

The Economy of Tomorrow Digital Innovations and Their Implications for the Economy of Bangladesh

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- In recent years Bangladesh witnessed a rapid growth of digitization that is slowly changing the shape of the country's economy, pushing it towards the digital age
- To sustain the contribution of digital innovations on the country's economy, emphasize should be given to the education and the healthcare sector
- A successful mass adaptation of digital technologies can boost the productivity of industrial sectors, leading to an industrial revolution

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1. Introduction

Bangladesh, along with the rest of the world, is witnessing a digital revolution in recent years. The digital revolution is reshaping the way of communication, the medium of transaction and the process of gaining information. We, right now, are living in the digital age and the impact of the digital revolution on our economic and social life probably is proving to surpass all previous revolutions. The Internet has evolved from being a potential medium of low cost communication to one of the most essential elements of business management. Technological progress is a blessing for any country's economy and its people. While adaptation of a new technology temporarily causes a period of unemployment, it also immediately creates new job opportunities. Since the technology is now improving at an exponential rate, with the proper adaptation of feasible technologies, any country can grow their economy in a robust way. For example, the developed countries are currently emphasizing on technologies such as 3D printing or biofuel engineering to find a sustainable development strategy. Digitization of bus and railway system, online banking facilities, Internet marketing services, e-learning projects, long distance call center services, etc. are some of the technological changes which have been successfully implemented in neighboring countries such as India. We are currently living in a generation when, to sell a product, the seller needs only a smartphone, an Internet connection and the knowledge of using these two. It has been proven in the developed countries that, the more accessible the information, the easier it is to improve our productivity and ensure efficiency.

Some of these technologies are being implemented in Bangladesh, and some others can be implemented in the near future. Being a low income developing country, Bangladesh faces many constraints when it comes to economic growth. Slow growth of productivity and inefficient management of time constraint are two

crucial restraints of economic growth. Days of our lives are wasted just waiting in a traffic jam for some work which might have been done in seconds online. Which is why, this paper tries to find out the possibilities of technological adaptation in Bangladesh which have the capability to improve productivity, save valuable time and thus contributing to the country's economy's growth.

2. Heading Towards a Digital Economy

According to Tapscott (2015), the economy for the 'Age of Networked Intelligence' is a digital economy. In this economy, the information flow will be more digital rather than physical. Instead of cash or checks, e-wallet will be used for transactions, face-to-face meetings will be replaced by video conferencing, 'hard' textbooks will become 'soft' digitized versions, and the definition of business will change along with the way it is publicized. The new economy will be an 'information economy' where more and more of the economy's added value will be created by the brain rather than brawl. With the convergence among computing (computers, software, services), communications (telephony, cable, satellite, wireless) and content (entertainment, publishing, information providers), a new industrial sector will emerge. The employment rate in these sectors will grow substantially compared to sectors such as manufacturing or agriculture because of the high degree of mobility. The sector will not be limited to a city or a country, rather it will be linked globally, where people from one side of the planet can work for a company located on the other side of the planet¹.

After 20 years of first predicting those terms, we can now observe the changes in a developing country like Bangladesh. Information and communication sector grew substantially in the last decade allowing the country to enter the digital economy. Indeed the Information and

¹ These predictions were made in the first edition of the book "The Digital Economy: Promise and Peril in

the Age of Networked Intelligence" that was published in 1996.

Communication Technology (ICT) sector is becoming more and more popular among the labor force and the policy makers of the country.

2.1 The Digitization Index

There are very few indices regarding the measurement of digitization of an economy. The most comprehensive one is the Network Readiness Index annually published by the World Economic Forum. The framework of this index is divided into four sub-indices: the environment for ICTs; the readiness of a society to use ICTs; the actual usage of all main stakeholders; and the impacts that ICT generates in the economy and in society.

