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Impacts of Technological Advancement on Achieving Sustainable Development Goals (SDGs): in Developing Countries

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ABSTRACT

SDG's goals are immensely affected by technological development. This paper mainly inspects the approaches and trials faced in a developing country: like Bangladesh. Data collection was performed by distributing questions on social media and selecting appropriate random sampling. Forty hundred completed responses were analyzed. The research techniques that were used were empirical and quantitative. Innovation, investment, economic freedom, human development, and globalization are some of the goals that are greatly impacted by digital technological influence. Conversely, inequality in development; lack of global partnership, energy consumption, lack of quality education, etc. are the limitations or reasons that slow down the process. The study discloses these approaches and limitations from different sectors and age groups. The findings have practical and theoretical implications for academics, scholars, institutions, business professionals, and other associated parties keen to identify the impact of technological advancement on SDGs.

Keywords: SDGs Goals, Technological advancement, Sustainability, Digital technology, and Strategies.

INTRODUCTION:

Technological progress refers to the creation or discovery of knowledge that expands our understanding of science or technology. In brief, technical advancement is our attempt to understand how things function to further develop procedures, goods, or services to advance and make our lives simpler. Technology advancement can be referred to as the results of our investigations into how things function and how to use them to create new things (AHMED, 2022). (Mohamed Sameer Hoosain, 2020) detailed that for more better and suitable roadmap for the future knowing the sustainable development goals are must for everybody. It deals with issues like environmental change, discrimination, fairness, deficiency, and harmony. Technological advancement plays a significant role in overcoming the issues of poverty and others to achieve the goals of sustainable development. For modern societies' development, SDGs imperatives emphasize studying digital technology. In recent years for economic growth digital applications have been the focal point (DigWatch, 2023). The impression of digital applications on SDG's goals was addressed undesirably by some of the critics as considering the ecological costs of economic development and traditional high socials (Delay VRO, 2023).

The empirical data shows that sustainable development in developing countries is significantly impacted by digital growth and economic impact. (Castro, 2018) find out that in developing countries adverse consequences of technical economic growth are much complex. Developing countries agonize ecological exp-

enses that upsurge the growth of production waste and the volume of natural resource consumption as well as social costs that are associated with the living standards, more joblessness, and income dropping which leads to a besmirched standard of life and environment (Rita S. Senise, 2021). (Doyle, 2021) specified that some mediating roles of increasing the approachability of online education, stimulation of global competition through the encouragement of globalization, and the upsurge in the accountability of financing are the reasons for lessening countries' inequality. To sustainable development goals, numerous facets of digital applications are put up inversely. This paper finds out that some specific SDGs are influenced by digital technologies such as economic freedom, innovations, investments, globalization, and human development. The influence does not apply across the board, it is country-specific therefore the influence of digital technology requires ad hoc management approaches (Duggal, 2023). Mainly, this paper has been answered the following research questions:

RQ1: What is the impact of technological advancement on the SDGs of Bangladesh?
RQ2: What are the approaches and strategies that have an impact on achieving the goal?
RQ3: What are the limitations or challenges in practicing the technology on the SDGs goals?

Research objectives

This paper's objective is to comprehend the impact of technological advancement changes and implications on the SDGs goals of a developing country, like Bangladesh. Some detailed aims include:

- To inspect the impact of technological advancement on the SDGs of Bangladesh.
- To examine the approaches and strategies that have an impact on achieving the goal.
- To identify the limitations or challenges in practicing the technology on the SDGs goals.

Review of Literature

According to a new analysis, as the negative consequences of climate change worsen in combination with other global problems, increased usage of digital technology can help to a more sustainable future. (The Role of Technology in the UN SDGs, 2017). The SDGs are a set of goals for human growth that have been developed through consensus. Climate action is a critical component of the SDGs, crossing territory and mandating effective services. A new analysis explores the crucial roles that the ICT sector must play in creating and deploying digital technologies (Rios, 2021). (UNCTAD, 2019) stated that Out of the 50 technologies considered crucial to accomplishing the SDGs, 10 have already been created. Two cutting-edge technologies that are anticipated to be disruptive in the SDG timeline are gene editing and aerial imaging. Making traditional crop varieties immune to some of the effects of climate change, particularly drought, and heat, will be the greatest immediate effect of CRISPR. Tata Group of Companies in India and Women's Hospital in Nairobi, Kenya are well-established to make mutually beneficial that produce revenues even though also resolving social problems on a broad scale (Rios, 2021). These businesses will likely be far more significant than Western corporations in this setting, for whom the low revenues from low-income areas would probably be unappealing. Governments need to take a far more strategic approach to promoting and importing innovative products and services (United Nations Inter-Agency Task Team on Science, 2022). (Dr. Chirag M. Patel, 2020) said that technology is a huge benefit to people, as well as in the business world. The rise of technological entrepreneurship has had a significant impact on economic growth. Business technology helps organizations improve their communication processes, which can lead to increased productivity and good business strategies. Startups have emerged as an excellent means of advancing technology due to their continuous innovation and thorough planning (Berawi, 2017). Top management can also use technology to easily create measurable goals for their employees to help them achieve and maintain company objectives. Businesses can use online marketing as a tool to reach new economic markets and customers by strategically placing web banners or ads (Rahman, 2018). It can also enable companies to outsource business operations to other people and establishments on a global scale. Business technology enables companies to outsource business operations to other people and establishments on a global scale (Duggal, 2023). According to (Doyle, 2021) over the past few years after the pandemic, the impact of technology on our daily life has grown

