



# Article Prospective Areas of Digital Economy in the Context of ICT Usages: An Empirical Study in Bangladesh

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**Abstract:** The objective of this study is to assess the current and future potential of the digital economy in Bangladesh, with the goal of fostering national development and prosperity by the year 2041. Concurrently, this study examines the various aspects of the digital economy through the lens of the Fourth Industrial Revolution and emerging technologies, specifically focusing on the utilization of information and communication technology (ICT) in Bangladesh. The methodology section employs a qualitative approach to ascertain the research objectives, utilizing secondary data. The purpose of this study is to provide an overview of the contemporary status of the digital economy, focusing on emerging trends that have a significant impact on the national gross domestic product (GDP). Companies and individuals possess an understanding of the digital economy, which has the potential to mitigate the digital divide and establish a robust connection between technology and the economy. The research contributes to a more thorough understanding that Bangladesh is ranked 40th out of 193 nations at present; with the advancement of the digital economy, it will move up to 24th place in 2034. Future research can perhaps be expanded by adopting a qualitative methodology to explore the concept of a smart Bangladesh.

**Keywords:** digital economy; perspective area; DE components; fourth industrial revolution; digital analytics architecture; smart Bangladesh

# 1. Introduction

The billions of regular online links among organizations, devices, individuals, data, and processes that involve economic activities are known as the "digital economy" [1]. Hyperconnectivity, or the increased interconnectivity of organizations, people, and machines by using the Internet, the Internet of Things (IoT), and mobile technologies is the foundation of the digital economy [2]. Researchers at present exist in a time where all that is required to sell a product is a smartphone, an Internet connection, and some basic smartphone expertise. It has been demonstrated in industrialized nations that the more accessible information is to acquire, the simpler it is to increase productivity and guarantee efficiency.

Bangladesh has been experiencing a digital revolution in ICT sectors alongside the rest of the world in recent years. The digital revolution in emerging technologies is changing the way people interact with one another, conduct business, and gather information [3]. The impact of the digital revolution on our economic and social lives has likely surpassed that of all earlier revolutions. Researchers are at present living in the digital age. The Internet has developed into one of the most crucial components of corporate management since its initial state as a possible low-cost communication channel. The economy and people of any nation benefit greatly from technological advancement.



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**Copyright:** © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). A new technology's adaptation may lead to a brief period of unemployment; however, it also rapidly generates new work prospects [4]. Given that technology is currently advancing at an exponential rate, any nation's economy can expand robustly with the correct adoption of practicable technologies. To discover a sustainable development strategy, for instance, wealthy nations are currently prioritizing technology, such as 3D printing or biofuel engineering [5]. In close-by nations, such as India, technical advancements, such as the digitization of bus and rail systems, online banking capabilities, Internet marketing services, e-learning initiatives, long-distance contact center services, etc., have been successfully implemented [6].

Some of these technologies are already used in Bangladesh, and others can be executed soon. Bangladesh faces numerous obstacles to economic growth as a low-income developing nation. The inability to manage time constraints effectively and the slow rise of productivity are two major obstacles to economic expansion. Human beings waste days of their lives waiting in traffic for tasks that can be completed online in a matter of seconds. Because of this, researchers have investigated the potential for technological adoption in Bangladesh that can increase productivity, free up valuable time, and thus support the expansion of the national economy.

The employment rate in areas, such as outsourcing and the ICT-based share market, has experienced considerable growth due to the high level of mobility observed in ICT-based industries as opposed to traditional labor markets. The industry will not be restricted to a single city or nation; instead, it will be interconnected on a worldwide scale, allowing people to work for businesses that are situated anywhere in the world. People can now see the changes in a growing nation, such as Bangladesh, 20 years after initially predicting those terms. The preceding years witnessed a substantial expansion in the technology and communications industry, facilitating the nation's participation in the digital economy of Bangladesh [7]. The policymakers and country's workforce demonstrated a keen interest in the ICT business.