In 2015, Bangladesh ranks 109 out of 148 countries in the Network Readiness Index with an overall score of 3.3. The detailed rankings are:

Table 1: Network Readiness Index Rankings

	Rank	Score
Environment	130	3.2
Readiness	100	4.0
Usage	120	2.9
Impact	106	3.1

Source: World Economic Forum (2015)

Bangladesh improved its position on this index over the last four years. Bangladesh ranked 113, 114 and 119 in 2012, 2013 and 2014, respectively. However, the country is still under the constrained stage of digitization² category (see Figure 1).

2.2 Available ICT Indicators of the Country

Since 2000 Bangladesh slowly began to enter the digital age. To understand the dynamics we can look at some of the ICT indicators which are used to show an economy's level of digital

transformation. Almost all key ICT indicators (with the exception of fixed landline subscription rate) show how much the sector grew in such a short time. Among the many different indicators of ICT, this paper will only look at the three major indicators relevant to the discussion of the later sections. These are a number of mobile phone subscribers, population using the Internet, and the value of export of software and information technology enabled services. For the first two indicators, data were collected from International Telecommunication Union, while the remaining one is obtained from Bangladesh Association of Software and Information Services. The discussion in the following sections are based on the developments of these indicators.

First of all, due to the expansion of telecom sector, the number of mobile phone subscribers grew dramatically in the last 15 years. Whereas in 2000, only 0.21 inhabitants out of 100 had a mobile phone subscription, the number increased to 74.43 in 2013. As of September, 2015, the total number of mobile phone subscribers is 131.436 million, according to Bangladesh Telecommunication Regulatory Commission. Considering that the total population of the country is 156.6 million, it is an extraordinary achievement for the sector. Compared to countries like India and Pakistan, Bangladesh's growth in this indicator of ICT is relatively steadier (see Figure 2).

The second ICT indicator where Bangladesh again showed a huge growth rate is the percentage of individuals using the Internet. From a nonexistent status in 2000, Bangladesh currently has 54.058 million people using the Internet (BTRC, 2015). Decline in the prices of the Internet and access to higher bandwidth is behind the growth of the Internet use since 2008. However, the real change came in 2012 after the launch of third generation mobile phone networking. Out of the number of the Internet subscribers mentioned above, 96.15% are mobile internet users. The boom in the

² The stages are- constrained, emerging, transitional and advanced.

smartphone market is a big factor for such an increase in the mobile internet service. However, compared to India and Pakistan, the growth rate of this indicator showed a much lower rate. Starting from almost the same percentage of population using the Internet in 2000, both India and Pakistan touched double digit percentage in 2013, while Bangladesh was stuck at 6.5 (see Figure 3).

Lastly, we examine the value of export of software and information technology enabled services (ITES). According to Bangladesh Association of Software and Information Services, over a span of 8 years, starting from 2004-05, the value increased from \$12.68 million to \$101.63 million in 2012-13, a 700% increase. Although the size of the industry is still quite small, the average yearly growth rate for the previous five years was 40%. Considering the yearly number of graduates from IT related subjects are more than 10,000, the growth of employment in IT sector is bound to increase in the upcoming years. The total estimated size of the industry is \$800 million, including exports and the employment in this sector is approximately 70,000 as of 2013 (see Figure 4).

3 The Use of Commercial Digitization in Bangladesh

While the statistical figures give one view of the scenario, there are countless other economic aspects of the digital age. Take into account e-commerce, for instance. From 2000 to 2008, the e-commerce sector of Bangladesh was limited to, websites being a medium of posting advertisements of the products. Due to the high cost of Internet and slow growth in the number of Internet users, the sector's share of the economy was literally nonexistent. However, a wave of growth touched the sector since the Bangladesh Bank allowed online transaction in 2009. Hundreds of online shops have opened up since

then, allowing customers to buy products from home using their credit or debit cards (e-CAB, 2015).

The second wave of the digital economy in Bangladesh came with the introduction of mobile financial services in 2011. The revenue per month from mobile financial services grew from \$15,425.47 in April, 2012 to \$106,692.85 in April, 2014 (PiStrategy Consulting, 2014). Linking with the increased number of mobile phone subscribers in the country, mobile financial transaction (the majority of which is led by 'bKash' from BRAC)³ was able to secure an impressive 186% increase in growth in 2013 (Dhaka Tribune, 2014).