exceptionally. By using mobile or laptops people are connected with one another and it provides a vast amount of knowledge. Everyone should incorporate technology in their daily life for business, communication, research, web-based advertising, etc. Technology allows organizations to connect both internally and externally through many channels. Businesses can carry out market research using secondary data when they use technology. (Alana Corsi, 2020) stated that this is incredibly beneficial because it offers organizations in-depth knowledge of markets prior to entering them. In addition to secondary research, firms can employ technology to do primary research, such as online surveys and customer feedback. One of the most useful applications of technology is advertising to millions of individuals all over the world at the press of a button. Websites and social media platforms are examples of web-based advertising (Duggal, 2023).

According to (Alicia Bárcena) access to an interconnected network of untapped big data through digitalization could be helpful for both society and the environment. This viewpoint emphasizes the possibilities that digitalization can offer for building a future society that is sustainable (Rahman, 2021). The three fundamental components of the food-water-energy nexus will benefit from the use of smart technology, which is seen as a game-changing solution. (Castro, 2018) stated that in order to boost a system's effectiveness and efficiency, these modern technologies have significance in societal, environmental, sustainability, and climate research. Researchers investigated how engineering and technology advancements closely related to artificial intelligence (AI) can help the United Nations' 17 Sustainable Development Goals (SDGs) (UN). The United Nations established these 17 SDGs as part of its 2030 Agenda to safeguard the environment and ensure prosperity for all (United Nations Global Compact, n.d.). They represent a substantial change for firms and governments in the development of new, sustainable business models and government regulations. Governments, businesses, and non-governmental organizations all play important roles in achieving the goals (United Nations Inter-Agency Task Team on Science, 2022). According to (The World Bank, Harnessing the Transformative Power of Technology to End Poverty), most of the studies on digital technology development on SDGs are country-specific but accomplishing the SDGs by 2030 demands explanations to tackle the complex glitches and new approaches. That's why in this paper I discuss some methods that can be an integral part of national sustainable development strategies by 2030. The adoption of technology, science, and innovation involves well-established organizational structures, good governance, and a legal framework that articulates a variety of strategies. The challenge in achieving the SDGs is reconsidering and implementing new approaches (UNCTAD, 2019). (TechnoServe, 2021) stated that a conceptual model was created to portray the impact of digital technological advancement to achieve sustainable development goals, based on the literature review on technological advancement on SGDs of developing countries. My study examines the approaches that have an impact on the effects of technological development of developing countries' SDGs, and the result would help the institute and organizations to adopt, respond and implement the strategies successfully to achieve the goals by 2030 (The Role of Technology in the UN SDGs, 2017).

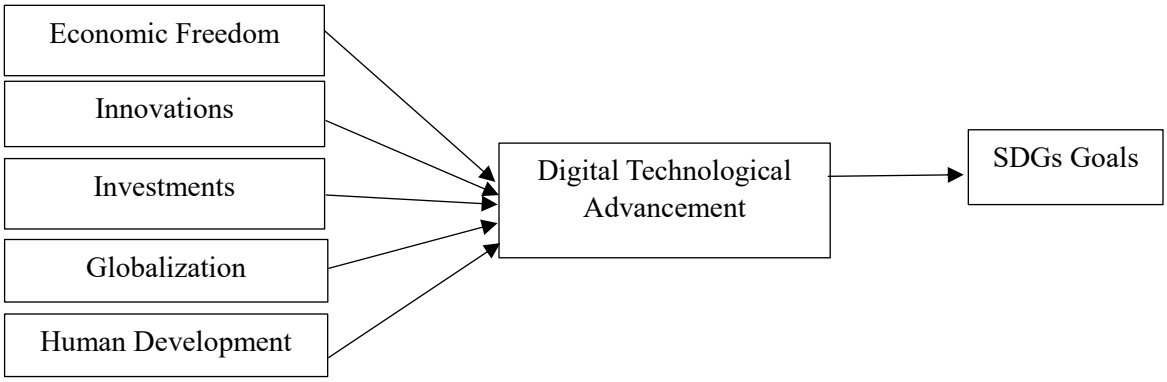

Fig. 1: Research Framework.