The technological revolution involved the Second Industrial Revolution in the 18th century in the United Kingdom. However, the Third Industrial Revolution also involves the use of the Internet, green energy, 3D printing, and other technologies, as well as a shift from a capitalistic structure to a mixed economy, which is leading to a free market economy in Bangladesh. Physical, digital, autonomous transportation, materials science, energy-saving computing, organic bubbles, and latest world technologies are all mixing with the Fourth Industrial Revolution [8]. The significance of a topic depends on the necessity to create theoretical concepts as well as practical implications for improving the government regulation process in specific background industries as they transition into the digital economy. This needs to be considered by policymakers. Therefore, it is essential to guarantee that the transition to a digital economy is conducted properly and efficiently, with the advantages outweighing the drawbacks, and that barriers must be limited so that new job opportunities can be increased and sustainable growth can be maintained [9].

While digitalization has clearly been a great equalizer across the board, especially with regard to digital payments and the electronic delivery of governmental services, there are still significant parts of Bangladesh's economy that are underdeveloped and entirely excluded. The digital economy will propel Bangladesh to a high-income status [10]. A limited number of research-based articles on the digital economy have been published in developed countries. However, few articles and publications exist on the present and future status of the digital economy. Therefore, the research efforts to examine the current and upcoming areas of the digital economy in Bangladesh with the adaptation of Fourth Industrial Revolution technologies contribute to the fulfillment of Vision 2041 as a prosperous nation. This study contributes to take decisive decision of policymakers, academics, and economists by presenting the current and future status of the digital economy in Bangladesh, which adds value to both the local and national economies of Bangladesh [11]. To put it specifically, the paper evaluates and discusses the digital economy in Bangladesh in terms of the following objectives:

- b. To analyze the various dimensions of the digital economy in Bangladesh and its potential contributions to the overall economic development of the country.
- c. To assess the present status of the digital economy in Bangladesh with the adaptation of the Fourth Industrial Revolution and its technologies.

## 2. Literature Review

The acceptance of ICT relevant to all business sectors to boost productivity is the foundation of the digital economy. Conventional wisdom on the formation of business, how consumers obtain products, services, and information, and how these new regulatory adjustments by the states are being challenged by the digital transformation of the economy would be identified. It describes an economy where economic activities leverage digital computing technologies. Digital networking and communication infrastructures offer a global platform for people and businesses to develop plans, engage, communicate, work together, and obtain information in this new economy [12]. More recently, the study of zero marginal cost intangible items sold online has been referred to as the "digital economy" [13].

The likelihood of a big data setup in Bangladesh is a challenging task. The finding and origin of an excursion are crucial for reducing the troubleshooting time and increasing the output. Therefore, it is crucial for all nations to comprehend the 4IR, its new technologies, and the challenges they pose. With the advent of robots came automation, global supply networks, and the effects of outsourcing on employment for everyone. The digital revolution will continue to focus on rapidly increasing technical advancements that allow for faster movement and a more thorough focus on a world powered by data, a world that employs artificial intelligence and experiences through machine learning procedures. Fund management in the banking industry needs to be totally digitalized in order to prevent Bangladesh's banking system from supporting the money laundering process and regular culture.

High technological industries are using AI and big data in digitization, which might revolutionize and transform the agricultural industry. Through facilitating communication between objects and people, IoT has the ability to encourage a new move to the Internet in a way that will make the world smarter and more capable. Since any alternative approach may result in the depreciation of human rights and society's values, restrictions on AI-based innovation, personal and societal well-being enhancement, and the ethical regulation of AI usage are therefore difficult, but vital, undertakings.

According to [14], it can be difficult to organize human resources and technological advancements in the digital economy and turn them into worthwhile endeavors that can advance social, equality, and fairness objectives in developing nations, such as Bangladesh. According to [15], there are great opportunities for the research into artificial intelligence technologies, the improvement of human abilities, and the most recent organizational configurations that are connected to Bangladesh's digital economy.

The entrance of fintech and big data into the payments industry might increase product assistance, decrease the cost of transactions, and encourage competitiveness in business area [16]. It can enhance financial inclusion by increasing the number and variation of individuals and how they behave, increasing people's access to financial services, and supplying more consumer-friendly assistance. Prior to the marketplace, one of the Fourth Industrial Revolution technology's applications, artificial intelligence (AI), might result in the market inflating safe transactions through market movements based on blockchain technology, which can disrupt forces and opportunities at a high cost. [17] implied that in order to contribute to the form, variety, and superiority of ecological information, as well as smartphone applications for tracking the environment and factory pollution discharges, a large proportion of the population in China must be reached. The usage of big data in businesses has risen as a result of companies being compelled to use it to grow their current operations or fix their replicas [18].