It is important to note that, according to the World Bank, only 59.6% of the population of Bangladesh had access to electricity in 2012. It indeed is a challenge for the country to enter digitization without more access to electricity. However, the data from the 2010 Household Income and Expenditure Survey shows some intriguing results. Of the 12,240 households, 57.65% had access to electricity while 65.03% of the total household had access to at least one mobile phone. This shows that even though the state of electricity is an issue for utilizing the benefits of digital innovations, it is possible for Bangladesh to spread mobile phone based services. This is a major reason why the mobile financial services became successful at a relatively short time in the country.

Table 2: Percentage of Households having Access to Electricity and Mobile Phone

	2005	2010
Electricity	47.13	57.65
Mobile Phone	12.29	65.03

Source: Household Income and Expenditure Survey

³ bKash Limited is a subsidiary of BRAC Bank which was launched in mid-2011

4. Is Bangladesh Ready for the Knowledge Economy?

Education is one of the key determinant of sustainable economic growth of any country. According to Hanushek and Wobmann (2007), education contributes to an economy in three ways. Firstly, education increases labor productivity and leads the economy to an equilibrium of higher economic output. Secondly, with higher education, the chances of innovation increases in an economy. Lastly, the more educated the people of a country, the faster they absorb the ongoing technological changes which can lead to a higher production possibility.

According to a report published by UNESCO (2011), the use of ICT materials played a significant role in educational development in developing countries. The research done by Kulik (2003) finds:

- Students who used computer tutorials in mathematics, natural science, and social science scored significantly higher on tests on these subjects. Students who used simulation software in science also scored higher.
- Primary school students who used tutorial software in reading scored significantly higher in reading scores. Very young students who used computers to write their own stories scored significantly higher on measures of reading skill.
- Students who used word processors or otherwise used the computer for writing scored higher on measures of writing skill.

Considering the importance of education for long term socioeconomic development, it is currently the prime focus of the ongoing digitization process. The National ICT Policy of 2015 clearly defines eight strategies to incorporate the use of

ICT in the education sector of Bangladesh. It includes short run initiatives like giving teachers, funding for maintaining ICT materials, medium runs initiatives such as establishing e-library for both teachers and students, and long run initiatives like transforming at least one university in each division as a “Center of Excellence for ICT”. Under the Access to Information (A2I) Program⁴ of the Prime Minister’s Office, digitization of the books of primary to higher secondary level is currently ongoing. The publication of the results of public exams such as Secondary School Certificate, Higher Secondary Certificate, etc. has been digitized for a number of years. From 2015, the system of online college admission has been undertaken (National ICT Policy, 2015).

A major drawback of the education system of any developing country is the static nature of its teaching materials, and Bangladesh is no exception to this. In comparison to the digitized textbooks of the National Curriculum and Textbook Board (NCTB) of Bangladesh, the National Council of Educational Research and Training (NCERT) e-books of India provide more updated examples of scientific topics and they are presented in a more attractive way⁵. The ICT policy states that the university level computer science course materials will be updated every two years, and the ICT curriculum of secondary and higher secondary level will be updated regularly. For meeting the goals of Vision 2021, the students need to be introduced to newer topics that are coming every year. Also, to properly utilize the benefits of the digitization processes, adaptive learning can be introduced. The adaptive learning is the process of using teaching materials that “adapts” based on the responsiveness of each student (Oxman and Wong, 2014). Human beings are different from each other. What works for one child of a class may not work for another child of the same class. Hence, the teaching methods that reacts to the

⁴ Access to Information (a2i) Programme is a project targeted to provide support in building a digital nation through delivering services at the citizen’s doorstep.

⁵ The National Council of Educational Research and Training, India website provides every academic ebook from class 1 to 12.

individual needs of a student is proven to work better than the one where everyone is treated as equals. Previously this method could not be used for classes with a large population, but using current digital mediums (like- e-books, video tutorials etc.) that are both time and cost efficient, it can very well be applied in an overpopulated country like Bangladesh.

