses a broad range of concepts, including the various definitions of MSMEs adopted by different countries and the difficulties in defining and measuring enterprises (Shakantu, 2012). Undoubtedly, notwithstanding the difficulties in defining CMSMEs globally (Shakantu, 2012). CMSMEs are typically perceived as independent enterprises, managed by their owners or co-owners, with a small market share (Burke, 2006). Due to the extensive range of small and medium-sized enterprises (SMEs), there is no singular definition for CMSMEs. However, standard criteria such as size, employee count, sales, assets, and turnover are used to define MSMEs/CMSMEs globally (Burke, 2006). Different countries employ different criteria to identify CMSMEs. For example, Egypt defines CMSMEs as businesses with a workforce of more than 5 but fewer than 50 employees, whereas Vietnam classifies CMSMEs as those with a workforce ranging from 10 to 300 people. Furthermore, the World Bank defines CMSMEs as enterprises with a maximum of 300 employees or $15 million in annual revenue and $15 million in assets. The Inter-American Development Bank defines CMSMEs as enterprises with a workforce of up to 100 employees and annual revenue of less than $3 million (Benzazoua et al., 2015). The construction industry in any country is composed of numerous firms, the majority of which are small, medium, and micro enterprises (SMMEs) in South Africa, micro, small, and medium enterprises (MSMEs) in Nigeria,

or small and medium enterprises (SMEs) in other regions of the world (Shakantu, 2012). The key component of any administrative development strategy should be to promote initiatives that foster economic growth of the nation, such as CMSMEs (Shakantu, 2012). Micro, Small, and Medium Enterprises (MSMEs) or Cottage, Micro, Small, and Medium Enterprises (CMSMEs) constitute a significant proportion of businesses in various economies and employ a substantial number of persons. They symbolize the process of growth and progress. The performance of the MSME/CMSMEs sector is strongly linked to the performance of the nation (Chittithaworn et al., 2011). Furthermore, MSMEs/CMSMEs are typically classified based on either quantitative or qualitative criteria. Quantitative factors refer to measurable aspects of businesses, such as their market share, financial indicators like available funds, capital, turnover, asset value, profit, as well as quantitative records like the number of employees. However, in Nigeria, MSMEs/CMSMEs are classified only based on their number of employees and total assets, excluding land.

Table 1: Categorization of CMSME sectors in Bangladesh (Industrial Policy, 2022)

Enterprise	Fixed Assets (Excluding land and buildings)	Employees	Loan limit
Micro	Tk 10 lakh- Tk 75 lakh (manufacturing)	16-30 or less	Tk 1 crore
	Less than Tk 10 lakh (service)	15 max	Tk. 25 lakh
Cottage	Less than 10 Lakh	15 max	Tk 10 lakh
Small	Tk 75 lakh – Tk 15 crore (manufacturing)	31-120	Tk. 20 crore
	Tk 10 lakh – Tk 2 crore (service)	16-50	Tk. 5 crore
Medium	Tk 15 crore – Tk 50 crore (manufacturing)	121-300 (garments 1000 minimum)	Tk. 75 crore
	Tk 2 crore – Tk 30 crore (service)	51-120	Tk. 50 crore
Trading sector	Less than Tk 10 lakh (micro enterprise)	15 max	Tk. 25 lakh
	Tk 30 lakh – Tk 2 crore (small industry)	16-50	Tk. 5 crore

The researcher used multiple definitions, for instance, definitions by the Bangladesh Bureau of Statistics, annual census records, the Bangladesh trade policy, and the World Bank Group. In 2022 industrial policy's definition of CMSMEs gained widespread acceptance as a uniform policy term. The value of fixed assets (apart from land and buildings) and/or the number of employees used to calculate the characteristics of CMSMEs (Table 1). In several nations, including Bangladesh, small and medium-sized enterprises (CMSMEs) are becoming more important as engines of economic growth. Small and medium- sized businesses (CMSMEs) provide affordable employment and flexible economic opportunities. Many of CMSMEs are export-oriented, showcasing their capacity for global competition. Given the importance of SMEs to the Bangladeshi economy and the difficulties they face, it is obvious that measures must be taken to encourage the development and growth of CMSMEs. The steady and sustainable growth of the nation's CMSMEs will be seen as one of the instruments for reducing poverty and increasing employment in policy measures (Zaman & Islam, 2019).

Environmental degradation can be fought through sustainable entrepreneurship. The owner-manager cognitive processes in CMSMEs are crucial parts of sustained entrepreneurial involvement (Aktar at. al, 2024) . The results demonstrated that while attitudinal and perceptual elements had a positive and significant influence, normative factors had no discernible influence on such a propensity. Therefore, it is crucial to concentrate on building sufficient sustainability competencies, forming a positive sustainability attitude, and creating appealing sustainable business practices to promote sustainable entrepreneurship (Koe et al., 2015).

Financing in CMSMEs can bring the development in the CMSMEs sector as well as social and economic development of a country by contributing in employment, income generation and accelerate the progress of urban and rural areas in a significant way. This statement is stated by Hallberg (2000), Olutunla (2001), Williams (2006) in their publication. Aziz and Siddique (2016) have evaluated the role of Bangladesh bank in promoting CMSMEs financing in our country. From their study, it is realised that Bangladesh bank is taking numerous steps on CMSMEs financing and development of this sector. Industrial lending, target based lending, CMSMEs cluster development, regulatory improvement, development of women entrepreneurship etc. are some steps taken by Bangladesh bank for that purpose.

Cottage, Micro, Small and Medium Enterprises (CMSME) are still rule over the world economy as it is a source of employment, remarkable contribution to the GDP growth, commence of innovation and create stirring for other economic activities.

According to this definition, SMEs are enterprises that employ up to 249 individuals. The breakdown of these firms is as follows: micro firms employ 1-9 persons, small firms employ 10-49 persons, and medium firms employ 50-249 persons.Based on the World Bank Enterprise Surveys, which cover more than 25,000 small and medium-sized firms (SMEs) in developing countries, the World Trade Organization (WTO) has calculated that direct exports account for just 7.6% of total sales for SMEs in the manufacturing sector. In contrast, major manufacturing enterprises have direct exports representing 14.1% of their entire sales. Africa has the smallest proportion of exports among emerging regions, accounting for only 3%, while developing Asia has a higher proportion of 8.7%. The involvement of small and medium-sized firms (SMEs) in the export of services in developing countries is minimal, accounting for only 0.9% of the overall sales of services. In contrast, large enterprises contribute significantly more, with a share of 31.9% (WTO, 2016). SMEs play a crucial role in the economy and broader business networks, especially in many nations, including those under the Organization for Economic Cooperation and Development (OECD). SMEs are the most common type of enterprise in the OECD area, making up almost 99% of all firms. They are the primary providers of employment, making up approximately 70% of jobs on average, and are significant contributors to value creation, providing between 50 and 60% of value added on average. SMEs in emerging economies account for up to 45% of the overall workforce and contribute 33% to the Gross Domestic Product (GDP).

When considering the contribution of informal firms, small and medium-sized enterprises (SMEs) account for over 50% of employment and gross domestic product (GDP) in most nations, regardless of their income levels. Furthermore, the expansion of small and medium-sized enterprises (SMEs) can play a significant role in promoting economic diversification and resilience, ultimately leading to a more sustainable economy. This is particularly pertinent for nations that have abundant resources and are highly susceptible to changes in commodity prices (OECD 2017).

A vibrant Small and Medium Enterprises (SMEs) sector is central to the economic development of developing countries and thus studying international competitiveness

of SME sector of developing nations is of greater significance. SMEs encourage private ownership and innovative skills and can adapt quickly to varying market situations, create employment opportunities, diversify economic activities, and contribute significantly to exports of a country. As such SMEs have attracted a growing interest from academicians, policy makers, businessmen and researchers across the world. In Bangladesh, this sector is considered as the driving force for industrialization as because with cheap labour SME sector is more capable to generate employment and thus increase national income. Accordingly, policies and strategies to foster SMEs and to increase their international competitiveness are a priority for Bangladesh. Exports of SME sector, especially from developing countries, plays a vital role in country's development process as it exemplify economic opportunities (Peña-Vinces et al., 2012). Recognizing the importance, there exists a

chunk of studies examined the factors of international competitiveness of enterprises of developed countries(Buckley et al., 1990; Cho et al., 2007; Dunning & Lundan, 1998; Elenurm, 2007; Fahy, 2002; Jones & Crack,2001). There have been, however, very few studies carried out in developing countries. As the developing countries economic structure, behaviour, political and educational systems and level of industrialization differsfrom the same of developed countries, findings based on studies of developed countries cannot be always applicable to developing countries. (Casanova, 2004; Cuervo-Cazurra, 2008; Peña-Vinces et al., 2012).

In the context of Bangladesh, a very few studies exists that are related to this discourse, though none of them are focused on the international competiveness of SME sector. Mintoo (2006), for example, by using the data of 1999–2004, described that contribution of SME sector to the GDP of Bangladesh had increased significantly.

Ahmed and Chowdhury (2009) observed that performance of SMEs, measured by employee turnover rate, quality assurance, allocation of funds, of Bangladesh is below international standard. Authors also found the development rate of SMEs is very low.

Table 2: Role of SMEs in Developing and Developed Economies (Synthesized by researchers from (WTO, 2016)

Aspect	Percentage	Sectors and Company classification
Direct Exports	7.6% of total sales	Manufacturing SMEs
	14.1%	Large Manufacturing
Export Share	3%	African developing economies
	8.7	Developing economies of Asia
SME Participation in export share	0.9 of total sales	Developing countries
	31.9	Large enterprise
OECD Group	99% of all companies	SMEs
	70% of employment	
	50-60% of the value created	
Developing economies	45% of all companies	SMEs
	70% of employment	
	33% of GDP	

In the previous industrial policy (2016) in Bangladesh, CMSMEs were recognized as the primary catalyst for the growth and expansion of export-oriented industries, the development of specialized industries by making the best use of local resources, and the provision of opportunities for women entrepreneurs (WE). Additionally, the policy aimed to provide legal and infrastructural support to encourage investment. Export diversification, increased focus on foreign direct investment (FDI), and emphasis on the Fourth Industrial Revolution (4IR) are key priorities in current industrial policy. The new strategy includes various strategies with specific timelines for implementation in order to support a dynamic and highly trained industry and service sector. Additionally, there is a particular focus on less developed areas to provide a steady supply of raw materials for enterprises who are focused on exporting and adding more value to their products.

Priorities include developing the capacity for technology and adapting to the Fourth Industrial Revolution (4IR), as well as addressing difficulties related to skilled

workforce development, diversifying exports, and exploring new markets. To encourage both local and foreign investment, administrative procedures will be simplified, and there will be an expansion of services such as industrial parks and economic zones. The government has announced various trade agreements at bilateral, regional, and multilateral levels, in collaboration with national and international organizations. These agreements aim to promote women entrepreneurs and provide financial support to cottage, micro, small, and medium enterprises. Additionally, efforts will be made to enhance the capabilities of the private sector to sustain themselves during natural and man-made disasters. The government also plans to support import substitute industries, as well as backward and forward linkage industries. In this regard, specific support will be provided to the light engineering sector.

The government has decided to address the issue of the informal sector by implementing a registration process and developing a time-bound action plan at the national level. An agenda has been devised to formalize informal establishments, which is a commendable endeavor. However, it is anticipated that this task will be challenging due to the lack of awareness among informal entrepreneurs regarding the comprehensive advantages of formalization, as well as their apprehension towards the rigorous administrative procedures that entail both financial and temporal investments. Attention must also be given to the implementation of policies. The industrial policy introduced several initiatives for start-ups and outlined strategies to establish a conducive climate for their growth. BSCIC (Bangladesh Small and Cottage Industries Corporation) fosters the development of new entrepreneurs by offering support services, advisory services, and comprehensive one-stop services (OSS) at BSCIC centers. They will also provide training and specifically promote entrepreneurship in the field of information and communication technology (ICT). Their capacities also needed to be upgraded and trainers need advanced level of training. Restrained budget and infrastructure may hinder the process. But government is taking so many initiatives to reinforce learning and training process.

Hi-Tech parks, also known as technology parks, are designated areas that provide infrastructure, resources, and support for technology-based businesses. Bangladesh has recently made significant strides in developing hi-tech parks to foster innovation and entrepreneurship in the country. The government has established several Hi-Tech parks

across the country. This includes the Bangabandhu Sheikh Mujib Hi-Tech Park in Gazipur and the Janata Tower Software Technology Park in Dhaka. These parks offer modern facilities such as high-speed internet, advanced telecommunication systems, and an uninterrupted power supply.

Digitalization of Bangladesh's government services have imposed a concern of digital divide between the rural and the urban areas. Union Digital Centers have been serving the rural population and mitigating the risk of a digital divide.

The majority of people in Bangladesh were unable to access government and other services because of customary paperwork and regional obstacles. The poorest people in society, who comprise 24.1% of the population, frequently lack access to basic healthcare services because of a number of issues, such a low value placed on their needs. On the other hand, 70.3% of rural households do not have internet access but the government has already digitized the ongoing services and procedures in Bangladesh, in order to eliminate bureaucratic red tapes and increase efficiency. This has imposed the concern of a digital divide between urban and rural populations. To deliver the government services at the root level the government came up with a new vision of decentralizing digitization for serving the public. UDC's computer training programme is among its most significant offerings. In order to create a civilization that is dependent on technology, this project is crucial. Currently, 3,773 EDCs use multimedia projectors to offer inexpensive computer instruction. UDC provided computer instruction to roughly 52,000 school children and young people between November 2010 and March 2014 (a2i)

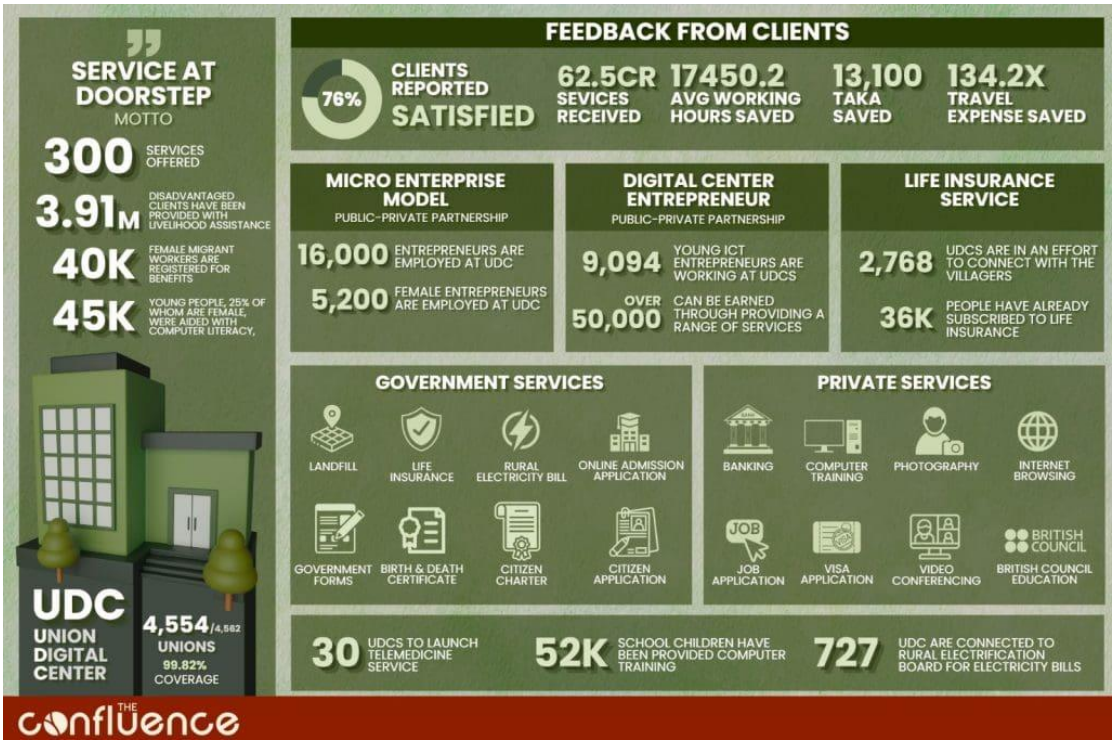

Figure 1: Union digital center activities (Source: https://a2i.gov.bd/union-digital-centers-digitizing-bangladeshs-grassroots/)

This is a positive development, nevertheless, it is necessary to reassess the trustworthiness of BSCIC in every area.

The program also prioritized the development of a range of export-oriented businesses, fostering a favorable environment for cottage, micro, small, and indium companies, and encouraging increased domestic and foreign investment in the country. Entrepreneurs in the informal sector will receive an MSME certificate after completing an online program and being registered in the national database. The National Productivity Organization and the Informal Sector Industry Skills Council will implement essential programs aimed at enhancing the productivity of enterprises in the informal sector. The provided link leads to an article about the inclusion of the informal sector in the industrial policy (*Newage bd*, 2024).