The "diamond–water paradox" is appropriate to apply to the digital economy because the digital marginal utility is greater depending on who can benefit from it. However, regarding those who are left behind due to the digital divide, the marginal benefit they receive will be zero, and the entire utility of digitization will also be zero, which needs to be considered by policymakers [19]. Therefore, it is crucial to ensure that the transition to a digital economy occurs effectively and efficiently, via benefits outweighing drawbacks, and that challenges to the creation of job opportunities are supplemented by growth in the economy and progress [20].

The Nation's Information and Communications Technology Policy (NIP) of Bangladesh is the main legal foundation for "Vision 2021" and "Digital Bangladesh" and is evaluated in this study for its influence and effectiveness. It addresses the concept of digital inclusion, which serves as the foundation for the present discussion on the digital divide and inclusion that are attained by the NIP policies [21]. The study conducted a qualitative approach and used a policy analysis to examine the internal logic and rationality of the NIP based on the three main criteria of the analytical framework for digital inclusion: ICT access, skills, and usage. The research contends that the policy is not clear and has a limited reference for digitization, which fails to completely solve the problems related to digital inclusion [22].

The government of Bangladesh, similar to many other developing nations, adopted numerous ICT strategies, laws, and policies to create a transparent and responsible government for socio-economic development. However, Bangladesh has had both positive and negative experiences putting policy goals into practice in the past. The government has recently launched several initiatives (such as access to information [a2i]) and, considering the advent of 5G technology and the 4IR for implementing ICT-driven activities, they expect to change their current policy [23].

## Conceptual Framework

The creation of digital technologies as well as all significant applications of those technologies would be included in the digital economy. Additionally, it would include some aspects of emerging economies, such as the sharing, gig, and platform economies, which can be regarded as new economic activities independent of digital technology [24]. Platform-based businesses, for instance, would be included. With companies that just deal in digital products, such as Facebook and Google, this is clear to notice; it is a little less obvious with platforms that deal in physical products, such as Amazon, eBay, or Alibaba, and it becomes increasingly unclear with companies, such as Uber and Airbnb. However, the latter would be categorized by researchers as belonging to our definition of the "digital economy" because they are digital platforms created using digital innovations and business models rather than being resort or taxi companies.

Scholars define the digital economy as the portion of economic output obtained completely or mostly from digital technology with a business model based on digital goods or services in light of this and the fundamental concept of extensibility. The concept has a blurred boundary; however, it is also adaptable enough to take into account the changes in digital technology and business models over time. It includes both the core digital sector and a wider spectrum of substantial digital activity, as summarized in Figure 1, without stating that every digitized activity is a component of the digital economy [25].

Figure 1 indicates that some core digital sectors identify the areas of the digital economy in Bangladeshi perspectives. Figure 1 mentions the core, and the narrow and broad scopes of the digital economy where some fields are emerging for the development of the nation, especially a developing country, such as Bangladesh. High-level talent and effective knowledge are needed for implementing the digital economy. Any businesses, managers might procedurally plan and monitor process arrangements of digital economy components. According to [26], digitalization has become evident as a result of the need for digital technology to gain momentum and relevance in the traditional economic model. The emergence of free digital technologies would positively impact production, sponsorship, and distribution, as claimed by [27]. As seen by the digitization of the electronic banking industry, the information environment is, in comparison to the research, a stronger motivator for the development of AI applications. These seven core factors should be supported by validity and reliability in order to create a prosperous and digitally advanced nation.



Figure 1. Scoping the digital economy. Source: author's work.