Another important point to remember is that in Bangladesh the number of students is significantly higher than the number of teachers. According to the Directorate of Primary Education, there are 37,672 government primary schools in the country. The number of students studying there is 10,687,349 compared to the number of teachers is 201,900 (Dhaka Tribune, 2013). It means there is only one teacher for every 53 students. The student-teacher ratio in the primary schools of Bangladesh in 2011 was 40:1, which makes it very difficult for teachers to provide due attention to each student. One solution to this problem could be the use of digital mediums like projectors or teacher-student portals in these classrooms. The new ICT policy targets to use low cost multimedia materials to teach students in all schools (The Daily Star, 2014). It is also worth mentioning that, remote teaching can be another good initiative for schools in rural areas. Since the Internet is now available in most areas of Bangladesh, remote teaching using computers and webcams can reduce the education quality gap between schools in rural versus urban areas. Using video calls a teacher from Dhaka can teach a class full of students in, say, Khulna.

It is worth mentioning that, a good example of an education model which incorporates technology to provide affordable yet quality education is the initiative by Bridge International Academies in Kenya. In their “Academy-in-a-Box” approach, they use mobile phones, tablets and customized text messages to reduce the cost of teaching, training, assessments and school management by almost 80%. Since government certified teachers are scarce in Kenya, Bridge hires local secondary school graduates as teachers for the schools after giving them intensive training to

ensure that the quality of the education is not compromised. BRAC has also successfully implemented a similar strategy in their education program in Bangladesh. Started in 1985, the main objective of BRAC Primary Schools was to introduce a non-formal four year education model to cover up the five year primary education to an underprivileged student. With a primary school examination passing rate of 99.54% in 2010, the model is a successful example of a remarkable educational approach along with local employment.

Essentially, the use of digitization in education sector depends on the proper combination of the range of adaptability and the range of applicability. In both of these cases, dynamism is the key variable that will determine the level of success.

5. What will be the Role of Digitized Healthcare in the Economy of Tomorrow?

For a country of 156.6 million people, healthcare certainly plays a very important role in Bangladesh. The country’s Ministry of Health and Family Welfare has done an exceptionally good job in developing the Health Information System (HIS) in 2008. Keeping the Vision 2021 in mind, the progress in electronic health system is widely appreciated by the Federal Ministry of Economic Cooperation and Development of Germany in the report titled “A quiet revolution: Strengthening the routine health information system in Bangladesh” (Azad, 2015). According to this report, HIS helped the country’s healthcare system by:

- Reducing administrative inefficiencies.
- Providing standard healthcare in remote areas.
- Reducing information gap between the doctors of different areas.

It is notable that the Honorable Prime Minister Sheikh Hasina received the United Nations South-South Award for Digital Health in 2011 due to the country’s success in this sector. The

success was possible due to the efforts of the Management Information System (MIS) of the Directorate General of Health Services (DGHS).

The main problem of the healthcare system of Bangladesh before 2008 was the fragmented datasets and uncoordinated structure. Even though there existed several datasets containing health related data, there was no process of crosschecking or combining them. With the help of Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Ministry of Health and Family Welfare set up a national data warehouse in 2009 using the comprehensive 'butterfly' model for HIS strengthening. After integrating the existing databases with this warehouse, it was then possible to gain access to the data of different programs from one single platform. It provided a good snapshot of the entire healthcare scenario which was used to create the National Healthcare Policy 2011 and to undertake several strategies.

In practice, the digitized healthcare of Bangladesh is addressing four major issues and providing solutions to them. First and foremost is the lack of access to doctors in rural areas. This issue is solved by using telemedicine, which opened the door of experienced doctors from capital city to give advice to patients or semi-experienced doctors in affected areas. Currently, all civil surgeons have access to the Internet and webcams using which they are reducing the information gap. For the patients, mobile health lines have proven to be highly effective, especially for the private operators. The second major issue is monitoring the activities of both the patients and the doctors. Almost 24,000 rurally deployed health workers are playing a major role in monitoring the patients. This leads to the third issue, which is to ensure the full capacity of the health workers, and to make sure they follow the step-by-step procedures. To solve these two issues, the government is distributing laptops with wireless modems to almost 15,000 government-backed health facilities which will be connected to the District Health Information System software (DHIS2). Workers will have access to the health e-contents that will improve their capacity. Lastly,

people's awareness regarding various health issues is being raised by using mobile messages.