2.2 SMART BANGLADESH:

The Smart Bangladesh Vision 2041 encompasses not only the vision of a technologically advanced Bangladesh, but also surpasses the goals of achieving 5G internet, 100% smartphone penetration, 100% high-speed internet penetration, and

transitioning to a cashless society. Smart Bangladesh focuses on inclusivity, specifically on the individuals who are residents of Bangladesh.

Based on the principles of Smart Citizens, Smart Government, Smart Economy, and Smart Society, this initiative aims to reduce the digital divide by creating and expanding sustainable digital solutions that can be utilized by all citizens and businesses, regardless of their socio-economic status or size (A2i, 2022).

Bangladesh is on the path to being a regional frontrunner in digital innovation as it moves towards becoming a smart nation. This transition is expected to stimulate economic growth and enhance the quality of life for its population.

The progress of Smart Bangladesh serves as evidence of the country's ability to recover quickly from challenges and adopt innovative strategies, establishing a standard for other developing countries that aim to embrace the digital era.

Stages of the Project

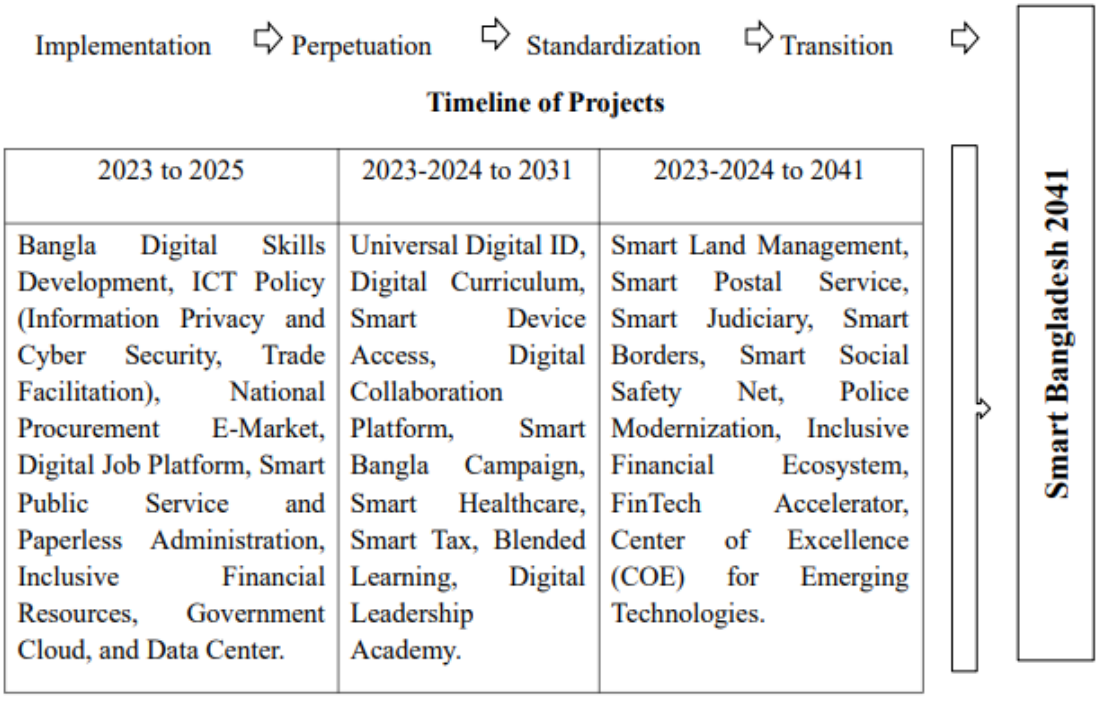

Figure 2: Smart Bangladesh: Vision and reality (Source: Sarker, 2022)

The government of Bangladesh has undertaken initiatives in the areas of smart citizens, smart economy, smart government, and smart economy. The Digital Service Design Lab aims to expedite the digitization of government services. It achieves this by

thoroughly examining and streamlining manual services, eliminating unnecessary steps for citizens. The lab then designs simplified digital versions of these services, creates budgets and implementation plans, and coordinates efforts between government officials, the public, local technology companies, and international experts (a2i, 2022).

Furthermore, MyGov (One Platform, Multiple Solutions) not only centralizes all digital services offered by various ministries into a single application, but also encompasses additional services such as online payment, benefit application, benefits information, complete benefit application, and benefit availability (a2i, 2022). Additionally, it facilitates users who lack internet connectivity to acquire information and make service requests. It can also be utilized to locate the closest digital center (a2i, 2022). Furthermore, the implementation of automation, artificial intelligence, and the transition to a circular economy in the context of the Fourth Industrial Revolution (4IR) has further exacerbated the issue of unemployment.

In order to confront the problems posed by the Fourth Industrial Revolution (4IR), the government of Bangladesh has established five fundamental components: real-time data analysis, predictive modeling, experimental approaches and adaptability, identification of possibilities, and policy formulation (a2i, 2022).

Furthermore, the Innovation lab (iLab) will accelerate the progress and commercialization of domestically developed gadgets, advancements, and solutions using five methods (a2i, 2022). iLab (Incubating and Scaling-up Social Innovations) incubates and accelerates advancements to address the most urgent societal and environmental issues that Bangladesh currently faces by harnessing innovation, specifically electro-mechanical devices, the Internet of Things (IOT), and renewable energy (a2i, 2022). Bangladesh is placing emphasis on innovation to create a technologically advanced society.

The digital transformation of Bangladesh's Cottage, Micro, Small, and Medium Enterprises (CMSME) encompasses several key aspects.

Firstly, it involves establishing a digital identity for every CMSME.

Secondly, it entails collecting and analyzing the previous transaction history of CMSMEs using various applications.

Thirdly, it involves determining the creditworthiness of CMSMEs by electronically obtaining eKYC information and examining their linked transaction history.

Fourthly, it focuses on enhancing the awareness and skills of CMSMEs through training and development programs.

Fifthly, it includes implementing safety frameworks to protect data privacy and mitigate the risk of digital identity theft and other related issues. Lastly, it involves establishing a partnership framework that encourages collaborative efforts among banks, Mobile Financial Services (MFS), and Application Programming Interfaces (APIs) to sign multiple Memorandums of Understanding (MoUs).

Table 3: Initiatives toward Smart Bangladesh (Source: a2i, 2022)

Initiatives	Functional areas
Internet access to last-mile citizens	Accessible, reliable, and affordable internet facilities to all citizens
Smart traffic system	Will track roads using artificial intelligence (AI) and data management,and install electrical vehicles with a computer-based system for connecting with others vehicles.
Smart health care	Data will be automatically generated by setting up the chip in the human body and sent to the doctor, and smart health records of patients will be kept for proper treatment.
Smart agriculture	Satellites, microsensors, and mobile phones will be used collectively for proper decisions in irrigation, fertilizer use, and harvesting by farmers and agriculture officers.
Smart education framework	Will focus 5 topics; Teaching-learning practices, content and resources, formative assessment, teacher professional development, and inclusive infrastructure incorporating blended learning.
Waste management in Bangladesh	Waste's place will be identified using image detection technology developing related policy and legal frameworks.
Govpreneurship	Focus on four areas; the purpose of civil service for reducing TCV (Time, Cost, and Visit), autonomy, increasing Competency, and collaboration.
SMART Village Transport	An electric vehicle having low-cost, and eco-friendly smart grid electric charging stations in the city and village.

BCC (Behavior Change Communication)	Change the psychology of citizens for increasing efficiency.
Smart service delivery	Prioritize on S-M-A-R-T where S stands for social to co-create services with citizens and civil society, M for the mobility of services, A for analytics of various departments of government, R for radical opens of government services, and T for trust in cyber security for ensuring security and privacy and protecting data leakage.

The "SMART Bangladesh Vision 2041" aims to transform the country into a high-income economy by 2041, while also achieving equitable and sustainable development. This vision encompasses the development of smart citizens, smart government, smart economy, and smart society.

2.3 Industry 4.0:

The First Stage of the Industrial Revolution presents water and steam-driven mechanical production machinery, the Second Stage introduces electrically powered mass production, the Third Stage combines electronics and IT in manufacturing processes, and the Fourth Stage is based on cyber-physical systems.

The Industrial Revolution is the process of change from an agrarian and handicraft economy to one dominated by industry and machine manufacturing. These technological changes introduced novel ways of working and living and fundamentally transformed the society. First Industrial Revolution (1IR) invented the steam engine, spinning jenny, cotton gin, and telegraph. The Second Industrial Revolution (2IR) brought the advent of the internal combustion engine, controlled electricity, the light bulb, the telephone, the phonograph, radio, and television. Third Industrial Revolution (3IR) has been driven by some new inventions, such as the personal computer, the internet, and mobile devices. These technologies have transformed many industries, including manufacturing, communications, transportation, and healthcare. Fourth Industrial Revolution (4IR) is the trend towards automation and data exchange in manufacturing technologies and processes which include cyber-physical systems

(CPS), IoT, industrial internet of things, cloud computing, cognitive computing, and artificial intelligence. The Fifth Industrial Revelution (5IR) will be human-centric research and development. This approach places human needs and ethics at the forefront, ensuring technological advancements are not only efficient but also beneficial and ethically sound for the society. In 5IR, new inventions may further blur the lines between humans and machines, with more intuitive, natural user interfaces and enhanced brain-computer interfaces that could allow for seamless communication between humans and digital systems. As we enter the The Sixth Industrial Revolution (6IR), also known as Industry 6.0, one technology stands out as a game changer: artificial intelligence (AI). The integration of AI technology into various industries is bringing about a new wave of automation, efficiency, and innovation.

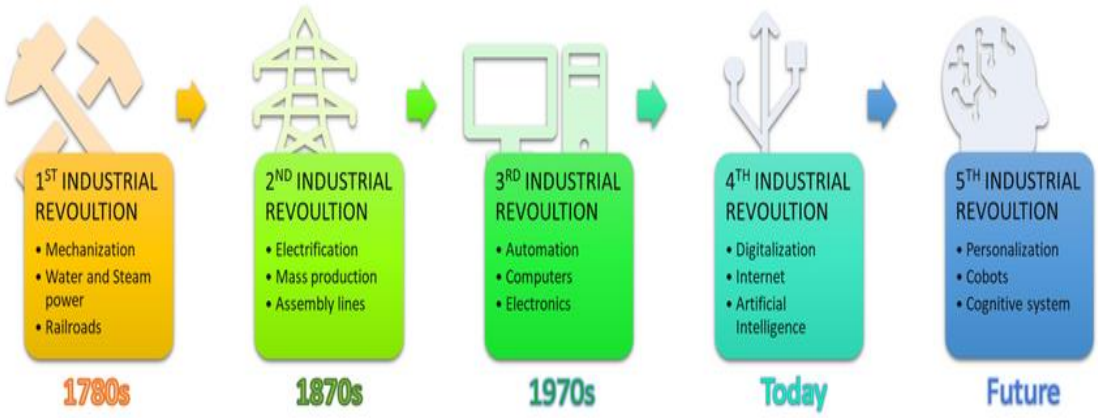

Figure 3: The fourth industrial revolutions (Source: Industrial paper International Journal on Interactive Design and Manufacturing (IJIDeM) (2023) 17:947–97)

Several writers concur with Schwab on the impact of the fourth industrial revolution phenomenon on SME businesses [Brynjolfsson at. al., (2014); Ford, M, (2015); Arntz, M at al., (2016); Frey, C.B & Osborne, M.A., (2017)]. According to Schwab, K (2016) this revolution is complex, scalable, and its scope has never existed in human history. Schwab advises that businesses should respond to it in a coordinated and thorough way, involving all partners globally, from private and public industries to the academic world and the public at large. The first industrial revolution started with water and steam to power machines for manufacturing; the second introduced electricity to create a mass-market of produced goods, the third later introduced electronics, computers, and information technology (IT) to automate the production of goods and services.

Building from the third, the 4IR embodies technologies that conceal the lines between the domains of biology, physical, and digital (Schwab, K, 2016) , and by extension, business domains, as well. Compared to the previous revolutions, the fourth is developing exponentially. Consequently, 4IR changes require governments, corporations, and individuals globally to adapt proactively.

The Fourth Industrial Revolution Industries undeniably have a crucial impact on the nation's economy. Until now, the world has experienced three industrial revolutions, specifically the first industrial revolution, sometimes referred to as Industry 1.0. During this period, there occurred the second industrial revolution, commonly referred to as Industry 2.0, followed by the third industrial revolution, known as Industry 3.0 (Sivathanu & Pillai, 2018).

The Fourth Industrial Revolution is a strategic initiative proposed by Germany to leverage advanced technology. The Fourth Industrial Revolution, commonly referred to as Industry 4.0, is characterized by the integration of advanced technologies and the internet.

After its introduction at the Hannover Fair in 2011, several European governments choose to adopt this technique. It should be emphasized that the fourth industrial revolution is now in its early stages (Strange & Zucchella, 2017; Ghobakhloo & Abbas, 2018). The initial industrial revolution primarily centered around the implementation of mechanical devices powered by steam engines and water power. This occurred throughout the late 17th and early 18th centuries, while the subsequent revolution in the 19th century facilitated the industrialization process through the utilization of electricity.

This method was motivated by the implementation of assembly lines. Henry Ford emerged as the pioneer of this method by establishing mass production as the standard practice. In the 20th century, the industry implemented computers, internet, and automation into production operations.

In the present era, characterized by the 21st century, the focus is on intelligent enterprises and digital technologies. The focus of the research is on artificial intelligence, big data analysis, and the internet of things (Sivathanu & Pillai, 2018; Ghobakhloo & Abbas, 2018).

2.3.1 Main Components of Fourth Industrial Revolution

Big Data: The analysis of Big Data is impacting every area of our modern daily existence. Examples of these aspects include physical science, finance and accounting, manufacturing, retail services, mobile services, and life sciences.

Smart Factory: A smart factory is the transition from conventional automation to a fully adaptable system. A flexible system is one that relies on a continuous flow of data from connected operations and production systems, enabling it to adapt and create new goods in response to changing demands. Gilchrist, A. (2016). Industry 4.0: the industrial internet of things

Cyber Physical System: As stated by Gilchrist (2016) in his work "Industry 4.0: the industrial internet of things," A Cyber Physical System (CPS) is the amalgamation of computation, networking, and physical processes. CPS is a composite of various systems with distinct characteristics. The primary objective of the whole system is to oversee and regulate all physical activities, while also adjusting to changing conditions and demands by utilizing feedback gathered from past physical processes.

Internet of Things: The Internet of Things (IoT), in its simplest form, refers to a network of interconnected objects. These items have the potential to be either individuals or objects. The primary relationships in IoT are categorized as follows: interpersonal, human-object, and object-object (Jun, L. at al., 2017). The IEEE has described the Internet of Things (IoT) as a network of objects that are equipped with sensors and connected to the Internet. Value creation by small and medium-sized enterprises (SMEs) that take part in global value chains within certain industries. It is projected that over 26 billion devices will be interconnected by the year 2020 using the Internet of Things (IoT) concept (Jun, L. at al., 2017).

Interoperability: Value creation by small and medium-sized enterprises (SMEs) that participate in global value chains within the industry. Interoperability refers to the seamless connection and communication of cyber-physical systems, humans, and smart factories via the Internet of Things (IoT) (Chen C. L., 2019). Through the implementation of interoperability, the exchange of information and knowledge can be facilitated seamlessly and accurately, eliminating the possibility of errors. [Jun, L., at al., 2017.]

Interoperability in manufacturing refers to the capacity of integrated components to communicate information with one other. Interoperability is the method by which efficiency, accuracy, and reliability are achieved. The Fourth Industrial Revolution (IR 4.0) will yield significant advantages for all types of enterprises. Organizations will benefit from optimizing production (Maskuriy at al., 2019).

IR 4.0 utilizes nine technological advancements, including autonomous robots, augmented reality, big data and analytics, additive manufacturing, Industries Internet of Things, horizontal and vertical system integration, cloud computing, simulation, and cybersecurity.

These advancements enable automation through autonomous robots and the Internet of Things, reducing reliance on humans and minimizing the potential for errors. The utilization of big data and analytics empowers small and medium-sized enterprises (SMEs) to effectively harness the substantial volume of data collected, thereby generating valuable insights and formulating strategic business plans.