# 3. Methodology

This research paper was principally based on qualitative approaches. A methodological approach was adopted to prepare the paper on the prospective sectors of the digital economy in Bangladesh. As the sectors of the digital economy are emerging, primary data collection is not possible from a Bangladeshi perspective. Hence, secondary data were applied here to prepare a report to represent the current status of the digital economy in Bangladesh. Around 100 papers were collected for conducting this research, of which 51 articles were used to align with the research objectives. Moreover, the data were collected from newspapers, student papers, the Internet, company websites, government statistics, market research reports, published journals, and other online sources. Most of the articles were selected from Google Scholar and the UGC approved database, such as Scopus and other index journal. The selected articles were retrieved from the latest published articles, which ranged from 2010 to 2023. As this topic is new and emerging in the research, it is difficult to measure the standard criteria for selecting articles. However, the researchers conducted this study on the basis of content matching, such as the digital economy, ICT usages, 4IR, etc., for searching the articles. Tables and graphs were retrieved from relevant websites, such as the World Economic League Table, Bangladesh Bank, BTCL, and Oxford Internet Institute, concerning the digital economy of Bangladesh. Figure 2 depicts the procedures and steps of methods about the prospects of digital economy by using ICT in Bangladesh. Researchers selected and identified different sources which are represented in Figure 2.



Figure 2. Methodology approach. Source: author's work.

#### 4. Analysis and Findings

If there is a reliable Internet connection and an easy online payment system, then it is estimated that the e-commerce industry will reach USD 3 billion in 2023, according to a webinar held by the Dhaka Chamber of Commerce and Industry (DCCI) in Dhaka in 2023. Most goods and services are included in the digital economy. The statement was made by Syed Almas Kabir during a program by the Bangladesh Association of Software and Information Services. In 2023, the e-commerce industry saw a significant increase as customers moved their shopping online because of the global pandemic, which forced people to stay at home as much as possible. There are 8.4 million Facebook users in the nation, out of 36 million active social media users. According to the internet, the Facebook commerce (f-commerce) market is worth roughly Tk 312 crore. According to Ghulam Rahman, president of the Consumers Association of Bangladesh, "F-commerce is thriving in the nation" (CAB). According to DCCI President Shams Mahmud, the local e-commerce market is currently worth roughly USD 2 billion and is growing by 50% annually.

Figure 3 represents the Bangladesh's current rank as 42; the country is expected to move up to 41 in 2022, then to 34 in 2026, and finally to 24 in 2036. The current period and subsequent ten years will see an economic boom as the outcome. According to [28] in Figure 3, the demographic dividend and rising per capita income will lead the Bangladeshi economy to increase at one of the most rapid rates from 2020 to 2034. The most recent WELT inquiry from the international economic forecaster states that, according to the London-based Centre for Economics and Business Research (CEBR), Bangladesh is currently ranked 40th out of 193 nations; however, due to the advancement of the digital economy, it will move up to 24th place in 2034, replacing Belgium, based on Figure 3.



**Figure 3.** Bangladesh economy to be the 24th largest in 15 years. Source: World Economic League Table (2023).

Bangladesh has emerged as a favorable destination for IT outsourcing due to its growing export profits from the information and communication technology (ICT) sector. The growth of the business process outsourcing (BPO) industry in Bangladesh is occurring at a rapid pace. The burgeoning digitization of Bangladesh, characterized by the widespread availability of Internet connectivity in metropolitan regions and the implementation of several government and non-government initiatives aimed at fostering freelancing, has played a pivotal role in driving the current surge in freelancing endeavors in the nation. According to the Oxford Internet Institute (OII), Bangladesh has emerged as the secondlargest provider of online labor. According to the ICT Division of Bangladesh in Figure 4, there is an estimated population of 650,000 registered freelancers in the country, out of which around 500,000 are actively engaged in their freelance work. These active freelancers collectively generate an annual revenue of USD 100 million. Based on the current data in Figure 4, it can be observed that India holds the position of being the primary provider of online labor, accounting for approximately 24% of the overall freelance workforce. Following India, Bangladesh ranks second with a contribution of 16%, while the United States follows closely behind with a share of 12%. Various countries provide a range of freelancing options, as can be seen in Figure 4. For example, within the realm of technology and software development, Indian freelancers hold a prominent position, while Bangladeshi freelancers lead the field of sales and marketing support services. In the future, Bangladeshi outsourcers will be leading IT-based outsourcing around the world.



Figure 4. World market position of IT-based outsourcing. Source: Oxford Internet Institute (2023).