The benefits of the digitization of healthcare are reflected in a paper by Biesdorf and Niedermann (2014). According to them, the first wave of IT adoption in healthcare began in the late 50s when manufacturers began using statistical data for standardized and repetitive tasks. The second wave of IT adoption began in the 80s. It helped integrate different parts of core processes within individual organizations. For example, it brought the electronic health card in Germany. It was also a catalyst for the Health Information Technology for Economic and Clinical Health Act in the United States—an effort to promote the adoption of health-information technology—and the National Programme for IT in the National Health Service in the United Kingdom. Based on the study conducted in Germany, the United Kingdom and Singapore, their research show three important predictions: (i) more than 75% of all patients are expected to use digital services in the future, (ii) digital-service is expected to increase across all age groups rather than just the young generation, and (iii) awareness and process of execution are the core drivers of digital-service adoption for patients (McKinsey, 2014). The implications of these results are also relevant for Bangladesh, considering its current advancement in digital health services.

6. The Economic Impact of Digitization

While Bangladesh debates about the means to improve its growth outlook from 6% to 7-8%, one of the most promising means of boosting economic activity is the increasing use of digital technologies. The mass adoption of digital technologies—known as digitization—in manufacturing sector has very aptly been dubbed as the “third industrial revolution.” Recognizing the huge opportunity as well as increasing vulnerability to digitization and technological advances, on July 31, 2013, the US has become the first country to categorize research and development and software into a new category of

“intellectual property products”, which will bring the US GDP accounting closer to economic reality (Bughin and Manyika, 2013). This is a sensible move because conventional accounting treats intangible assets as such Google’s search algorithm or Amazon’s recommendation engine not as company investment, but as expenses, stripping away an important component that economists now refer to as “digital capital.” The McKinsey consulting firm, reckons that digital capital is now the source of roughly one-third of total global GDP growth (Dobbs, Manyika and Woetzel, 2015).

In thinking about the impact of technology on economic growth, it is important to clarify the two dimensions of the technology in question. These are “range of applicability” and “range of adoption” (Eichengreen, 2015). Range of applicability refers to the number of different sector or activities to which the (new) technology can be productively applied. For example, the steam engine had a limited impact on output and productivity because its applications were confined to the textile industry and railways, which accounted for only a relatively small fraction of economic activity. To a great extent, the computer revolution also did not yield expected results on economy-wide output and productivity growth because its applications were largely limited to finance, wholesale and retail trade. By comparison, the electricity had a larger impact on economic activity because of its productive applicability to a wide range of economic sectors. Range of adoption, on the other hand, means to what extent a country must be reorganized to reap the maximum benefits of innovations on output and productivity growth. For example, to benefit from electricity, a country must have a good network of roads and transmission lines. Thus, new innovations such as the Internet of Things⁶ have the potential to connect most physical objects electronically (e.g., linking a patient’s home health monitor to the hospital’s health information system) (this is the

range of applicability dimension), but requires high-level coordination on many levels such as technology, capital investment, organization change and so forth (the range of adoption dimension).

However, measuring the economic impact of digitization is notoriously difficult because we can’t always put a price on many products and services that we consume on the Internet (think about finding a solution to a problem on Wikipedia). Moreover, since the output (or GDP) includes monetary transactions, not welfare, the consumer surplus derived from using internet activity does not show up in GDP (The Economist, 2013). For example, an estimate for the United States shows that time saved using the Internet generates roughly \$500 of consumer surplus per user annually, or \$65-\$150 billion nationally (Varian, 2014). Clearly, the net benefit of the internet goes beyond the GDP.