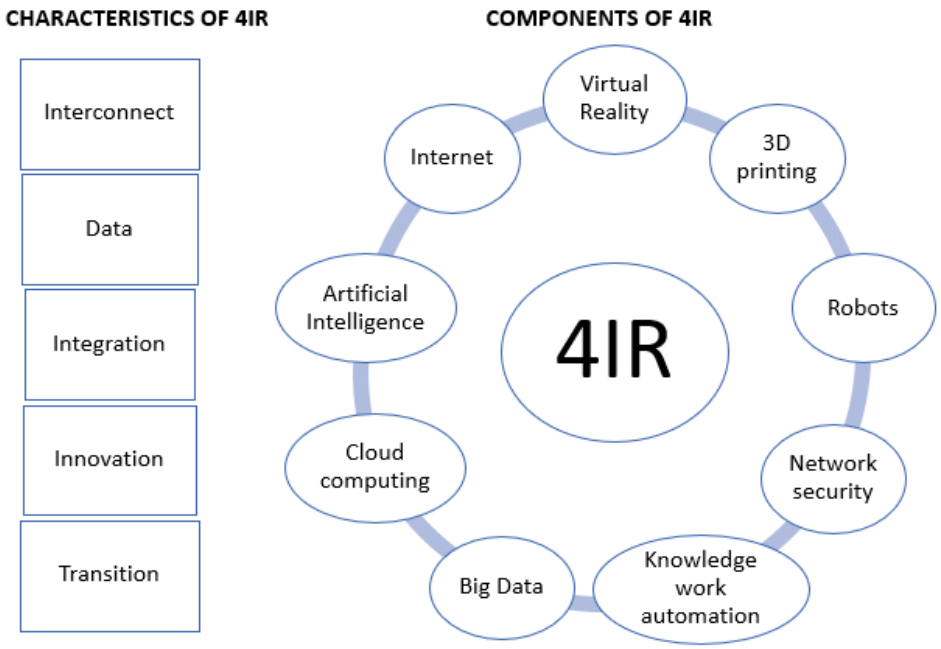

Figure 4: Components of 4IR.0 (Source: Yusuf, Byabazaire at al. , 2020)

Machine learning enables a deeper comprehension of consumer behavior and facilitates the proactive customization of marketing strategies. Cloud computing allows small and medium-sized enterprises (SMEs) to delegate their IT services to cloud providers and

concentrate on their core business activities. Cybersecurity assists small and medium-sized enterprises (SMEs) in effectively safeguarding their data, including customer information, corporate secrets, and sensitive data.

Essentially, implementing self-optimized production will result in minimal or no interruptions in the manufacturing process, which is very important for SME sector. Furthermore, it can enhance the capacity to produce diverse items with increased speed and quality, while also ensuring heightened efficiency.

Furthermore, reducing operational expenses is an additional advantage of the Fourth Industrial Revolution (IR 4.0). This can be attributed to the increased level of automation in the fourth industrial revolution (IR 4.0), which necessitates a reduced workforce and leads to decreased material waste and improved operational efficiency. Therefore, IR 4.0 has the potential to enhance production and efficiency, while also lowering operational expenses and ultimately enhancing competitiveness.

The implementation of IT infrastructure in the initial stages of IR 4.0 will surely necessitate a substantial investment. However, it will ultimately result in a huge long-term impact. Small and medium-sized enterprises (SMEs) will achieve greater cost effectiveness after the complete implementation of Industrial Revolution 4.0 (IR 4.0) takes place (SME Bank, 2017).

Currently, digitalization and Industry 4.0 are prominent trends in the corporate world. However, a recent poll revealed that several industry leaders admitted to being completely unaware of these concepts. Certain leaders possessed knowledge of this fact, but, they lacked the ability to effectively execute or, in other words, adequately equip their businesses for the integration of Industry 4.0. Undertaking the transformation of a firm to digitalization is a momentous decision, since it necessitates a complete overhaul of the organization's strategy.

An evaluation of the organization's readiness for Industry 4.0 is conducted using a self-assessment method. Several studies (Gill and Van Boskirk, 2016) analyze detailed information about IT organizations. The PwC Industry 4.0 maturity model was first presented in the 2016 PwC Industry 4.0 study. The ACATECH study conducted by Schuh et al. in 2017 presented a comprehensive depiction of the maturity model for Industry 4.0. The Forrester digital maturity model (Gill and VanBoskirk, 2016)

measures an enterprise's digital transformation based on four factors, which reflect its complexity and maturity.

According to a theme analysis, the assessment dimensions of these models are conceptually distinct from each other. Through conducting a comprehensive evaluation of existing literature and analyzing the factors that determine a company's readiness for Industry 4.0, our aim is to address the lack of knowledge in this area.

In order to meet the ever-changing demands of clients in a highly competitive environment, manufacturers must regularly reduce operational expenses to be adaptable, efficient, responsive, and cost-effective (Fatorachian and Kazemi, 2018). The broad utilization of automation and digitization, both within and outside the organization's supply chain, enables this. The firm is vertically integrated, with many functional subsystems such as manufacturing, human resources, planning, and procurement operating within it. Automation has been extensively employed in manufacturing environments. While certain production processes were automated, the rest of the functional systems inside the organization were not connected, thereby limiting the advantages of automation (Fatorachian and Kazemi, 2018). Another contributing aspect to the limited success was the lack of interoperability between different interfaces or communication mechanisms, leading to a misalignment between automation systems (Gruhier et al., 2017). Industry 4.0 involves the connection and integration of the virtual and physical worlds by using Cyber-Physical Systems (CPS) and Internet of Things (IoT). This is achieved through the use of intelligent devices that communicate and interact with each other.

Therefore, it is essential for firms to assess their preparedness for Industry 4.0 BIJ before deciding to implement it, as it is a critical strategic decision. Maturity modeling is a widely used approach to assess the level of development of an organization or process in order to gauge its capacity to achieve desired objectives.

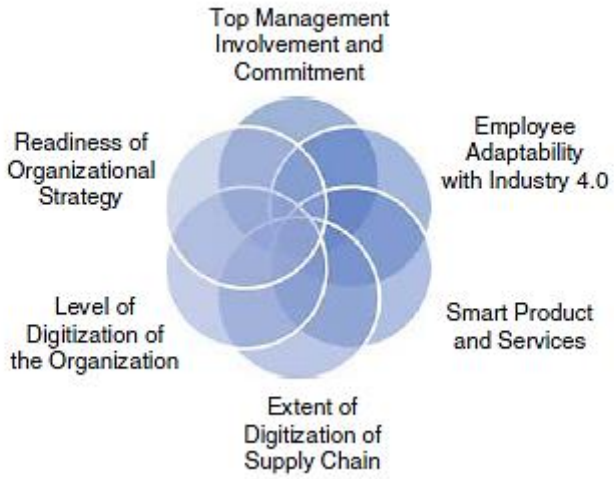

Figure 5: Key ingredients for evaluating Industry 4.0 (source: Fatorachian and Kazemi, 2018).

Despite the growing interest in researching Industry 4.0, the examination of maturity models reveals a lack of research on their applicability in the adoption of Industry 4.0. There is a lack of a universally approved model, and other models differ in their evaluation criteria, dimensions, and elements (Akdil et al., 2018). Moreover, the main emphasis of most of these models' components was on assessing IT readiness. To comprehensively assess the readiness for implementing Industry 4.0, it is crucial to have a clear understanding of the fundamental components involved.

2.3.2 4IR Opportunities:

The influence of Cottage, Micro, Small, and Medium Enterprises (CMSME) on constructing an intelligent Bangladesh in line with the Fourth Industrial Revolution (4IR) offers a multitude of prospects. Here are a few examples:

1. Innovation Ecosystem: Small and medium-sized enterprises (SMEs) in the creative, media, and service sectors (CMSMEs) have the potential to enhance the development of an innovation ecosystem by utilizing digital technology. They have the ability to provide cutting-edge solutions customized for the requirements of a technologically advanced Bangladesh, including Internet of Things (IoT) enabled gadgets, artificial intelligence (AI) powered applications, and environmentally friendly production methods.

2. Job Creation : Micro, small, and medium enterprises (CMSMEs) possess the capacity to provide a substantial amount of employment opportunities, especially

within the technology industry. With the shift towards a knowledge-based economy propelled by the Fourth Industrial Revolution (4IR), Bangladesh will experience an increasing need for proficient professionals in areas such as software development, data analytics, and digital marketing. The establishment of hi-tech parks in Bangladesh is a crucial step towards building a knowledge-based economy. These parks aim to attract local and foreign investment in the information technology (IT) sector, create jobs, and contribute to economic growth. The government has set a target to create millions of jobs in the IT sector by 2025, and the development of hi-tech parks is a key component of this plan.

Currently, there are around 28 Hi-Tech Parks (HTP) / Software Technology Parks (STP) / IT Training and Incubation Centers across the country. The concerned authority has completed some of them which are currently operational. Also, they are working on several other projects which are under construction. Moreover, the government has recently approved some more hi-tech park projects. Bangladesh Hi-Tech Park Authority (BHTPA) is working to implement and maintain these projects. The government established BHTPA under the "Bangladesh Hi-Tech Park Authority Act-2010" with the objective of creating an investment-friendly environment and creating employment through the development and growth of high-tech industries in the country. (https://businessinspection.com.bd/hi-tech-parks-in-bd-present-scenario-and-future-prospects/)

The Union Digital Centre (UDC's) primary objective is to strengthen the Union Parishad in order for decentralized governance. Furthermore, by eliminating technological barriers and integrating all individuals into the contemporary information flow system, these centers have the potential to significantly increase public access to public-private information and services. In Bangladesh, the public-private partnership (PPP) model of micro-enterprise has been utilized in the creation of UDCs. The UDCs are de facto managed by a male and a female entrepreneur, and their modest size makes them "micro" enterprises. The capacity to collaborate with various private-sector players as well as public-sector organizations in order to deliver services at a reasonable price gives birth to the entrepreneurial role. In Bangladesh, under the spirit of micro-entrepreneurship propelled by a PPP structure, UDCs integrate commercial services in addition to government services. With the slogan "Serving with heart," 16,500 entrepreneurs, including over 5,200 women entrepreneurs, are now employed at the

Digital Centre. The number of entrepreneurs between the ages of 31 and 40 is relatively higher at 54%.

The Union Digital Centre (UDC) has been operating as a facility facilitator. Two entrepreneurs—a male and a female—work in each center. Women now have easy access to the center since there are female entrepreneurs, given Bangladesh's unfortunate gender construct which causes discomfort for many rural women to seek service from a male service provider. Entrepreneurs do not invest in companies or hire staff; instead, they make their living by charging the public for their services. Information and service centers have invested in both the government and businesses since they are run on the public-private partnership model. While this is going on, a few business owners are doing great by overcoming the challenging circumstances and making over Tk 50,000 a month by offering a range of public and private e-services to the public.

A study conducted by a2i and UNDP shows the average income of a UDC entrepreneur has soared from 7000 per month on an average to 31000. (https://a2i.gov.bd/union-digital-centers-digitizing-bangladeshs-grassroots/)

3. Access to Global Markets: CMSMEs can conveniently reach worldwide customers by utilizing e-commerce platforms and digital marketplaces. By targeting overseas customers, businesses in Bangladesh can effectively promote their products and services, resulting in greater export prospects and more foreign exchange revenue.

4. Skills Development: A proficient staff is necessary for the implementation of digital technology in CMSMEs. This provides a chance for investments in programs that aim to enhance digital literacy, coding, and other pertinent skills through training and capacity-building initiatives. By enhancing the skills of its workforce, Bangladesh can guarantee that its labor force maintains its competitiveness in the Fourth Industrial Revolution (4IR).

5. Promotion of Hightech Entrepreneurship: CMSMEs are frequently propelled by enterprising individuals with inventive concepts. By fostering a conducive ecosystem for entrepreneurship, Bangladesh can incentivize a greater number of individuals to embark on their own entrepreneurial ventures. This can result in the establishment of

novel startups and innovative firms that contribute to economic expansion and technological progress.

6. Inclusive Growth: Small and medium-sized enterprises (SMEs) in the creative, media, and entertainment sectors (CMSMEs) have the capacity to foster inclusive economic development by generating employment and entrepreneurial prospects for women, young individuals, and underprivileged groups. By implementing measures such as providing digital skills training, facilitating access to finance, and offering mentorship programs, these groups can engage more actively in the digital economy and reap the rewards of its expansion.

7. Sustainable Development : The Fourth Industrial Revolution (4IR) offers CMSMEs (micro, small, and medium enterprises) the chance to use sustainable practices in their operations. CMSMEs can minimize their environmental impact and support sustainable development goals by utilizing technologies such as renewable energy, smart manufacturing, and resource optimization. The main employment effect of 4IR technologies will not be found in the sectors that provide the technology services – mainly the ICT sector. Even in the U.S., an ICT giant in terms of output, employment in the ICT sector – including software development and applications - was only 3.8 percent of all employment in 2017; the telecoms sector in Africa only employs 240,000 people (AUC/OECD, 2021). But Hjort and Poulsen (2019) found that the arrival of high-speed internet in Africa created substantial jobs primarily by pulling people into the labor force to seize opportunities created, increasing overall employment rates.

They also found a significant increase in new firm entry in South Africa. They also found that access to internet increases the probability that a household will operate a nonfarm enterprise. Similarly, research found that a 10 percent increase in e-mail use by firms in a geographicalarea increases the number of full-time employees by 12-14 percent in the same area. Thus the analysis willocus on key employment sectors – agriculture, manufacturing, and services – and how the adoption of4IR technologies could affect employment opportunities there(Louise Fox; Landry Signe, 2021). While we find opportunities for earnings increases (an element of decent jobs) in all sectors, the main effects on the extensive margin – new formal job. If increasing the use of digital and other 4IR technologies could be deployed to support improvements in on- and off-farm productivity, agriculture could be an important growth sector in Africa for

several reasons – can be expected primarily in the services sectors.4IR technologies are already in use in the agricultural sector in Western Europe, North and South America, and East Asia. AI, IoT, Big Data, and autonomous vehicles and drones, along with biotechnologies are being used together in a model called “precision agriculture,” a method of site-specific crop and farming management used to improve farm profitability, efficiency, and sustainability. For example, GPS-based mapping systems including yield monitors are already being used on half of all corn and soybean farms in the U.S.18 Autonomous vehicles for soil preparation, planting,and harvesting are also already in use, and advanced robotics is expected to take over many farm tasks currently done by workers, such as fruit and vegetable harvesting. Radio chips embedded in a IoT systemare widely used to manage livestock production, and IoT technology using field sensors is enabling precise irrigation and fertilization, reducing water wastage and pollution of water resources from agriculturalrunoff. Drones are taking over crop spraying, and connect with sensors on the ground to measure crop health and soil conditions.19 4IR technology is expected to help farmers around the world cope with andmitigate the challenges of a warming and more unstable climate.By following the lead of upper-income countries, Africa could deploy 4IR technology to modernizeand improve productivity, reducing poverty and food insecurity (Signé, 2022). Already, mobile phones are bringing more information to farmers about when and what to plant based on weather forecasts and technical information about crop varieties, building a knowledge-based agricultural community.

Mobile phones are aiding in price discovery and helping to match farmers and wholesalers, reducing price dispersion and transaction costs (Louise Fox; Landry Signe, 2021).Ghana-based companies Farmerline and Agrocenta offer farmers mobile and web technology for agricultural advice, weather information, and financial tips. Zenvus, a Nigerian startup, measures and analyzes soil data to help farmers apply the right fertilizer and optimally irrigate farms . The African Soil Information Service uses remote sensing, providing soil data on an open-source basis, bringing down the cost of soil mapping by 97 percent. If more AI and GPS-coded sensors were used, information could be even further customized, and supply chains could track the progress and quality of crop production in any area. Smartphones are enabling farmers to access pricing data on platforms, reducing the cost of price discovery and shrinking price variation among buyers (Louise Fox; Landry Signe, 2021). Meanwhile, Hello Tractor,

a start-up in Nigeria and Kenya that allows farmers to hire affordable tractors via mobile phone, is expanding operations, bring the efficiency of mechanization to African SHF. The company had already served up to 22,500 customers and reported yield increases of 200 percent for its clients by 2015; it has grown substantially since then. The Moroccan company Visio-Green Africa is partnering with the Moroccan Association of Producers and Exporters of Fruit and Vegetables to use IoT to bring smart irrigation techniques to Morocco's farmers, saving water in an increasingly water-limited country (Louise Fox; Landry Signe, 2021).

Like other countries Bangladesh can also attain sustainable growth through the Fourth Industrial Revolution (4IR). By using technologies such as IoT, AI, and big data, the country may enhance resource efficiency, mitigate climate change, improve healthcare access, promote sustainable urban development, create equitable economic growth, and enhance education and skill development..

8. Government Support: Policies and incentives can be implemented by governments to assist CMSMEs in their transformation into intelligent companies. These measures encompass tax benefits for technology investments, financial aid for the adoption of sustainable energy solutions, and assistance for research and development endeavors. The overall influence of CMSMEs on the establishment of a technologically advanced Bangladesh in line with the Fourth Industrial Revolution is substantial. It presents prospects for creativity, employment generation, skill enhancement, inclusive economic expansion, sustainable development, and governmental backing. By efficiently capitalizing on these opportunities, Bangladesh has the potential to establish itself as a frontrunner in the digital economy and realize its goal of being a technologically advanced nation.