Figure 5 shows the software development category of IT services (web services, system integration, product design, customized software development, mobile applications, software services, etc.), which has the highest share of market value in the ICT sector in Bangladesh for accelerating the country's digital economy. The government of Bangladesh has taken numerous initiatives to increase income levels in the ICT sector, which is directly connected with the digital economy. Web services and mobile applications are some of the ICT share markets for the young generation in the near future. From Figure 5, it can be seen that the percentage values are increasing percentage. International businesses looking to outsource this area of their operations to other nations highly value it. IT based outsourcing market is classified in the IT services category's engineering services section, including platform and software development, testing, and the development of specialized software areas. The Bangladeshi digital economy is being driven by these sectors; hence, experts in the field are always in demand. Freelancers from all over Bangladesh have recently joined Bangladeshi businesses that have long been exporting these services, finding employment independently through websites, such as Upwork and Freelancer.



Figure 5. Share in total ICT sector in Bangladesh. Source: Bangladesh Bank (2022).

The objectives of the digital economy have not significantly altered the digital world. Digital devices, digital media, digital data, digital audiences, and digital ambitions compose the digital universe. Global brand visibility is achieved through the use of brand objectives and tactics. Because of the constrained commercial objectives prior to globalization, brands were not concerned with having digital goals. To date, unlike in the past, branding is an essential component of many firms because strong brand positioning increases the revenue for a company. The goal of a company is essential to creating a brand in the digital economy.

The ideal customers for the brand are among the Internet audience [29]. The target market, business-to-business, consumer-to-business, and consumer-to-consumer segments all compose the digital audience. Understanding a company's digital audience is crucial for developing a business plan. Digital devices that fall under the digital economy include smartphones, tablets, desktop computers, smart speakers, and digital televisions. Everything in a digital economy is based on digital data, which companies use to create their business models. However, there are both organized and unstructured data types in digital data. Businesses can use digital data to derive client profiles, habits, values, and communication preferences to provide customers with personalized services.

Figure 6 shows the volume of digital transactions at different levels, such as Internet banking and card and MFS transactions, which are major positive indications of the expanding digital economy of Bangladesh. Due to a lack of readily available cash, many people are performing transactions with checks or account transfers at present. Additionally, they have shifted to using digital wallets, such as e-wallets, which enable money transfers over the Internet, as shown in Figure 6. All of this can lead to a digital economy with more white money and transactions being recorded. The government's tax revenue can rise as a result. Moreover, the volume of diverse digital transactions increased during the pandemic, as shown in Figure 6. The digital economy transformation might be facilitated by entrepreneurship, innovation, and creativity. Electronic financial transfers and electronic data interchange complement one another. Technology driven innovation will be superior compared to manual labor in digital economy. Competitive intelligence may therefore need to increase. Youths must be employed and resources must be provided to support the program while local economies are synchronized through digitization. Digital media must be used in Bangladesh for marketing strategies, the promotion of goods and services, the sharing of company plans, the management of customer relationships, the dissemination of news, events, advertisements, video conferencing, and advertising, as well as research.



Volume of Different Modes of Digital Transactions in Bangladesh (in Crore BDT)



# 5. Discussion

A digital economy is composed of each and every economic sector that makes use of advancements in digital technology and provides enterprises with countless options. In a digital economy, the use of digital technologies by firms, data, processes, and people facilitates economic activity [30]. ICT, digital media, and content are all part of the digital economy and produce large amounts of data, as can be seen in Figure 7. The digital economy is being impacted by the digital transformation taking place in a number of industries, including banking, insurance, commerce, agriculture, health, tourism, and education, among others. Due to the fact that these industries use digital technology on a daily basis, each of them contributes significantly to the digital economy.



## Digital technology spreads through the entire economy

Figure 7. Present and future areas of the digital economy. Source: author's work.

Figure 7 shows that a large amount of data is produced as digital transformations and digitization occur throughout the industries. The relationship between corporate value, data, and decision making is the basis of digital economics. Without data insights, firms cannot expect to have a competitive advantage over their rivals in this fast-processing world. At present, a considerably larger proportion of individuals utilize cellphones over desktops or laptops. At present, people can use mobile devices for a variety of purposes. For instance, Google Colab allows programmers to work without a computer—only a smartphone—to complete their work. Digital technologies have become so ingrained in daily life that it is impossible to execute activities without them.