Nevertheless, in recent years there have been a number of attempts to quantify the contribution of digitization on social and economic outcomes. For example, Sabbagh et al. (2012) construct a composite index of digitization consisting six critical dimensions using 23 indicators of information and communication technology. Based on a sample of 150 countries and using a classical production function model they find that a 10% increase in digitization leads to a 0.50 to 0.62 percent gain in per capita GDP, and the impact accelerates as countries transition to a more advanced stage. In addition, the social impact of digitization in developing countries is found to be weak because basic needs that are critical to quality of life have to be satisfied before digitization can act as an enabler of socioeconomic development.

McKinsey Global Institute (2011) uses the expenditure approach, rather than production approach, to quantify the internet’s contribution to GDP. In practice, expenditure data are easier to

⁶ According to McKinsey (2015), the Internet of Things is defined as “sensors and actuators connected by networks to computing systems.

obtain than production data. Their method looks at four factors: private consumption, public expenses, private investment, and trade balance. Based on a sample of 13 emerging and developed countries, they find that, on average, the internet accounts for 3.4 percent of GDP, weighing more than agriculture, energy, and other established industries contribution to economic growth.

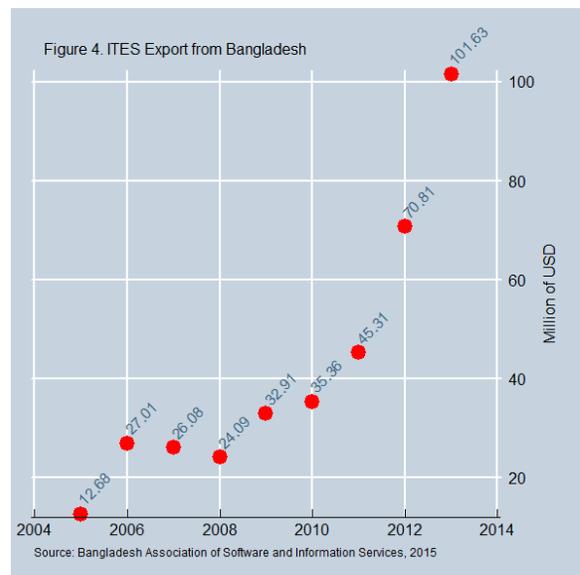
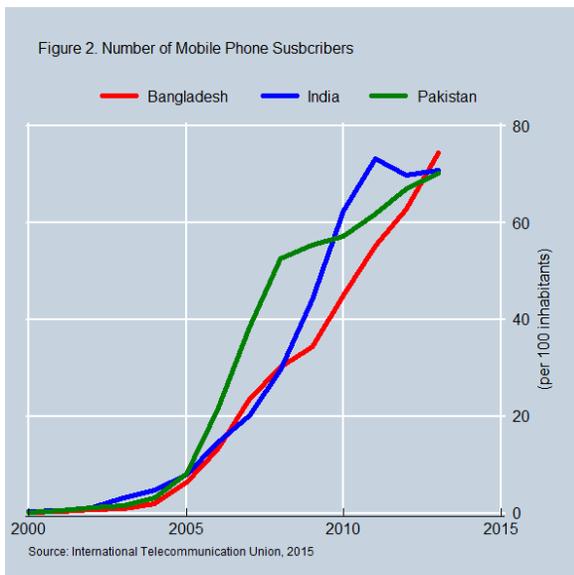
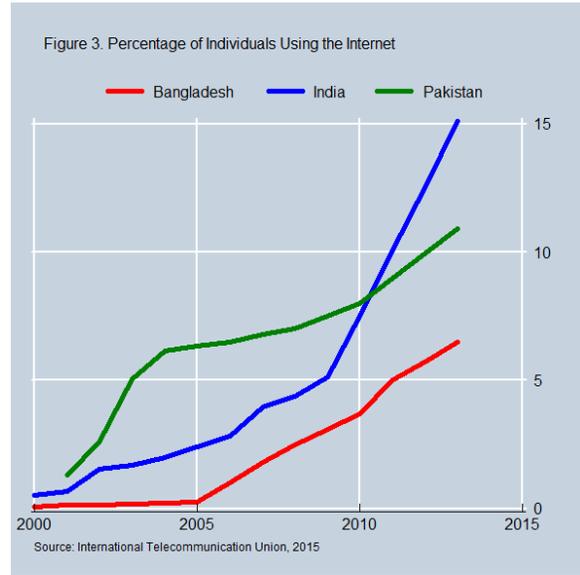
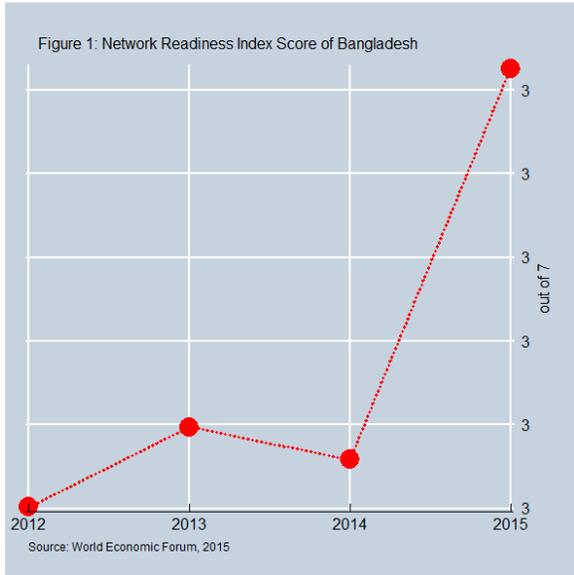
Today, the Internet's contribution to Bangladesh's GDP is unavailable, but the Internet is likely to be a strong catalyst for economic growth in the coming decade. In December 2008, the Government of Bangladesh introduced the vision 'Digital Bangladesh by 2021' to leverage the Internet to improve the delivery of its services, particularly among the poor people. As discussed above, a quiet revolution in digitizing its health sector is already under way to strengthen the Health Information System (HIS), which enables real-time monitoring of population health. The Internet could provide solutions to a number of structural problems besetting Bangladesh's health sector. For example, the use of ICT to provide remote diagnosis, advice, treatment, and health education could address a major part of the health issues of patients in rural clinics, which are typically the most poorly staffed. Online tools and mobile innovations can improve the operational efficiency and productivity of (rural) health system by enabling more effective service delivery. The use of ICT in education has a similar potential to deliver rapid gains in access to education, teacher training, and learning outcomes. As pointed above, web-based school management systems that can support standardization and monitoring of school performance could enable the government to achieve more with their