2.3.3 4IR Challenges:

The integration of CMSMEs (Cottage, Micro, Small, and Medium Enterprises) in order to develop a technologically advanced Bangladesh presents various problems that are in line with the concepts and requirements of the Fourth Industrial Revolution (4IR).

Here are several significant obstacles:

1. Technological Adoption Gap: Numerous CMSMEs may have limitations in terms of resources or knowledge necessary to implement sophisticated technologies such as

the Internet of Things (IoT), Artificial Intelligence (AI), or Blockchain, which play a crucial role in the Fourth Industrial Revolution (4IR) environment. To address this disparity in the uptake of technology, it is necessary to make significant investments in training, infrastructure, and the availability of affordable solutions.

2. Digital Infrastructure: The shift towards a Smart Bangladesh requires a strong digital infrastructure that includes fast internet access, dependable power supply, and secure data storage facilities. However, in numerous regions, especially rural ones, there may be a deficiency or insufficiency of such infrastructure, which obstructs the extensive implementation of digital technologies by CMSMEs.

3. Digital Economy: Access to cash is a common obstacle for CMSMEs when it comes to obtaining funding for technology upgrades and innovation. Conventional banking institutions may hesitate to provide loans to CMSMEs due to perceived risks or absence of collateral. Creating novel funding structures specifically designed for CMSMEs is crucial in order to enable their engagement in the digital economy.

4. Skills Development: The fast rate at which technology is advancing in the Fourth Industrial Revolution (4IR) necessitates a workforce that is proficient in utilising new technologies to their full potential. Nevertheless, small and medium-sized enterprises in the creative, media, and technology sectors may encounter difficulties in attracting and retaining highly skilled individuals with the necessary digital expertise. To tackle this dilemma, it is imperative to allocate resources towards education and vocational training initiatives that specifically target the enhancement of digital literacy and technical abilities.

5. Regulatory Environment: It can hinder the expansion of CMSMEs in the digital economy if regulations are outdated or excessively burdensome. To cultivate a flourishing CMSME sector in line with the principles of the 4IR, it is crucial to streamline regulatory processes, safeguard data privacy and security, and provide a favourable policy environment for digital entrepreneurship.

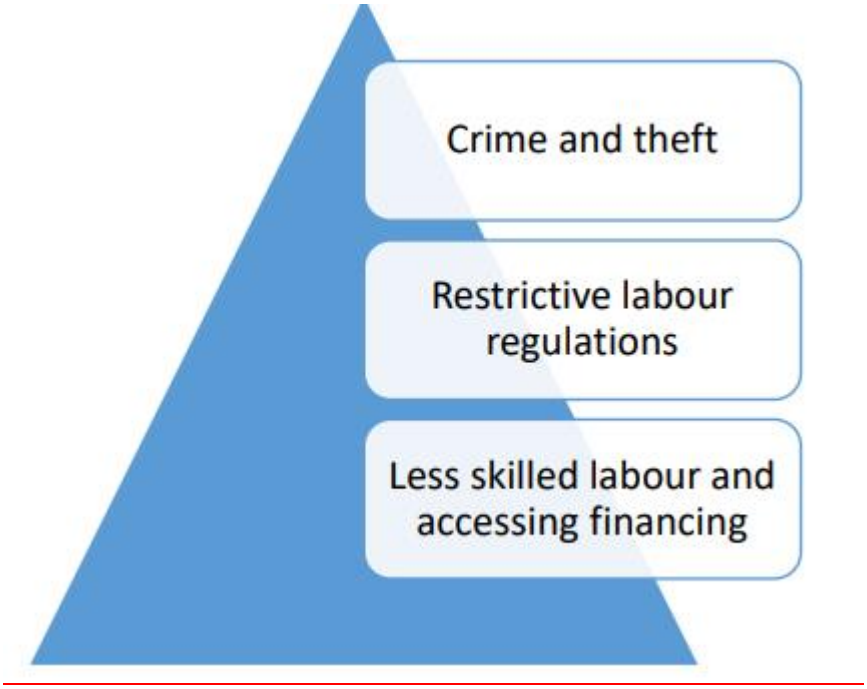

Figure 6: Challenges faced by SME incorporating 4IR

6. CMSMEs encounter intense competition from larger firms and multinational organizations, especially in the digital marketplace. Facilitating support mechanisms such as granting access to digital platforms, offering marketing assistance, and providing mentorship programs will help equalize opportunities and empower CMSMEs to effectively compete in the digital economy.

7. Cybersecurity Risks: As CMSMEs increasingly depend on digital technologies for their operations, they become more susceptible to cyber risks such as unauthorized access to data, malicious software assaults, and extortion through ransomware.

To effectively reduce these risks, it is crucial to raise awareness about the best practices in cybersecurity and offer cost-effective cybersecurity solutions that are specifically designed for the needs of small and medium-sized enterprises in the creative, micro, small, and medium-sized enterprise sector. To tackle these challenges, it is necessary to adopt a multi-stakeholder approach involving the government, private sector, academia, and civil society. This approach will help create a favourable environment for CMSMEs to prosper in the digital era and contribute to the development of a technologically advanced Bangladesh that aligns with the principles of the Fourth Industrial Revolution.

3.0 Methodology

3.1 Research Design

The majority of this study relied on primary interviews with industry experts to assess the role of CMSME in building SMART Bangladesh in context of Industry 4.0 adoption, as well as the related problems and opportunities. Information on the number of small and medium enterprises (SMEs) in Bangladesh, sectorial overviews, statistical data, and the BSCIC industrial estate (IE) was gathered by analyzing secondary sources such as Management Information System (MIS) reports, public databases, papers, and others. Subsequently, we conducted Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) with the industry owners of the chosen 11 industrial estate across various districts. The purpose was to ascertain the significant issues encountered by the industry owners and gain complete insights into the relevant concerns.

3.2 Questionnaire Development:

The whole questionnaire was developed in 3 parts.

First Part:

Here general details about the responders, including their names, ages, levels of education, industries, and descriptions of their products were collected.

Second Part:

In the second part of questionnaire CMSMEs' current conditions in relation to the four SMART Bangladesh pillars (Smart Government, Smart Citizen, Smart Economy, and Smart Society) were measured. Here data was collected about things like the technical and analytical skills of the employees, the quantity of current and past machinery (automatic, semi-automatic, manual) in use, the number of general and special (third gender, disabled etc.) personnel, and the government support needed for this transition. This section consisted of open-ended and multiple-choice questions.

Third Part:

In this section, we assessed the industries' readiness for 4IR adaptation within the context of SMART Bangladesh. Here we applied the Likert Scale.

3.3 Data Collection Methods

3.3.1 Quantitative Data

Survey: A structured questionnaire was developed to collect data from owners and managers of CSMEs across various industrial estates of BSCIC throughout Bangladesh. The survey cover aspects such as current technology adoption, challenges, and perceptions of 4IR and Smart Bangladesh.

3.3.2 Desk Research

A comprehensive desk research was conducted to gather information regarding the diverse CMSME sectors. MIS reports, journals, policy documents, newspapers, and reports from the Bangladesh Government have been used as research materials.

3.3.3 Qualitative Data

Interviews: In-depth interviews were conducted with key stakeholders, including policymakers, industry experts, and representatives from CSMEs. The interviews will focus on gaining insights into the strategic roles, challenges, and opportunities of CSMEs in the context of 4IR.

Focus Groups: Focus group discussions were held with employees and managers of CSMEs to understand their experiences and attitudes towards technology adoption and innovation.

3.4 Sampling: :

Yamane sampling technique was used for sample size calculation. We particularly used this technique because the sample size is too large. As there are limitations in time, budget and manpower it is the most quick and efficient way to determine sample size. The study included the participation of CMSMEs from several industries, such as light engineering, electric products, plastics, pharmaceuticals, leather goods, agro and processed food, and hosiery. The study team has made an effort to ensure consistency in selecting interviews from all chosen industries, achieving some degree of success.

$$n = \frac{N}{1 + Ne^2}$$

n = Sample size
N = Population Size
e = Margin of Error

Here,

Approximate population size, N= 1000

Margin of Error, e = 6%

So,

$n = \frac{1000}{1+1000.06^2}$ =217

3.5 Data Analysis Methods

3.5.1 Quantitative Data Analysis

Descriptive Statistics: To summarize the survey data, including means, frequencies, and percentages..

3.6 Limitations of the Study

1. **Accuracy of the sample:** Findings may not be able to represent all the CMSMEs throughout the country, particularly enterprises in remote and underdeveloped area might face different challenges.
2. **Vastness of the topic:** The research topic is vast, as it covers three significant factors: Smart Bangladesh, 4IR, and CMSME. Sometimes it was difficult to connect all three of them to a single factor.
3. **Self-reporting problems:** As some qualitative questions required certain knowledge about advanced technology the respondents might over estimate their readiness of technology adoption which may lead to biasedness of result.
4. **Lengthy Questionnaire:** As previously mentioned, the research covers several broad topics which led to a four-page questionnaire. The respondents may have been bored or uninterested due to the lengthy questions, which could have led to incorrect responses.

5. **Geographical Difference:** Since the research topic did not specify any particular region, data was gathered from 11 industrial estates located in 10 districts. Furthermore, all the participants were registered with BSCIC. However, individuals who are not located among these specific 10 districts or are not registered with BSCIC may present somewhat different situations.
6. **Constraint of Resources:** Due to the importance and scope of the subject matter, additional resources, including time and money, are required. The lack of these resources may have constrained the sample size and thoroughness of the study.
7. **Technological advancements:** Rapid advancements in 4IR technologies may outpace the study's timeline.

Any other biasness??? Also need to include the areas which are relevant to this topic but due to some constraints like time and budget researcher was undable to include those here in this study.

3.7 Timeline

Month 1-2: Literature review and development of research instruments.

Month 3-4: Pilot study and refinement of instruments.

Month 5-6: Data collection (surveys, interviews, focus groups).

Month 7-8: Data analysis.

Month 9: Case studies.

Month 10: Compilation and writing of the research report.

Month 11-12: Review, revision, and finalization of the report.

3.8 Expected Outcomes

A detailed understanding of the role and impact of CSMEs in the context of 4IR.

Identification of key challenges and opportunities for CSMEs in building a Smart Bangladesh.

Policy recommendations to enhance the contribution of CSMEs to the national economy through the adoption of 4IR technologies.

This methodology outlines a comprehensive plan for investigating the pivotal role of Cottage, Small, and Medium Industries in the development of Smart Bangladesh within the framework of the Fourth Industrial Revolution.

4.0 Results and Discussions

4.1 Smart Citizen

4.1.1 Analytical Abilities of the Employees:

While the overall analytical skills of employees across industries are generally similar, it is worth noting that cottage and micro industries have demonstrated superior performance compared to small and medium companies. There are other factors contributing to this, such as the higher number of workers in small and medium-sized industries compared to managerial-level staff. The analytical aptitude of these numerous employees has a significant influence on their overall ratings. Micro and cottage industries, in contrast, have a small workforce where everyone participates in the decision-making process, resulting in the development of strong analytical abilities among all employees (Figure 7).

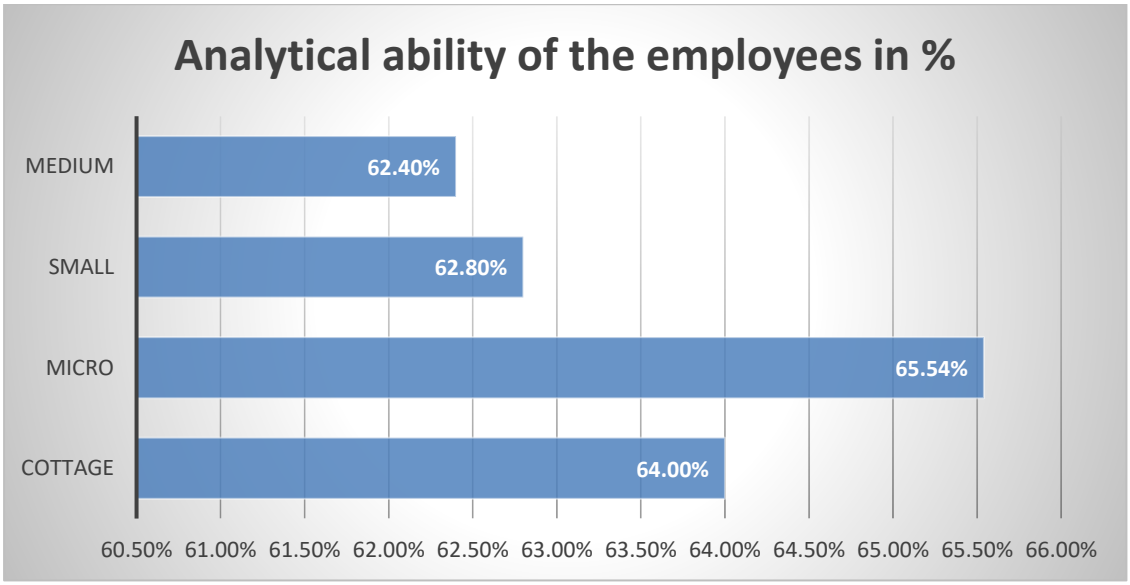

Figure 7: Analytical Abilities of the Employees

4.1.2 Technological Abilities of Employees

It is clear by looking at the technological skills of workers in different sectors that although analytical skills may seem similar, more in-depth variations become apparent. Fundamental technological abilities including computerised machinery competence and mobile operations are required for hiring in small and medium-sized businesses. In contrast, product promotion and active social media participation in cottage and micro

companies require a higher degree of technology literacy, including computer and mobile technologies. This division emphasises the need of customised hiring practices and skill development programmes to meet the various technological needs of different industrial levels (Figure 8).

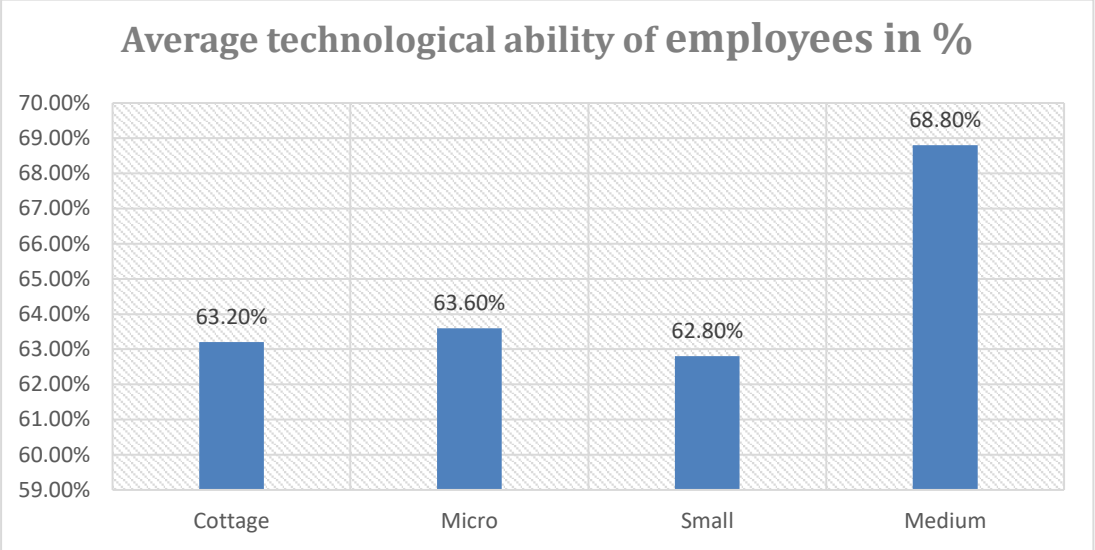

Figure 8: Technical Abilities of the Employees

4.1.3 Participation in the local government initiatives/decision-making processes

The survey revealed that 69% of the respondents have engaged in local government projects and decision-making processes. This involvement basically includes major bi-annual or annual stakeholder meetings with the DC office, participating in government-organized fairs, various national-level programs, and many more. 31% of the population does not participate in such activities. It is important to mention that this 31% primarily consists of cottage and micro industries, as they have limited connections with the local government, aside from participating in various fairs (Figure 9).