## 5.1. Link between Smart Bangladesh and Digital Economy

The "Smart Bangladesh" ecosystem will have four pillars: "Smart Citizen", "Smart Government", "Smart Society", and "Smart Economy". "Smart Economy" is crucial because Bangladesh wants to rely on ICT for its revenue by 2041. The ICT industry will exceed USD 50 billion by 2041, and at least 50 unicorn businesses will dominate Bangladesh's market. The government's grandiose objective of developing "Smart Bangladesh" by 2041 will be difficult to achieve. It is significant because Bangladesh wants to make information and communication technology one of its pillars in terms of revenue generation by the year 2041. It is anticipated that by the year 2041, Bangladesh's whole information and communications technology (ICT) sector will be worth USD 50 billion, and at least 50 unicorn firms will dominate the market. Finally, human resource development should be prioritized. Universities have not yet integrated technology into their curricula. Academics and the industry should close the large gap as quickly as possible. In summary, Bangabandhu Sheikh Mujibur Rahman wanted a country without poverty, social and economic fairness, and shared wealth. Vision 2041, a continuation of Digital Bangladesh Vision 2021, aims to end extreme poverty and become a high-income nation by 2041. The actions and labor of the present will determine how rapidly the objective is attained. The government and corporate sectors should collaborate to create "Smart Bangladesh".

#### 5.2. Digital Universe

Figure 8 identifies the significant industry trends that are influencing the ICT industry in Bangladesh. The government is implementing measures to enhance the IT and telecommunications industries in response to the increasing need for a digital transformation. The Bangladesh government's Posts and Telecommunications Division has undertaken an initiative to expand its fifth-generation (5G) mobile Internet services project. This expansion is being conducted in conjunction with Teletalk, with the aim of providing 5G technology-based mobile services to the general population. The implementation of such governmental efforts is expected to generate novel avenues for growth within the ICT sector of Bangladesh. The increasing need for enhanced agility and flexibility within the information technology infrastructure is propelling the expansion of the information and communication technology market. One example of a corporation dealing in data storage is BDCCL (Bangladesh Data Center Corporation Limited, Dhaka, Bangladesh). Major corporations typically utilize various sorts of virtualized storage to store their data. These enterprises focus on the provision of reliable and expedient accessibility. In addition, it aids them in fulfilling the rigorous safety regulations set by the government. In order to realize the objective of Digital Bangladesh, the nation of Bangladesh has successfully established a Tier-IV data center in Kaliakoir, Gazipur, which stands at present as the seventh largest of its kind in the world. The implementation of such infrastructure measures is expected to create fresh avenues for growth within the ICT market in Bangladesh.

The adoption of 3G, 4G, and 5G technologies continues to grow throughout the country as a result of the expansion of new networks and the increased demand for high-speed connectivity services. For example, a collaboration between Huawei and Nokia was established with Teletalk to implement the initial 5G network in specific regions of Dhaka. According to a report by GSMA, it was projected that the rate of smartphone adoptions in Bangladesh would experience a substantial increase of 75%, resulting in a total of 138 million smartphone users by the year 2025. The utilization of smartphones among the adult population in the country is experiencing a steady increase. Therefore, the expanding population will have an increased need for information and communication technology (ICT) products and services. The expansion observed in the telecommunications sector can be mostly attributed to the escalating population and the concurrent surge in the use of broadband services within the nation. Based on the data from the Ookla Speedtest Global Index, Bangladesh attained a ranking of 102 in terms of its median fixed broadband download speed, which stood at 34.85 Mbps during the month of November in the previous

year. The penetration of fixed broadband services is experiencing a substantial growth, resulting in an increased demand for the telecommunications services sector.



Figure 8. Components of the digital economy. Source: author's work.