education budgets and providing millions of students with the foundation for a better future.

7. Conclusion

In the end, it is clear that the digital age and its associated variables are continuously getting integrated into our economy and society. Due to the limitations of data, only a snapshot of the impact on education and healthcare of Bangladesh is shown in this paper. All of the available sources show that to make a dramatic shift in these two sectors, incorporation of digitized materials is one of the most important factors of current time. However, there are many questions regarding the impact of the digital age in the socioeconomic conditions of Bangladesh that still remained unsolved. For example, how do we quantify the impact that the internet and internet driven business have on a country's GDP? How does a digitized registration process reduce corruption? What will the legal system of the country look like when digitization will take place there? Is the internet creating a divergence among the different groups of people? How much of labor hours are people wasting doing unproductive works on the internet? For every new digital adoption, someone may be getting a new job, whereas someone, somewhere may be losing his/her job. So what if the rate of losing jobs is far greater than the rate of creating employment opportunities? The answer to these questions require further research, including reviewing the experiences of other countries where these questions have already been addressed. However, one thing is clear that these topics will dominate the research agendas in the upcoming years and their findings will help Bangladesh to transform into a more balanced, robust and sustainable economic growth.

Appendix 1: Figures



Appendix 2: Variable Names and Sources

Name	Source
Network Readiness Index	World Economic Forum
Mobile Phone Subscribers	International Telecommunication Union
Internet Users	International Telecommunication Union
ITES Export	Bangladesh Association of Software and Information Services
Academia-in-a-Box	The Bridge International Academies
Health Information System	Ministry of Health and Family Welfare, Bangladesh
HIES 2010	Bangladesh Bureau of Statistics

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