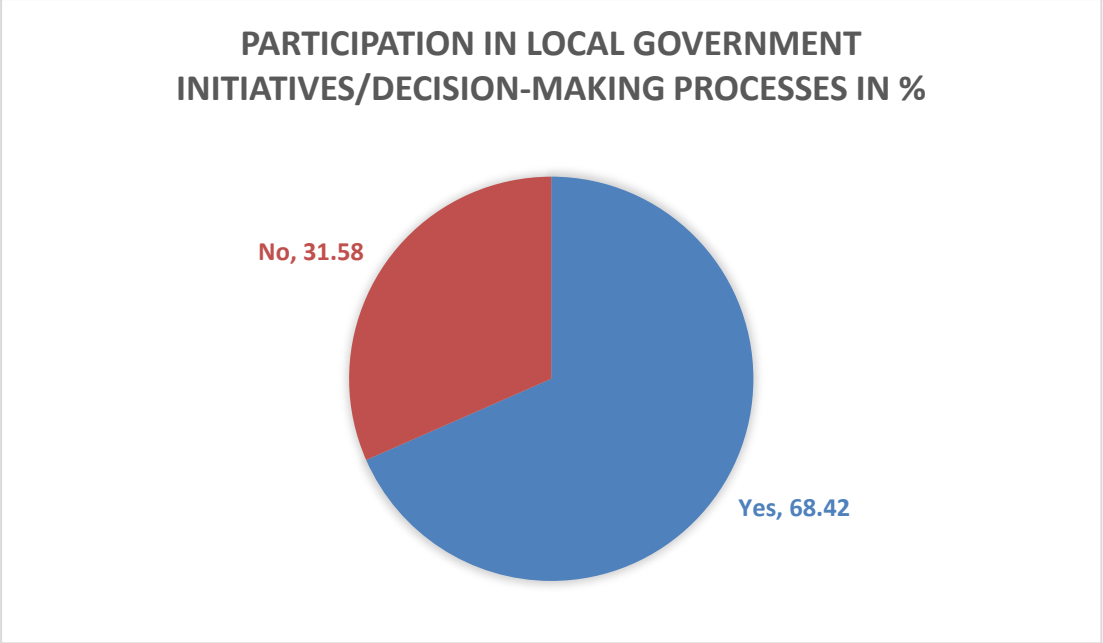

Figure 9: participation in local government initiatives/decision-making processes (%)

4.1.4 Use of Digital Devices

The survey has revealed that organizations employ various forms of digital devices. 50% of the participants utilize smartphones, 30% utilize laptops, 10% utilize tablets, and 30% utilize desktop computers. 10% of the participants utilize a different gadget (Figure 10).

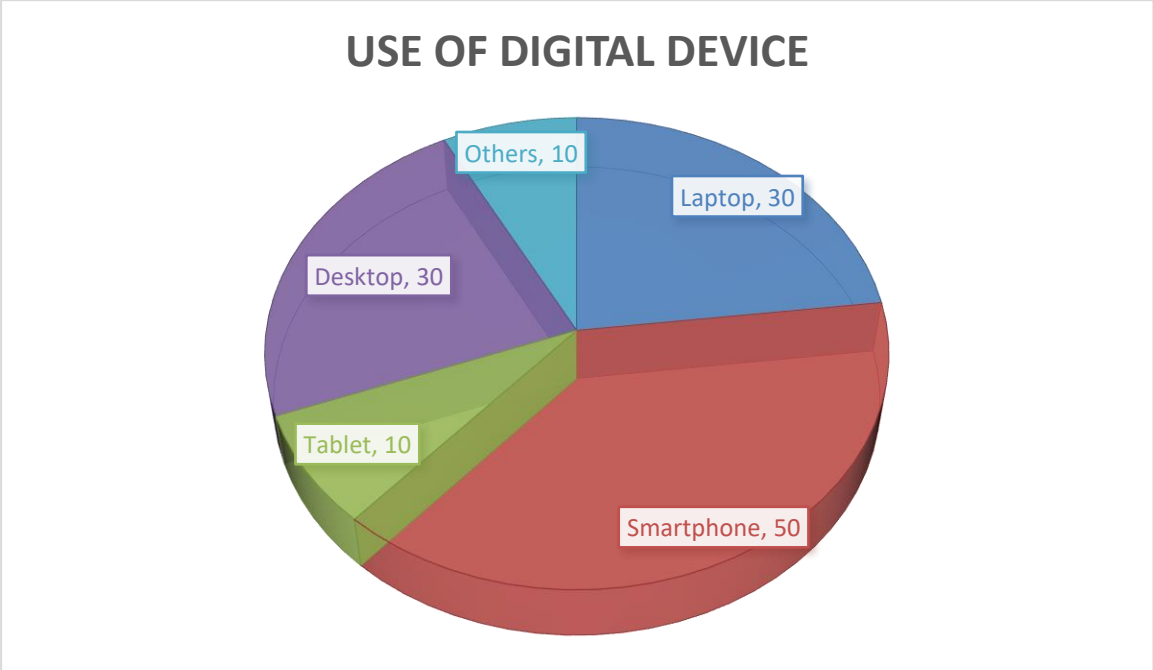

Figure 10: Use of various digital devices in %

4.2 Smart Society

4.2.1 Special Categories of Employees

According to the survey, nearly one percent of workers are classified as special needs. of these individuals, 55% have some kind of physical disability; 22% identify as non-binary; 20% are members of indigenous tribes; and 3% are just not identified. These minimal numbers show how critical it is to have policies and procedures that welcome people of all identities and backgrounds in the workplace (Figure 11).

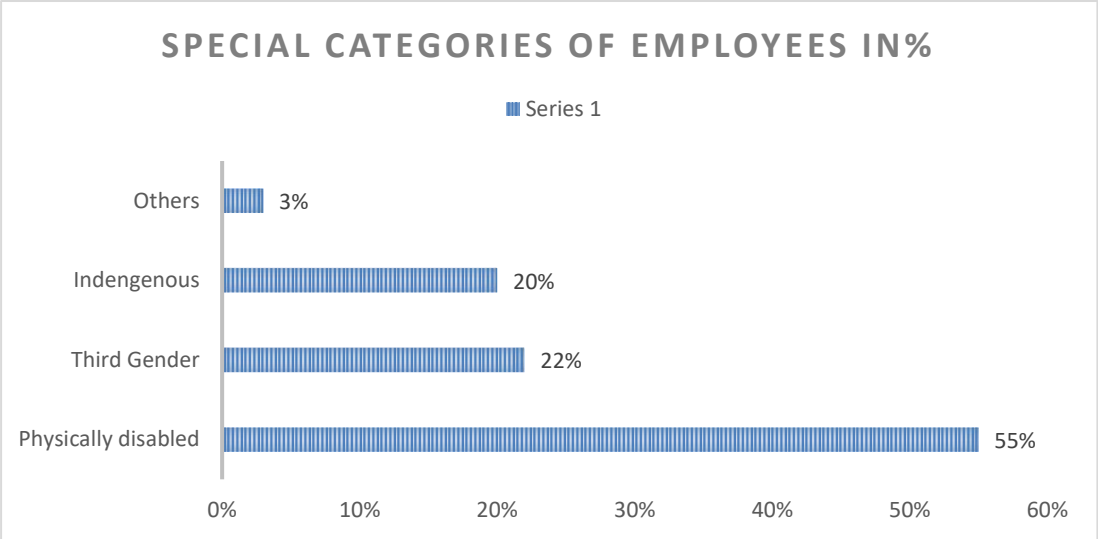

Figure 11: Special Categories of Employees

4.2.2 Company's Efforts to Adopt Sustainable Practices (Such as Waste Management and Green Energy)

According to the survey, as expected medium industries (79%) outperformed small industries (70.49%), micro industries (69.40%), and cottage industries (67.37%). As they scored their industries, respondents for this segment took into account factors like using natural light, waste management, recycling, reducing idle time in manufacturing processes, and shutting off equipment when not in use (Figure 12).

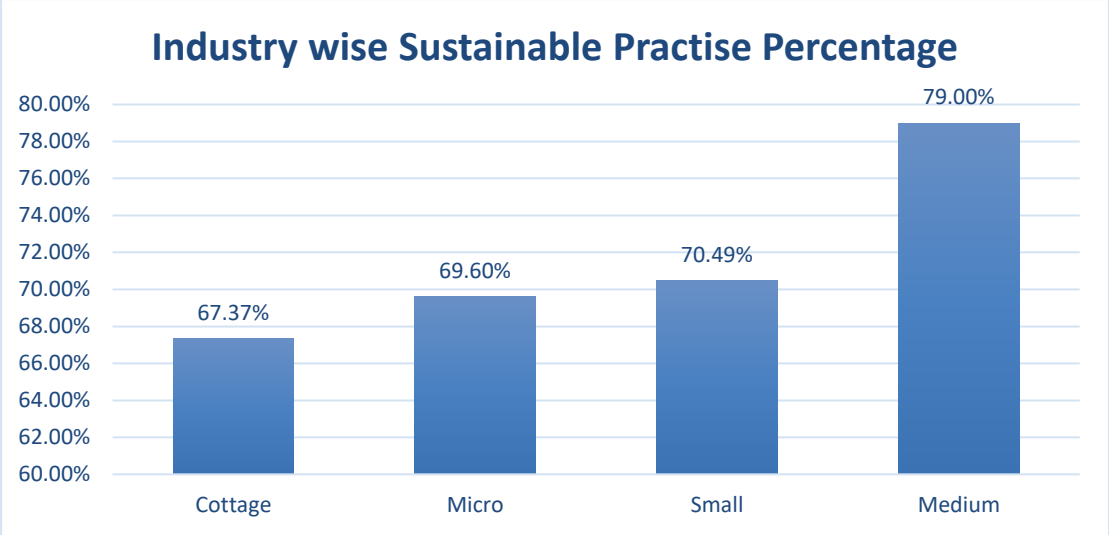

Figure 12: Industry wise Sustainable Practise Percentage

4.2.3 Gender Wise Salary Gap in the Company

According to the results, the vast majority of companies (87%) do not discriminate against women in terms of pay. Around five percent of the companies have a small gender pay gap. Eight percent of the total organisations chose not to respond. So, pay is based on merit rather than gender (Figure 13).

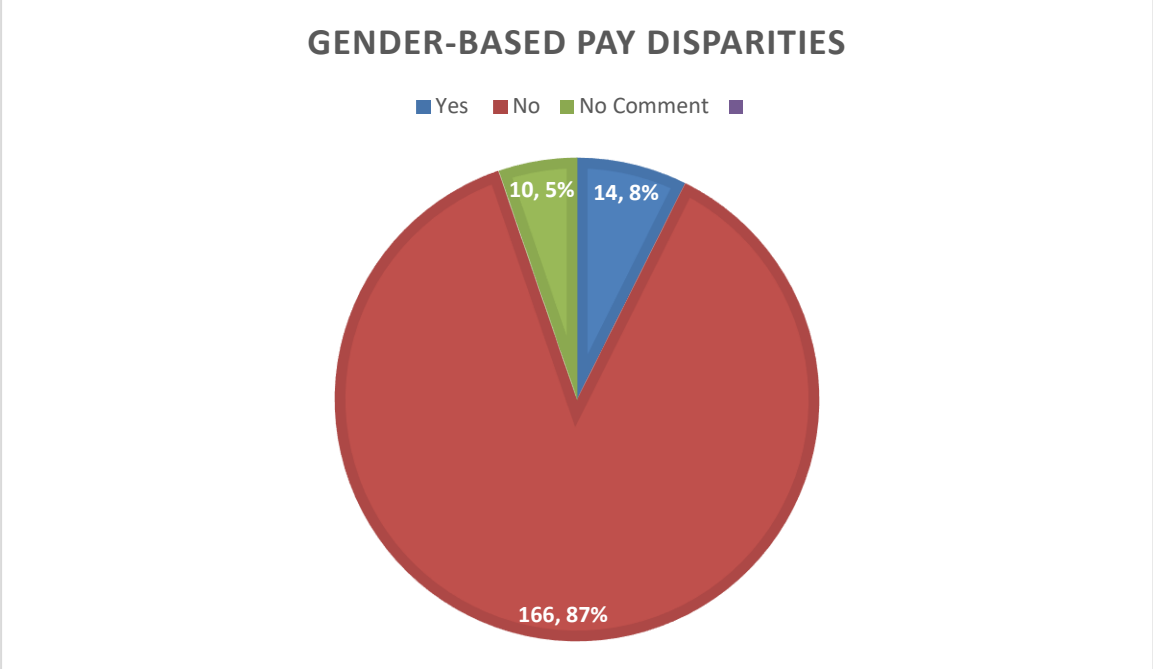

Figure 13: Gender based pay disparities.

4.2.4 Company Complies with Social Compliance

The poll indicated that an insignificant 30% of all companies strictly comply to social compliances, which encompass provisions such as child care centres, maternity leave, and punctual salary and wage payments. Roughly 50% of companies adhere to social compliance concerns in a subpar manner, ensuring merely timely payment. Meanwhile, the remaining 20% do not comply with social compliance. 50% of the industries are comprised of small and micro enterprises, while 30% are primarily middle and small enterprises. This indicates a lack of effectiveness in the cottage and little adherence to social standards (Figure 14).

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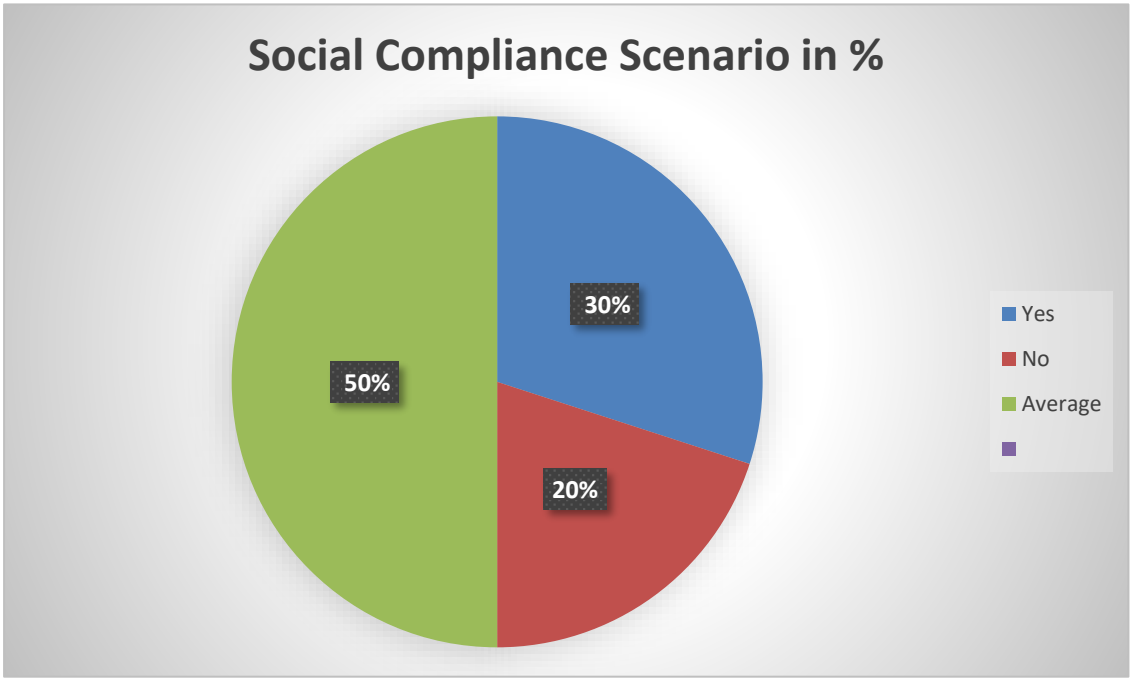

Figure 14: Special Compliance Scenario

4.2.5 Company's Arrangement Related to Social Compliance

The survey on social compliance arrangements revealed that 6% of the companies have a child care facility, 30% of the companies have maternity leave facilities, 90% of the companies' pay salaries and wages on time, and 60% of the companies offer overtime and festival bonuses. Approximately 30% of the companies offer production bonuses and make donations (Figure 15).