The market's growth is being propelled by globalization in this region and the increasing demand for the use of sophisticated technologies, such as the cloud, the Internet of Things (IoT), and artificial intelligence (AI). Based on the International Monetary Fund's (IMF) projections (Figure 9), it is anticipated that Bangladesh's gross domestic product (GDP) will reach a value of USD 4171.06 by the year 2027. This observation suggests that there is a positive trend in the growth of the gross domestic product (GDP), and it is anticipated that the ICT market in Bangladesh will also experience growth in the subsequent five years. In order to establish a digital economy in a nation, it is necessary to participate in a wide range of economic activities and emphasize supporting applications of 4IR and AI in a variety of manufacturing and service industries, beginning with the administration of educational institutions, tourism businesses, and hospitality establishments where gross domestic products have been directly and indirectly corrected (Figure 9). Bangladesh may try to promote the regional organization known as "BIMSTEC" at the regional level. Instead of moving the Rohingya population to Bangladesh, which would be more beneficial for BIMSTEC as an organization, the contentious issue of Rohingya should be resolved and a solution found for it. More women will have access to more opportunities in the 4IR if the government provides support in this area. The government needs to make more use of innovations that are data driven. GDP per capita in Bangladesh is increasing trends in Figure 9.





The digital economy of Bangladesh must be altered in order to accommodate the necessary change and usage in the technological pattern. Artificial intelligence must be used to create a chain reaction between the producer, buyer, and supplier in order to increase the possibility of new employment opportunities. Robots can be utilized for domestic tasks, medical applications, home automation, and hotel management recognition by artificial intelligence (AI). The use of AI across a wide range of sectors where entrepreneurship development is needed should be employed, starting with the agriculture-based sector. More access for women is required during the 4IR process [31]. The country urgently needs household robots for assistance, particularly middle-class families and people with disabilities. As a result, digital connection and digital entrepreneurship ought to function simultaneously.

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Fintech reduces the gap between traditional financial methods and covers a broad range of businesses. It refers to the use of technological applications to perform tasks and processes where human input is minimized. It reduces the operating costs, enhances productivity and efficiency, and achieves high levels of process reliability. Robotic process automation (RPA) and artificial intelligence (AI) have created innovative opportunities to automate human tasks. There is a positive impact of technology on good governance. It includes improving the reliability, accuracy, and transparency of information so that decision makers can make effective decisions. The government should monitor the technological advancements because, sometimes, they might have negative impacts, such as data and privacy breaches, cybersecurity risks, fraudulent activity, and so on. Ethics and governance are key considerations here, and they also require government rules and laws. Adequate safety measures will help to integrate emerging technologies successfully within a society.

#### 6. Conclusions and Recommendations of the Study

# 6.1. Conclusions

Bangladesh must prioritize skill development and update the elements of the digital economy to meet the challenges of the 4IR in Bangladesh in every sector. E-commerce, e-governance, e-banking, IT/ITES, digital payments, sharing economy, telemedicine, online education, IT outsourcing, digital media, telecommunication, and emerging (4IR) technolo-

gies are the present and future categories of the digital economy in Bangladesh [32]. The present status of the digital economy is due to emerging trends that contribute to the adjustment of the national GDP during the Fourth Industrial Revolution for promoting Smart Bangladesh [33]. According to the findings of the study, the digital economy is expected to extend its commercial and business opportunities. Bangladesh is currently ranked 40 out of 193 nations; with the advancement of the digital economy, it will move up to 24th place in 2034. The number of digital transactions at different levels, such as Internet banking and card and MFS transactions, are a major positive indication of the expanding digital economy in Bangladesh. The study had some limitations and only focused on secondary data. If the study was conducted on a primary data basis, this may have affected the outcomes and results concerning the digital economy. Future researchers should eliminate the less significant areas of the digital economy to produce more accurate information.