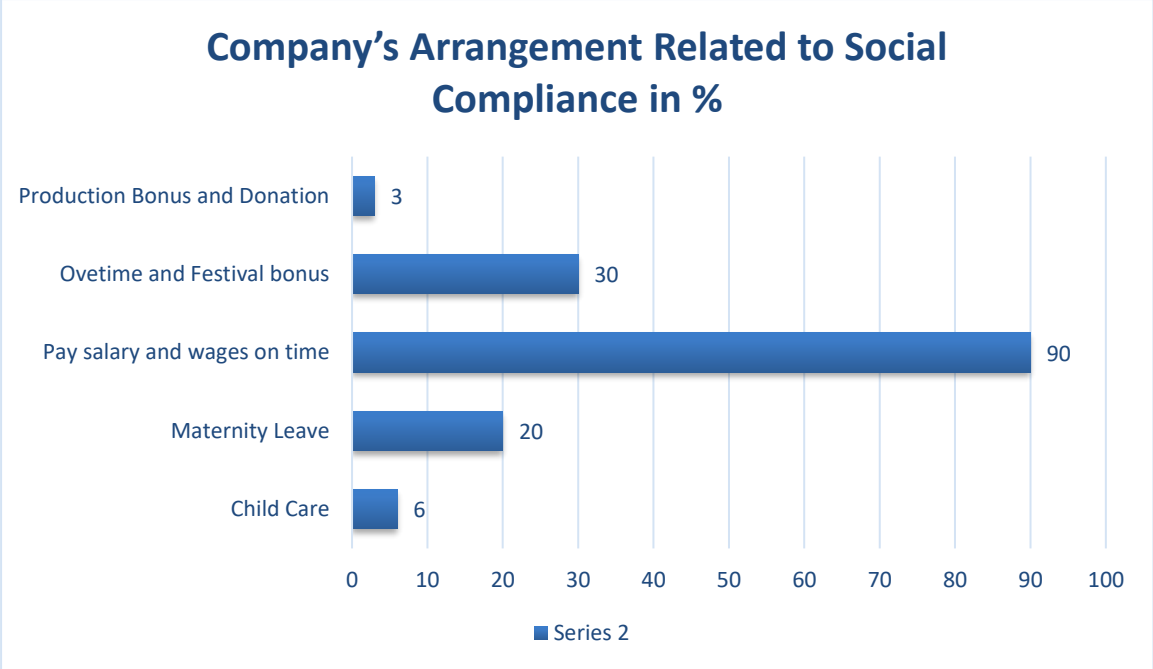

Figure 15: Company' s arrangment related to social compliance in%

4.3 Smart Economy

4.3.1 Changes in Manpower

According to the survey, the demand for human labor decreases as industry reliance on machinery and technology increases. Because of the obvious need for human labor and manual machinery in cottage and micro enterprises, the number of people employed in these fields has been rising in parallel with the rise of entrepreneurship in the whole country (Figure 16).

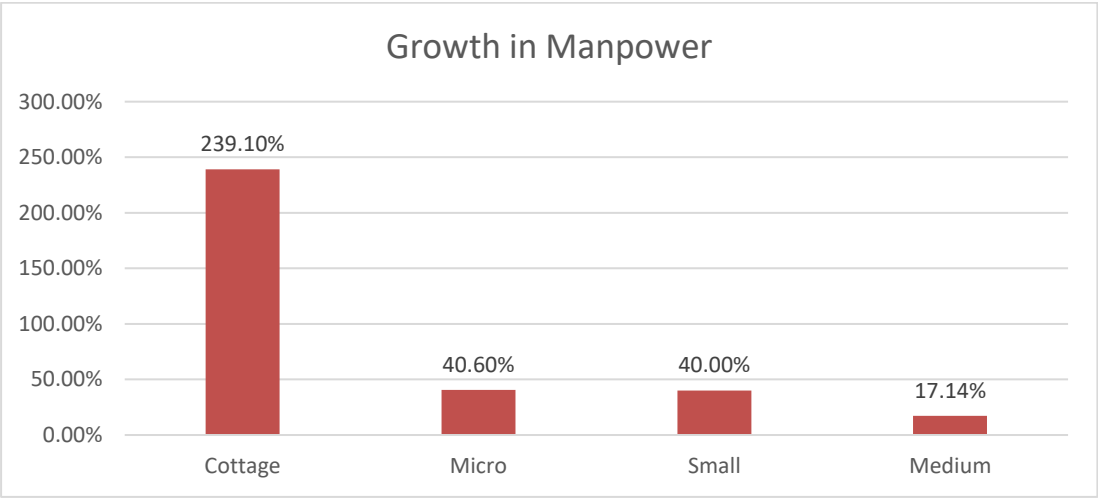

Figure 16: Growth in Manpower

4.3.2 Changes in Salary

The poll showed an interesting fact: the yearly increment of operators exceeds that of managers. If we dig further, the major reason is that technical or hard skills are more valued than soft skills by managers in this competitive industrial environment. With the advent of the Industrial Revolution, more workers with technical abilities will be required. Conversely, there are fewer managerial positions and lower starting salaries in the cottage and micro industries. As a result, their growth appears to be higher (Figure 17).

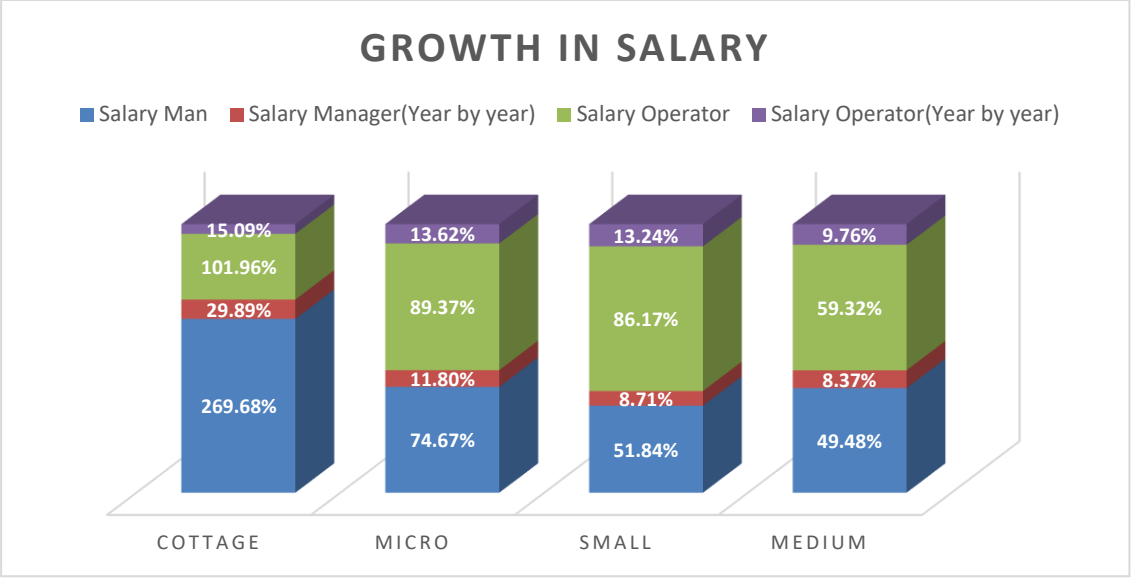

Figure 17: Growth in salary

4.3.3 Cashless/digital transactions in the companies

The lower performance of cottage and micro companies on this metric is not surprising given that medium-sized and small companies employ a larger workforce. Mobile financial services and banking channels account for the majority of these workers' income and benefit distribution. In addition, small and medium-sized business clients tend to have significantly bigger purchase sizes. So, instead of paying with cash, people frequently use a banking channel or mobile banking (Figure 18).

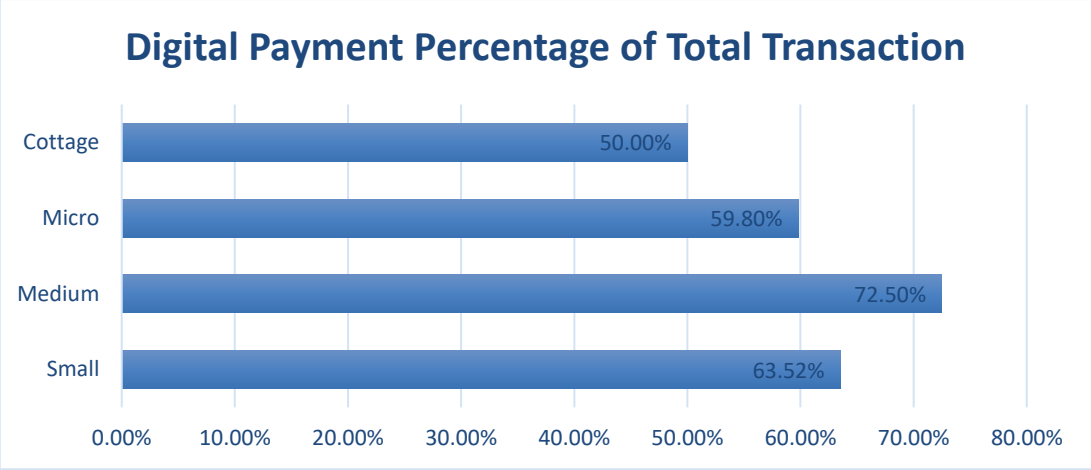

Figure 18: Digital payment percentage of total transaction

4.3.4 Adoption of Machineries Growth

This graph illustrates the occurrence of the industrial revolution throughout many sectors of the economy. The small and medium industries are experiencing a significant increase in the use of automated and semi-automatic machinery. However, cottage industries continue to primarily depend on semi-automatic and manual machinery. Given that our small and medium industries are the primary catalysts of our industrial revolution, it is anticipated that their reliance on automated machinery would progressively grow. Consequently, as we can see from the preceding graph, these two industries are seeing relatively slower manpower growth (Figure 19).

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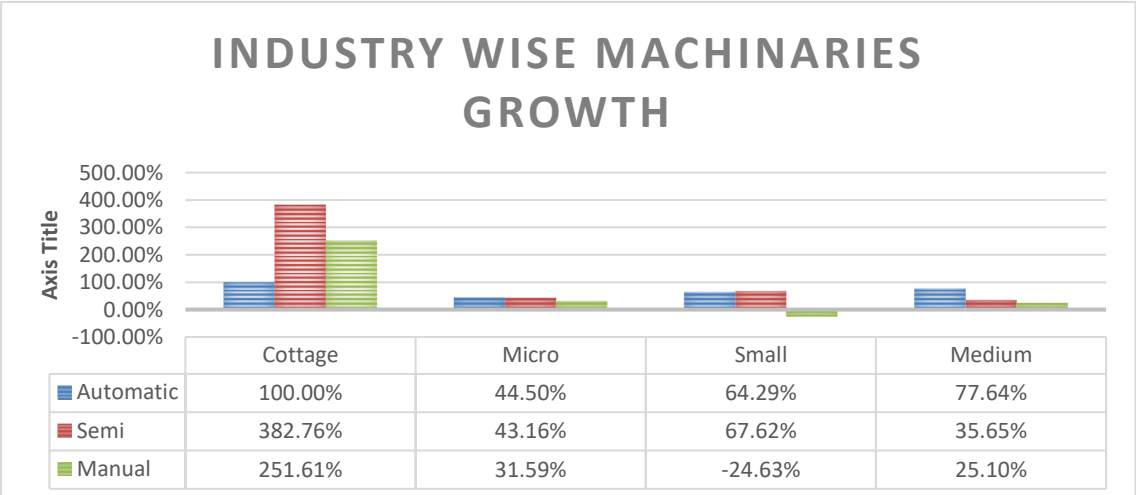

	Cottage	Micro	Small	Medium
Automatic	100.00%	44.50%	64.29%	77.64%
Semi	382.76%	43.16%	67.62%	35.65%
Manual	251.61%	31.59%	-24.63%	25.10%

Figure 19: Industries wise machineries growth

4.4 Smart Govt

4.4.1 Evaluation related to the use of advanced technologies (e.g., IoT, AI, blockchain) in government operations

The majority of the participants were neutral on this segment due to their lack of familiarity with advanced technology. The individuals who utilize these technologies are somewhat content with the government's initiatives; however, they have suggested that there is ample opportunity for improvement, as new technologies are introduced daily. The assimilation of these technologies into government services should be user-friendly and accessible to the general public (Figure 20).

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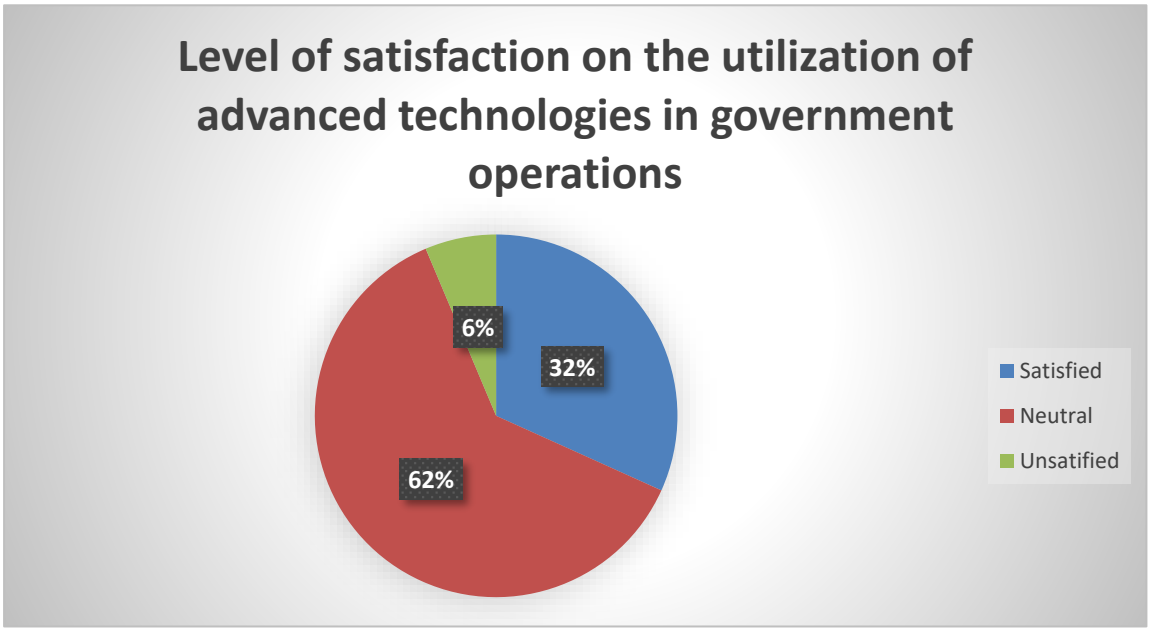

Figure 20: Level of satisfaction on the utilization of advanced technologies in government operations

4.4.2 The roles of organizations play in building a smart Govt

The survey revealed that around 60% of all enterprises contribute to the development of a smart government. They have actively engaged in various government programs, strictly adhere to all government regulations, diligently fulfill their obligations to pay value-added tax and taxes, and contribute to the eradication of unemployment (Figure 21).

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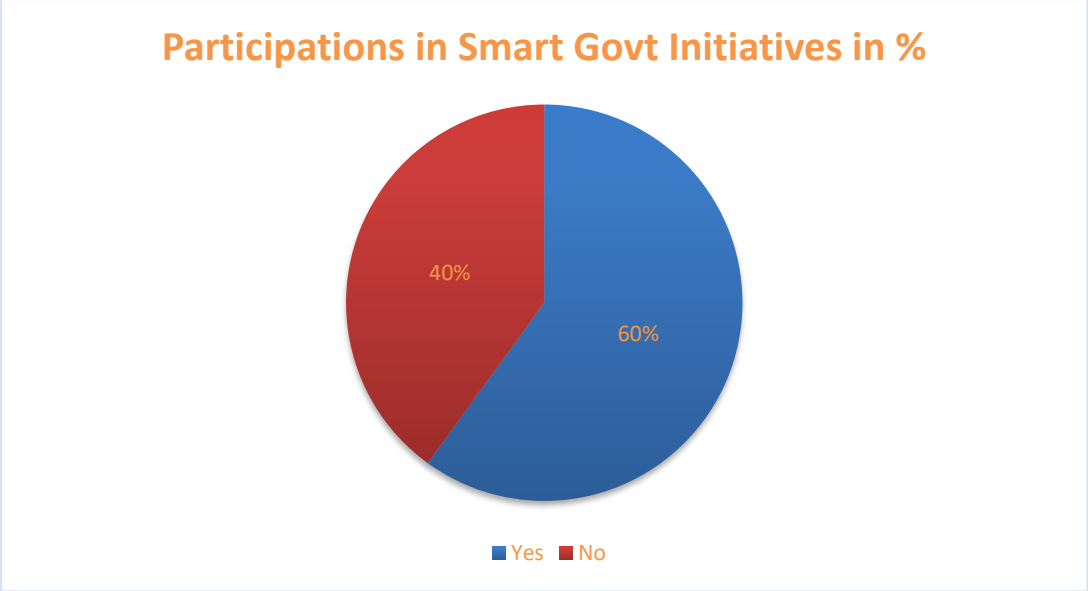

Figure 21: Smart govt initiatives

4.4.3 BSCIC One-Stop Service (OSS) Registration

The survey findings indicate that approximately 80% of small and medium industries operating within our industrial estates are currently enrolled in BSCIC OSS (One Stop Service). However, this figure drops to around 50% for cottage and micro industries, suggesting a significant portion of entrepreneurs in this sector remain unregistered with BSCIC.

Given BSCIC's pivotal role as the supporting authority for Cottage, Micro, Small, and Medium Enterprises (CMSMEs) in the country, efforts should be made to increase this registration rate. Notably, among the companies registered with BSCIC OSS, 80% obtained industrial registration, while half of them availed services for obtaining Export Registration Certificates (ERC) and Import Registration Certificates (IRC). Moreover, 85% of participants benefited from training services facilitated by BSCIC OSS (Figure

22).

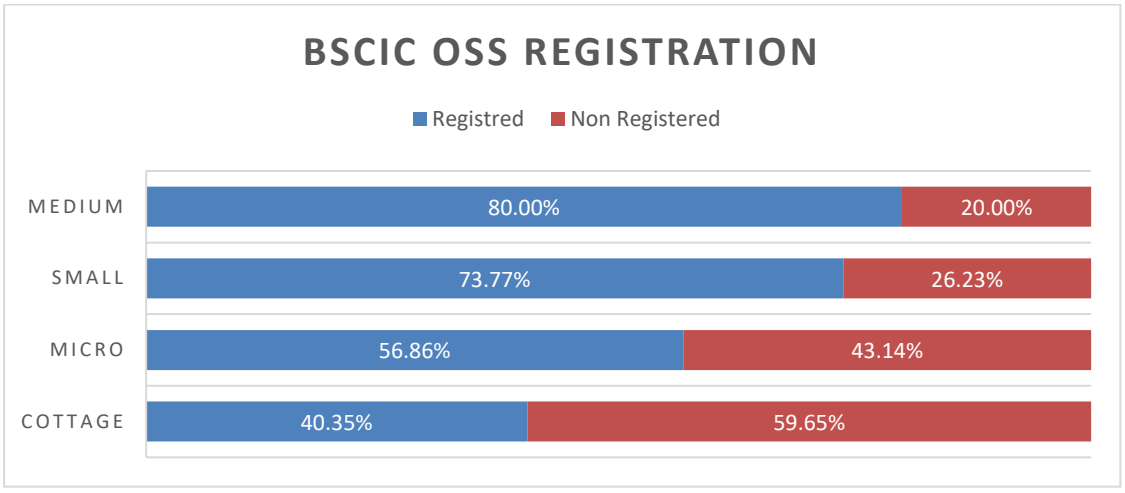

Figure 22: Industry-wise BSCIC OSS Registration

5.0 Findings

1. Employee's Analytical Skills

Cottage and micro industries beat small and medium firms in analytical skills, even though employees across industries are generally similar. Other considerations include the higher number of workers in small and medium-sized industries than managerial-level professionals. The analytical skills of these many personnel affect their ratings. In contrast, micro and cottage companies have a small workforce where everyone participates in decision-making, developing excellent analytical skills.

2. Employee's Technological Skills

The technological skills of workers in different areas show that while analytical skills may seem similar, they differ considerably. Small and medium-sized firms hire people with computerized machinery and mobile operations skills. Cottage and micro businesses need computer and mobile technology proficiency for product promotion and social media involvement. This division emphasizes the need for customized recruiting and skill development to satisfy industry technological needs.

3. Participation in Local Govt Initiatives

The study found that 69% of respondents participated in local government programs and decision-making. This includes large bi-annual or annual stakeholder meetings with the DC office, government-organized fairs, national programs, and more. 31% of people don't do so. This 31% is mostly cottage and micro industry, which have few local government contacts besides fairs.

4. Utilization of Digital Device

The survey found that enterprises use numerous digital devices. 50% use smartphones, 30% laptops, 10% tablets, and 30% desktops. 10% of participants use another device.

5. Special Categories of Employees

The survey found about 1% of workers are in special category. 55% have a physical impairment, 22% are non-binary, 20% are indigenous tribal members, and 3% are unidentified. These low numbers demonstrate the importance of workplace practices that welcome various identities and origins.

6. Sustainable Practices

Medium industries (79%) exceeded small (70.49%), micro (69.40%), and cottage (67.37%) industries, as projected. In scoring their industries, respondents for this section considered natural light, waste management, recycling, reducing idle time in manufacturing processes, and turning off equipment when not in use.

7. Gender Base Salary Disparity

The statistics show that 87% of employers do not pay women differently. A slight gender wage gap exists in 5% of organizations. Eight percent of organizations declined to answer. Thus, merit determines income, not gender.

8. Social Compliance

The poll found that only 30% of companies strictly comply with social compliances such child care centers, maternity leave, and timely salary and wage payments. About half of firms just pay on time for social compliance. The remaining 20% violate social compliance. 30% of industries are middle and small firms, while 50% are small and micro enterprises. This suggests the cottage is ineffective and not socially acceptable. According to the social compliance survey, 6% of employers have child care facilities, 30% have maternity leave facilities, 90% pay salaries and wages on time, and 60% offer overtime and festival bonuses. About 30% of corporations donate and offer production bonuses.

9. Changes in Manpower

The poll indicates that as industries increasingly depend on machines and technology, the demand for human labor reduces. The increase in entrepreneurship across the country has led to a corresponding surge in employment within cottage and micro companies, as these sectors require human labor and manual machinery.

10. Changes in Salary

The poll revealed a noteworthy finding: the annual growth rate of operators surpasses that of managers. Upon closer examination, the primary factor is that managers in this fiercely competitive industrial setting place a higher importance on technical or hard abilities compared to soft talents. The Industrial Revolution will need an increased demand for workers with technical skills. In contrast, the cottage and micro businesses offer a limited number of managerial opportunities and comparatively lower starting salaries. Consequently, their rate of growth seems to be elevated.

11. Cashless or Digital Transaction

The relatively weaker performance of cottage and micro enterprises on this criterion can be attributed to the fact that medium-sized and tiny companies have a larger number of employees. The primary source of income and delivery of benefits for these workers is through mobile financial services and banking channels. Furthermore, it is noteworthy that clients belonging to small and medium-sized businesses exhibit considerably larger buy amounts. Instead of using cash, customers often opt to utilize a banking channel for their transactions.

12. Machineries Growth

Automated and semi-automatic machinery usage is rapidly rising in small and medium-sized companies. Nevertheless, cottage industries still rely predominantly on semi-automatic and manual machinery. Considering that our small and medium industries are the main drivers of our industrial revolution, it is expected that their dependence on automated machinery would gradually increase. Therefore, based on the previous graph, it is evident that these two industries are seeing comparatively sluggish workforce expansion.

13. Implementation of Advanced Technologies

Most of the participants expressed neutrality towards this portion since they were not well-versed in new technologies. The users of these technologies are moderately satisfied with the government's efforts; however, they have indicated that there is much room for enhancement, given the constant introduction of new technology. The integration of these technologies into government services should prioritize ease of use and be readily available to the general population.

14. The role of Organization plays in building Smart Govt

The survey findings indicate that around 60% of all firms actively contribute to the advancement of a smart government. They have actively participated in several government initiatives, rigorously comply with all government rules, conscientiously perform their responsibilities to pay value-added tax and taxes, and contribute to the elimination of unemployment.

15. BSCIC One stop Service

About 80% of small and medium companies in our industrial parks are enrolled in BSCIC OSS, according to the survey. This percentage reduces to 50% for cottage and micro industries, showing many entrepreneurs in this category are unregistered with BSCIC. As the sole supporting authority for Cottage, Micro, Small, and Medium Enterprises (CMSMEs), BSCIC should boost this registration rate. BSCIC OSS enrolled 80% of firms for industrial registration, and 40% for ERC and IRC services. BSCIC OSS training helped 85% of participants .

5.1 Readiness of the Industries in Context of Fourth Industrial Revolution (4IR)

5.1.1 Smart Society Readiness in the context of the 4IR

In this case, the percentages for micro (56.37%), small (59.12%), and medium (65.00%) were all quite close. There are several underlying reasons for this:

Investment in Digital Infrastructure: Most of these companies have invested in dedicated internet connections and data security, as investing in digital infrastructure is essential for gaining a competitive advantage in the digital business world.

Social Inclusion: It's encouraging to see that around 90% of industries have adopted a decent salary structure that applies to all demographics, regardless of gender, race, or religion. This demonstrates a positive step towards creating a more inclusive and prepared society. It is important that salaries are determined by individual merit rather than demographic factors.

The lacking that we have seen are:

Data Security: Most of the companies lack enough data security measure which makes them vulnerable to any kind of data breach or cyber attacks. Moreover they don't have any kind of centralized database which is a severe threat to data security.

Quality Monitoring Tools: Furthermore, cottage and micro industries lack dedicated quality monitoring tools and techniques. Up until now, they have been relying on their own judgment and manual inspections, which has had a significant impact on their scores.

5.1.2 Smart Citizen Readiness in the Context of the 4IR

As Expected in this criteria medium (80.00%) industries outperformed micro (56.62%) and small (61.07%) industries. There are several underlying reasons for this:

Use of HR Management tools: Most small and medium industries utilize various HR management tools, whether digital or manual. This tool is capable of performing

various tasks such as attendance tracking, performance monitoring, and hiring, among others.

Employee Involvement in Decision-Making: Employee participation in decision-making is common in good companies. Though it is widespread in small and medium-sized companies, this approach appears to be prevalent in cottage industries as well. Because they have fewer employees, the owner must make judgments based primarily on information provided by the employees.

There are some lackings as well:

Inclusion of HR Management Tools In contrast to small and medium-sized enterprises, cottage and micro industries make little use of digital HR management technologies. These industries rely heavily on manual registers for HR operations. For any kind report the reliance on the manual report is quite inefficient and time consuming.

5.1.3 Smart Economy Readiness in the Context of the 4IR

In this segment none of the industries performed up to the mark but still small (50.14%) and medium (66.25%) industries somewhat performed better than the cottage (35.39%) and micro (49.78%) industries.

Reasons:

Adoption of Digital Payments: All companies engage in digital transactions, with small and medium-sized enterprises conducting nearly 70% of their transactions through online and banking channels. This transformation simplifies the reporting process and saves a significant amount of time.

Establishment of Research and Development Cells: The small and medium industries, particularly the RMG and pharmaceutical sectors, have set up specialized R&D cells. In order to thrive in today's fiercely competitive landscape, constant innovation is an absolute necessity.

Challenges:

Cash Transactions: Most of the cottage and micro industries prefer cash transactions over online transactions because of their lack of digital literacy. Occasionally, they purposefully stay away from this channel in order to evade tax and record-keeping requirements. The reliance on cash transactions reduces the accountability and transparency in the business world.

Limited Innovation: Trading is generally preferred by cottage and micro industries over manufacturing. They heavily rely on existing designs on the market for manufacturing since they don't have a dedicated innovation or R&D cell. Their inability to grasp the bigger picture blocks them from establishing a strong brand presence and sustaining a competitive edge in the long run.

5.1.4 Smart Govt Readiness in the Context of the 4IR

This segment saw the worst performance by all the industries. If we must look for a bright spot, medium industries scored nearly 50%, small and micro industries scored about 40% whereas cottage industries did the worst, scoring less than 30%.

Positives:

Paperless Office: Small and medium companies performed this much as they have adopted the paperless office culture. Whereas cottage and micro industries maintain some sort of manual registers for their documentation.

Challenges:

Readiness for new machine installation: Most of the companies whether it is small or medium they lack the setup for installing new machineries. To be a 4IR ready company factories have to be plug and play ready for new machineries.

Data-driven decision-making: In today's world, making a decision without thorough data analysis is equivalent to making no decision at all. According to our survey, small and medium industries employ some form of data-driven decision-making, while cottage and micro industries still rely on the owners' decisions, which may or may not stem from proper data analysis.

6.0 Recommendations

Within the framework of Bangladesh's CMSME (Cottage, Micro, Small, and Medium Enterprises) sector and its integration with the Fourth Industrial Revolution (4IR), the following strategic proposals are proposed:

1. Enhance Analytical Ability

Develop and execute specialized training programs (Data Analytics, Critical Thinking, Emotional Intelligence, TQM, etc.) in all industries, specifically designed to improve analytical skills.

Cottage and micro industries should implement systematic decision-making processes to foster the development of analytical abilities among their staff

2. Improve Technological Ability

Implement subsidies or grants to support CMSMEs in procuring and adopting Industry 4.0 technologies, including automated manufacturing systems, IoT devices for supply chain management, and predictive analytics for production optimization.

Promote innovation by providing research and development incentives specifically designed for small and micro firms.

3. Participation in the Local Government Initiatives

Provide a variety of awareness-raising events, such as workshops, fairs, and seminars, to encourage people to get involved in local government projects.

Emphasize the opinions of the industry owners in the local govt. decision making process.

4. Adoption of Industry 4.0 and Access to Technology:

Easing automated and semi-automated machineries import, Vat and Tax may be reduced for importing digital machineries and machine parts.

Provide necessary technical support and training for the operations of these machineries.

Promote wider utilization of digital devices in all industries by providing subsidies or incentives for small and micro firms. This effort has the potential to enhance operational efficiency and connection, which are crucial for effectively navigating the Fourth Industrial Revolution (4IR). Implement subsidies or grants to support CMSMEs in procuring and adopting Industry 4.0 technologies, including automated manufacturing systems, IoT devices for supply chain management, and predictive analytics for production optimization.

Promote innovation by providing research and development incentives specifically designed for small and micro firms. Streamline access to financial and technological

resources to improve competitiveness and responsiveness to the demands of the Fourth Industrial Revolution (4IR).

Create cooperative environments where CMSMEs can utilize common resources and specialized knowledge in Fourth Industrial Revolution (4IR) technologies, promoting the development of new ideas and the exchange of information.

Reducing vat-tax on ICT equipment.

5. Implement Inclusive Workplace Practices:

Establish comprehensive diversity policies that cater to employees belonging to unique groups/ special categories, such as those with physical disabilities, non-binary, tribal groups, etc. individuals.

Govt. may provide certain incentives on achieving a level of inclusiveness in the workforce of the industries.

6. Promote Sustainable Practices:

Set universal standards for sustainable practices across the business and provide incentives for adherence, including in the areas of waste management and energy efficiency.

Offer training and assistance in the implementation of environmentally-friendly technologies at all levels of industry.

7. Address Gender Pay Disparities

Conduct periodic audits to ensure equal pay between genders.

Establish equitable wage frameworks that priorities merit and performance above gender, so strengthening the organization's dedication to impartial employment policies.

8. Strengthen Social Compliance

Enhance social compliance by increasing awareness and enforcement of rules related to maternity leave and child care facilities.

Assist cottage and micro industries in meeting these standards by implementing capacity-building activities.

Guarantee the well-being of workers in industrial parks.

9. Skill Development and Training programs

Make a workplan addressing the need of dense labor industries in context of our huge population and demographic dividend.

Create updated training modules based on need and implement training initiatives to help CMSMEs' employees and owners become more proficient in digital skills. These encompass fundamental IT skills, digital marketing, e-commerce, and knowledge of cybersecurity. Also, implement training programs focused on new technologies such as artificial intelligence (AI), Internet of Things (IoT), and blockchain, specifically designed to meet the requirements and capabilities of small and medium-sized enterprises (CMSMEs)

10. Cashless/Digital Transactions in the Companies

Limiting Cash Transaction and adapting digital transaction

Govt. may provide some sort of incentive for achieving certain level of digital transaction.

11. Enhance BSCIC One Stop Service (OSS) Registration

As the country's support authority for Cottage, Micro, Small, and Medium Enterprises (CMSMEs), BSCIC should boost this registration rate and make it easier and accessible for the mass community.

Majority of the respondents suggested that BSCIC should take necessary initiatives to avoid dual taxation and BSCIC should be the only body to collect taxes and revenues.

12. Electronic Commerce and Digital Marketing:

Equip CMSMEs with the necessary tools and resources to build and effectively manage e-commerce platforms. This encompasses assistance for online payment gateways, logistics solutions, and digital marketing techniques. Provide instruction on using social media, SEO, and content marketing to broaden market coverage and enhance customer interaction in the field of digital marketing.

13. Financial Accessibility:

Enhance the availability of funds by utilising digital platforms, such as peer-to-peer lending and crowdfunding, to meet the financial requirements of CMSMEs that may not meet the criteria for conventional bank loans. Financing for the purchase of digital machines might be available.

7.0 Conclusions

This research highlights the crucial significance of CMSMEs in Bangladesh's journey towards becoming a Smart Nation within the Vision 2041 framework. The findings shed light on the opportunities and difficulties that CMSMEs encounter while implementing Fourth Industrial Revolution (4IR) technologies, which are crucial for improving productivity, competitiveness, and sustainability.

The study indicates that CMSMEs have different levels of preparedness for 4IR technologies, but they still face substantial obstacles such as lack of digital literacy, budgetary limitations, and insufficient infrastructure. To fully realise the promise of CMSMEs and successfully incorporate them into the digital economy, it is crucial to address these obstacles.

The recommendations gained from this research highlight the necessity for focused interventions. Efforts to improve digital literacy, offer financial incentives for technology adoption, create innovation centres, and reinforce policy frameworks are crucial measures for creating a favourable climate for CMSMEs to succeed in the Fourth Industrial Revolution era.

Furthermore, it is essential to have cooperation between government agencies, industry associations, academics, and foreign partners in order to successfully execute these proposals. Through the use of combined knowledge and resources, stakeholders have the ability to accelerate the technological development of CMSMEs, which in turn makes a substantial contribution to the economic growth and societal progress objectives of Bangladesh.