#### 6.2. Recommendations

Bangladesh recognizes the significance of information and communication technology (ICT) as a crucial catalyst for future economic expansion within the country. Consequently, it is highly motivated to capitalize on the various prospects presented by the digital age. The government is actively encouraging the development of a digital ecosystem and giving priority to the information and communication technology (ICT) industry as part of its Digital Bangladesh initiative [34]. This initiative aims to foster a conducive environment for business growth, both domestically and internationally, particularly through the outsourcing model. Bangladesh has ventured into the realm of low-value information and communication technology (ICT) outsourcing, catering to corporations based in the United States, Europe, and Southeast Asia. The current surge in the information and communication technology (ICT) industry suggests that Bangladesh has the capacity to use the potential advantages offered by digital technologies [35]. This would enable the country to not only match its neighboring nations, but also accelerate its progress towards reaching the economic standards of high-income countries. Nevertheless, it is widely believed in numerous international markets that conducting business in the country continues to pose risks. Additionally, the physical infrastructure in Bangladesh is perceived to be subpar in comparison to some alternative locations. Furthermore, there are concerns regarding the ability of Bangladeshi ICT companies to effectively handle complex business process outsourcing (BPO) operations. However, Bangladesh has strategically positioned itself in a highly appealing place for operations due to several factors. These include the availability of a large pool of skilled labor at considerably reduced rates, rules that are conducive to investment, and the rapid advancement of Internet technologies. Nevertheless, it is important to note that Bangladesh has not yet effectively tackled the issues pertaining to intellectual property rights (IPRs). This observation is supported by the Property Rights Alliance and its prominent publication: The International Property Rights Index. In 2022, Bangladesh's position in the world ranking was 116 out of 129 countries. With the increasing utilization of Bangladesh as a business process outsourcing (BPO) destination by several organizations, the country's competitive edge is being strengthened further. This advantage has been effectively leveraged as Bangladesh has gradually established itself as an attractive and economically viable option in the global outsourcing market [36].

Every nation on the globe requires a comprehensive strategy to develop a cutting-edge, inclusive approach that includes a platform shared by the government, payment service providers, mobile operators, NGOs, banks, and users. This will increase user caution and reap the benefits of the 4IR. In order to enact the policies of the Bangladeshi government, A2I must function honestly and ethically. The nation should not rely solely on a small number of businesses that uphold the moral standards. Instead of focusing on achieving advantages for their own organizations, BASIS should take a more proactive approach. ICT skill readiness is more realistically required for implementation. The digitization process should not conflict with the demand for labor. The telecommunications industry should serve as a catalyst for meaningful digital transformations and the closing of the digital divide.

The Bangladesh Employment Policy 2022 aims to consider digitization and the growing labor engagement capacity demand in formal areas. The establishment of the digital economy requires appropriate training in ICT-related subjects. With Bangladesh's economy becoming more digital, moral governance and regulation should be acknowledged [37]. If Bangladesh's sizable young population were to receive the kind of training and market-relevant skills they need, they may greatly benefit from the digital economy [38]. The government must act fast and highly prioritize the digital platform economy in its policy agenda for rapid decision making compared with other countries in the 4IR age.

## 7. Implications and Limitations of the Study

# 7.1. Implications

From the conceptual implication, businesses and people are aware of the digital economy, which will reduce the digital divide and create a strong interconnection between technology and the economy. Moreover, gaining consumer confidence and trust will be a major challenge for Bangladesh's digital platform economy in the future. From the point of practical implication, IT industries and business organizations would cope with the emerging 4IR and its technologies [39]. The job market would also increase and expand and diversify, which will ultimately contribute to the national economy.

The utilization of information and communications technology (ICT), the Internet, and other intelligent methods in the digital economy has the potential to enhance the industrial structure and augment employment opportunities. The digital economy significantly contributes to the reduction in economic losses and the facilitation of economic recovery. Furthermore, the stringent policies enacted by policymakers with the aim of reducing social mobility also have a negative impact on macroeconomic activity. In contrast, the digital economy has emerged as a promising avenue for the digital transformation of industries, owing to its inherent advantages in advanced technology and seamless connections with other sectors. Digital technologies, industries, and services have a significant impact on the economy, serving as stabilizers, lubricants, and boosters in comparison to the tangible aspects of the economy. Therefore, these policies are regarded as significant strategies for addressing the crisis and catalysts for stimulating economic development in Bangladesh.

#### 7.2. Limitations

Primary data collection is not possible because Bangladesh's economy is still in its infancy and not all of its sectors have adopted the idea of a digital economy. As a result, adopting strategies from technologically advanced nations and effectively summarizing them raises concerns for all economic sectors. There was no funding for conducting this research, and time was also limited for the researchers. There is a lack of previous research on the topic from Bangladeshi perspectives, which might present difficulties when trying to correlate the findings and research objectives. The researchers believe that the future research should be more understanding and comprehensive regarding academicians, researchers, and other concerned parties.

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