This research provides useful information that may be used to inform the development of policies and strategic plans targeted at speeding the integration of CMSMEs into a Smart Bangladesh. By embracing Fourth Industrial Revolution (4IR) technology and overcoming barriers to adoption, small and medium-sized enterprises (CMSMEs) can become powerful catalysts for innovation and inclusive economic development. This will lead Bangladesh towards sustained prosperity in the next decades.

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Annexture

1. Questionnaire

বিসিক ট্রেনিং ইনস্টিটিউট (সাবেক স্কিটি)

প্লট ২৪/এ, রোড নং: ১৩/এ, সেক্টর-৬, উত্তরা মডেল টাউন, ঢাকা - ১২৩০

‘স্মার্ট বাংলাদেশ বিনির্মাণে সিএমএসএমই খাতের ভূমিকা: প্রেক্ষিত চতুর্থ শিল্প বিপ্লব’ শীর্ষক গবেষণা

শিল্প মালিক/উদ্যোক্তাদের জন্য প্রযোজ্য

(উত্তরদাতার গোপনীতা রক্ষা করা হবে)

উদ্যোক্তা/তথ্য প্রদানকারীর তথ্য

নাম	:		
প্রতিষ্ঠানের নাম ও ঠিকানা	:		
পদবি	:		
শিক্ষাগত যোগ্যতা	:	১. প্রাতিষ্ঠানিক শিক্ষা নেই	৬. মাস্টার্স/সমমান
	:	২. প্রাথমিক শিক্ষা	৭. পিএইচডি
	:	৩. মাধ্যমিক/সমমান	৮. ডিপ্লোমা
	:	৪. উচ্চ মাধ্যমিক/সমমান	৯. অন্যান্য (উল্লেখ করুন)
	:	৫. অনার্স/সমমান	
বয়স	:		
মোবাইল নম্বর	:		
ই-মেইল	:		
প্রতিষ্ঠানের ধরণ	:	১. কুটির ২.মাইক্রো ৩. ক্ষুদ্র ৪.মাঝারি	
সেবার/পণ্য ধরন	:	১. কৃষি ২. উৎপাদন ৩. সেবা ৪. অন্যান্য (উল্লেখ করুন)	
পণ্য/সেবার বিবরণ	:		

উদ্যোক্তার স্বাক্ষর

প্রশ্নপত্র-০১

অংশ-১

স্মার্ট সিটিজেন

১.১ (১ থেকে ৫ এর স্কেলে) আপনার প্রতিষ্ঠানের কর্মীদের সামগ্রিক প্রযুক্তিগত দক্ষতার মূল্যায়ন করুন :		
☐ ৫ (সর্বোত্তম)	=	%
☐ ৪ (উত্তম)	=	%
☐ ৩ (মোটামুটি)	=	%
☐ ২ (খারাপ)	=	%
☐ ১ (খুব খারাপ)	=	%

১.২ নিচের কোন ডিজিটাল ডিভাইস আপনি নিয়মিত ব্যবহার করেন? (প্রযোজ্য সমস্ত নির্বাচন করুন)
☐ স্মার্টফোন
☐ ল্যাপটপ
☐ ট্যাবলেট
☐ ডেস্কটপ কম্পিউটার
☐ অন্যান্য (উল্লেখ করুন)

১.৩ আপনি কি কখনও স্থানীয় সরকারের উদ্যোগের/সিদ্ধান্ত গ্রহণের প্রক্রিয়াগুলিতে অংশ নিয়েছেন?
☐ হ্যা
☐ না
☐ মন্তব্য নেই

১.৪ (১.৩ এর উত্তর হ্যাঁ হলে) আপনার প্রতিষ্ঠানের স্থানীয় সম্প্রদায়ের/সরকারের ইভেন্ট বা কার্যকলাপে অংশগ্রহণের হারঃ
☐ বাৎসরিক
☐ ষাণ্মাসিক
☐ ত্রৈমাসিক
☐ মাসিক

১.৫ আপনার প্রতিষ্ঠানে কোন সমস্যা বা সিদ্ধান্তের সম্মুখীন হলে আপনি কিভাবে সমাধান করেন?
☐ সমস্যা সমাধানের কৌশল বা পদ্ধতি (SWOT Analysis, PDCA Cycle etc.)
☐ কর্মীদের সাথে আলোচনা (ফোকাস গ্রুপ ডিসকাশন)
☐ কনসাল্টেন্সি সার্ভিস গ্রহণ
☐ অন্যান্য (উল্লেখ করুন)

১.৬ (১ থেকে ৫ এর স্কেলে) আপনার প্রতিষ্ঠানের কর্মীদের সামগ্রিক বিশ্লেষণাত্মক (এনালিটিক্যাল) দক্ষতার মূল্যায়ন করুন		
☐ ৫ (সর্বোত্তম)	=	%
☐ ৪ (উত্তম)	=	%
☐ ৩ (মোটামুটি)	=	%
☐ ২ (খারাপ)	=	%
☐ ১ (খুব খারাপ)	=	%

১.৭. **কর্মীদের Smart Citizen হিসেবে গড়ে তোলার জন্য কোন ব্যবস্থা আছে** কি?

☐ হ্যাঁ ☐ না

১.৮ (১.৭ এর উত্তর হ্যাঁ হলে) কী কী ব্যবস্থা আছে?

ক)

খ)

১.৯ কর্মীদের Smart Citizen হিসেবে গড়ে তোলার জন্য আরো কী কী ব্যবস্থা গ্রহণ করা দরকার বলে মনে করেন?

ক)

খ)

অংশ-২

স্মার্ট সোসাইটি

২.১ আপনার প্রতিষ্ঠানে কতজন নিম্ন বর্ণীত বিশেষ শ্রেণীর কর্মী বিদ্যমান?		
☐ শারীরিকভাবে প্রতিবন্ধী	=	
☐ তৃতী লিঙ্গ	=	
☐ আদিবাসী	=	
☐ অন্যান্য	=	

২.২ আপনি কীভাবে টেকসই অনুশীলন গ্রহণের ক্ষেত্রে আপনার কোম্পানির প্রচেষ্টাকে(যেমন বর্জ্য ব্যবস্থাপনা এবং সবুজ শক্তি) মূল্যায়ন করবেন ?
☐ ৫ (সর্বোত্তম)
☐ ৪ (উত্তম)
☐ ৩ (মোটামুটি)
☐ ২ (খারাপ)
☐ ১ (খুব খারাপ)

২.৩ কোম্পানিতে লিঙ্গভিত্তিক বেতন-ভাতার বৈষম্য আছে কিনা?
☐ হ্যা
☐ না
☐ মন্তব্য নেই

২.৪ আপনার কোম্পানিতে সোস্যাল কমপ্লায়েন্স (যেমনঃ শিশু পরিচর্যা কেন্দ্র, মাতৃত্বকালীন ছুটি, নির্ধারিত সময়ে বেতন ভাতা প্রদান ইত্যাদি) প্রতিপালন হয় কিনা?
☐ হ্যা
☐ না
☐ মোটামুটি

২.৫ (২.৪ এর উত্তর হ্যাঁ হলে) কী কী ব্যবস্থা আছে?
☐ শিশু পরিচর্যা কেন্দ্র
☐ মাতৃত্বকালীন ছুটি
☐ নির্ধারিত সময়ে বেতন ভাতা প্রদান
☐ অন্যান্য

২.৬ আপনার কোম্পানিতে কোন কোন চিকিৎসা সুবিধা দেয়া হয়?
☐ মেডিক্যাল ইন্সুরেন্স
☐ চিকিতসা ভাতা
☐ ফার্স্ট এইড
☐ কোনটিই নয়

২.৭ **Smart Society গঠনে আপনার প্রতিষ্ঠান কোন ভূমিকা রাখছে কি?**

☐ হ্যাঁ

☐ না

২.৮ **(২.৭) নং প্রশ্নের উত্তর হ্যাঁ হলে,** কী কী ভূমিকা রাখছে?

২.৯. **Smart Society গঠনে আরও** কী কী ব্যবস্থা গ্রহণ দরকার বলে মনে করেন?

অংশ -৩

স্মার্ট ইকোনমি

৩.১ আপনার কারখনার মোট জনবল

জনবল	বর্তমান **জনবল**	৫ বছর পূর্বে **জনবল**

৩.২ আপনার প্রতিষ্ঠানের একজন ম্যানেজারের গড় মাসিক বেতন কত?

গড় মাসিক বেতন	বর্তমান	৫ বছর পূর্বে

৩.৩ আপনার প্রতিষ্ঠানের একজন **অপারেটর/**হেল্পারের গড় মাসিক বেতন কত?

গড় মাসিক বেতন	বর্তমান	৫ বছর পূর্বে

৩.৪ আপনার কোম্পানিতে ক্যাশলেস/ডিজিটাল লেনদেন হয় কত শতাংশ? (বেতন-ভাতা, ক্রয়-বিক্রয় বাবদ অর্থ আদায় ও প্রদান)
☐ ৮০-১০০ %
☐ ৬০-৭৯%
☐ ৪০-৫৯%
☐ <৪০%

৩.৫ আপনার প্রতিষ্ঠানে মেশিনের সংখ্যা:		
মেশিনের ধরন	বর্তমান মেশিন সংখ্যা	৫ বছর পূর্বে মেশিন সংখ্যা
Automatic		
Semi-Automatic		
Manual		
Total		

৩.৬ Smart Economy গঠনে আপনার প্রতিষ্ঠান কোন ভূমিকা রাখছে কি?

☐ হ্যাঁ

☐ না

৩.৭ (২.৭) নং প্রশ্নের উত্তর হ্যাঁ হলে, কী কী ভূমিকা রাখছে?

৩.৮ Smart Economy গঠনে আরও কী কী ব্যবস্থা গ্রহণ দরকার বলে মনে করেন?

অংশ-৪
স্মার্ট সরকার

৪.১ সরকারের কার্যক্রমে উন্নত প্রযুক্তির ব্যবহার (যেমন, IoT, AI, blockchain) মূল্যায়ন করুন
☐ ৫ (সর্বোত্তমভাবে)
☐ ৪ (উত্তমভাবে)
☐ ৩ (মোটামুটিভাবে)
☐ ২ (খারাপভাবে)
☐ ১ (খুব খারাপভাবে)

৪.২ সরকার প্রদত্ত ডিজিটাল পরিষেবাগুলির অ্যাক্সেসযোগ্যতা এবং ব্যবহারযোগ্যতা নিয়ে আপনি কতটা সন্তুষ্ট?
☐ খুব সন্তুষ্ট
☐ সন্তুষ্ট
☐ **নিরপেক্ষ**
☐ **সন্তুষ্ট নয়**
☐ **একদম সন্তুষ্ট নয়**

৪.৩ আপনার প্রতিষ্ঠানে স্মার্ট ড্যাশবোর্ডের মাধ্যমে ডাটা-চালিত সিদ্ধান্ত গ্রহণ করা হয় কি না?
☐ **হ্যাঁ**
☐ **না**

৪.৪ Smart Government গঠনে আপনার প্রতিষ্ঠান কোন ভূমিকা রাখছে কি?

☐ হ্যাঁ
☐ না

৪.৫ (৪.৪) নং প্রশ্নের উত্তর হ্যাঁ হলে, কী কী ভূমিকা রাখছে?

৪.৬ Smart Government গঠনে আরও কী কী ব্যবস্থা গ্রহণ দরকার বলে মনে করেন?

৪.৭ BSCIC One Stop Service (OSS)-এ আপনি নিবন্ধিত কিনা?

☐ হ্যাঁ ☐ না

৪.৮ (৪.৭ নং প্রশ্নের উত্তর হ্যাঁ হলে) BSCIC OSS থেকে আপনি কী কী সেবা গ্রহণ করেছেন?

- Registration
- IRC-ERC
- Training

৪.৯ (৪.৭ নং প্রশ্নের উত্তর হ্যাঁ হলে) BSCIC OSS এ কী কী সেবা যুক্ত করলে সুবিধা হবে বলে আপনি মনে করেন?

প্রশ্নপত্র-০২
(প্রযোজ্য ঘরে টিক (√) চিহ্ন দিন)

কোড	বিবরণ	প্রযোজ্য নয় (০)	নগণ্য (১)	মোটামুটি (২)	ভাল (৩)	খুব ভালো (৪)
S-1	আপনার কোম্পানির ইন্টারনেট সংযোগের গতি এবং নির্ভরযোগ্যতা					
S-2	কোম্পানির ডাটা হ্যাকিং হতে নিরাপদ (এন্টি ভাইরাস/ অন্যান্য সফটওয়্যার)					
S-3	কোম্পানির পণ্যের কোয়ালিটি মনিটর করার জন্য অটোমেটিক ব্যবস্থা আছে					
S-4	কোম্পানিতে নিয়োগের সময় সকল লিঙ্গ,বর্ণ,ধর্মের মানুষকে সমান সুযোগ দেয়া হয়					
C-1	কোম্পানির কর্মী ব্যবস্থাপনা ডিজিটালি করা হয় (হাজিরা, পারফরম্যান্স, নিয়োগ কার্যক্রম, বেতন-ভাতা প্রদান ইত্যাদি)					
C-2	কোম্পানির নীতি-নির্ধারণে সকল পর্যায়ের কর্মকর্তা-কর্মচারীর অংশগ্রহণ নিশ্চিত করা হয়					
E-1	অনলাইন পেমেন্ট ব্যবস্থা আছে (মোবাইল ব্যাংকিং, ইন্টারনেট ব্যাংকিং)					
E-2	কোম্পানিতে ইনোভেশন সেল/ R&D সেল আছে					
E-3	কারখানার যন্ত্রপাতিসমূহ স্বনিয়ন্ত্রিত					
G-1	আপনার কোম্পানির কার্যক্রম কাগজবিহীন(পেপারলেস)					
G-2	নতুন প্রযুক্তির যন্ত্রপাতি ব্যবহারের জন্য কারখানা প্রস্তুত (AI,IOT,Robotics ইত্যাদি)					
G-3	আপনার প্রতিষ্ঠানে স্মার্ট ড্যাশবোর্ডের মাধ্যমে ডাটা-চালিত সিদ্ধান্ত গ্রহণ করা হয়					
G-4	প্রতিষ্ঠানের সংবেদনশীল তথ্য সুরক্ষিত					

তথ্য সংগ্রহকারীর স্বাক্ষর

Annexture 2: Photos of Different FDGs and KIIs


গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
শিল্প মন্ত্রণালয়
বাংলাদেশ ক্ষুদ্র ও কুটির শিল্প কর্পোরেশন (বিসিক)
কর্মশালা


গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
শিল্প মন্ত্রণালয়
বাংলাদেশ ক্ষুদ্র ও কুটির শিল্প কর্পোরেশন (বিসিক)
সেমিনার


গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
শিল্প মন্ত্রণালয়
বাংলাদেশ ক্ষুদ্র ও কুটির শিল্প কর্পোরেশন (বিসিক)
'স্মার্ট বাংলাদেশ বিনির্মাণে সিএমএসএমই খাতের ভূমিকা: প্রেক্ষিত চতুর্থ শিল্প বিপ্লব'
শীর্ষক গবেষণার তথ্য
কর্ম
স্থান ঃ হোসিয়ারী শিল্প
নারায়নগঞ্জ
আয়োজনে ঃ বিসিক ট্রেনিং
উত্তরা, ঢাকা।


গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
শিল্প মন্ত্রণালয়
বাংলাদেশ ক্ষুদ্র ও কুটির শিল্প কর্পোরেশন (বিসিক)
'স্মার্ট বাংলাদেশ বিনির্মাণে সিএমএসএমই খাতের ভূমিকা: প্রেক্ষিত চতুর্থ শিল্প বিপ্লব'
শীর্ষক গবেষণার তথ্য সংগ্রহের লক্ষ্যে
সেমিনার
উত্তরা, ঢাকা।


গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
শিল্প মন্ত্রণালয়
বাংলাদেশ ক্ষুদ্র ও কুটির শিল্প করপোরেশন (বিসিক)
স্মার্ট বাংলাদেশ বিনির্মাণে সিএমএসএমই খাতের ভূমিকা:
'প্রেক্ষিত চতুর্থ শিল্প বিপ্লব, শীর্ষক গবেষণার তথ্য সংগ্রহের লক্ষ্যে'
কর্মশালা
আয়োজনেঃ বিসিক প্রশিক্ষণ ইউস্টিটিউট (বিটিআই), উত্তরা, ঢাকা।


সেমিনার

Research Report on

Role of CMSME Sector in Building SMART Bangladesh: Fourth Industrial Revolution Perspective

BSCIC Training Institute (BTI)

Bangladesh Small & Cottage Industries Corporation

Ministry of Industries

Uttara, Dhaka-1230

June, 2024