Table 1: Operational definition.

Variables identified	Operational definition
B1. Take it as a Global matter.	Abasement of environment, steady economic progress and social discri-mination are the challenges for the global community (Alicia Bárcena).
B2. Take it as a Local matter.	To accomplish SDG's vision, it needs execution in regional level.
B3. Take it as a responsibility of the government.	To attain the 2030 agenda, government of developed and developing countries integrated the alignment of financing, and regulatory planning on social, environmental, and public financing (Doyle, 2021).
B4. Future sustainability deve-lopments will be driven by new innovations and technologies.	Without reaching the proper development of innovation, science, and technology, accomplishing SDG's goals is nearly impossible (How technology support the Sustainable Development Goals, 2021).
B5. It is the responsibility of everyone to act sustainably.	To achieve the SDG's goal every country needs to act sustainably.
B6. Encouraged organizations to implement and introduce new sustainable concepts and ideas.	By 2030, inspire more developed and developing countries to implement safe reuse, pollution reduction and increasing significant recycling (DigWatch, 2023).
B7. Promoting the importance of ecologically sustainable aspects.	For developing countries escalating financial resource allocation and international collaboration is a must for reprocessing, recycling, and ecological sustainability (Rios, 2021).
B8. To achieve SDGs Govern-ment should subsidize activities for organizations.	Organizations should encourage growth-oriented activities for supporting entrepreneurship, financial facilities, and micro-small and standard-size organizations (Alicia Bárcena).
B9. In the field of sustainability, organizations should put more effort into development and research.	By 2030, encourage more scientific research, innovation, and technological development work.
C1. Income & development inequality	Between the developed and developing countries social, economic, and environmental inequality has risen (United Nations Inter-Agency Task Team on Science, 2022).
C2. Guaranteeing excellence in education at multilevel educational streams	Confirming equivalent access for all to excellent and reasonable professional, practical, and tertiary education in all levels of education systems (Dr. Chirag M. Patel, 2020).
C3. Safeguarding renewable growth	Preservation of natural resources is crucial for achieving renewable growth.
C4. Climate vulnerability	Every nation is now facing environmental change that disrupting their lives, the expenses of people, and the economy (UNCTAD, 2019).
C5. Lack target-oriented efforts	Most countries are trying to cover all the issues at once creating a lack of forecasting, exertion, and determination (AHMED, 2022).
C6. Lack of appropriate finance needed for its implementation	Developing countries are facing necessary fund deficiencies for their project implementation. Current funds are not sufficient for their estimates (Castro, 2018).
C7. Lack of Good Governance	It is caused by a lack of regional-level planning and an underprovided development plan.
C8. Unemployment among the youth	The deficiency of sufficient work openings creates attrition of basic social agreement (Alana Corsi, 2020).
C9. Difficulties regarding poli-cymaking and related issues	Most countries are solely converging on their expansion goals not on their progress transformative goals that create major challenges for them (Doyle, 2021).

METHODOLOGY:

Instrumental progress

Using a structural survey, I collected all the primary data. In addition to demographic information, this survey consisted of three major areas. The introduction part contains four questions: participants' age, occupation, gender, and education. Then the second part comprises familiarity with the UN Sustainable Development Goals. In the next section, part 1 of the questionnaire consists of six innovative ideas of tech-

nological advancement and seven approaches to achieve technological advancement in developing countries. Finally, in Part 3 of the question contributors were requested to segment opinions by rating five points Likert scale of agreement. It consists of nine improvement approaches that can have an impact on technological advancement and nine challenges that developing countries are facing in achieving SDGs. Nine related challenges & improvements were used in the study, shown in **Table 1**.

Data &sample assembly

The facts for this survey were assembled throughout February & March 2022 through a planned form disseminated on social media platforms. The testing method was chosen for its convenience, where technology operators are identified from various sectors in a very expedient style. Nearly 750 questionnaires were distributed online to collect responses. Overall, 400 responses were received, and the completely answered questionnaires resulted in a 53% response rate.

Analytical Framework

To evaluate the input data, I used SPSS-21 (IBM statistical package for social science). At first, I tested the validity and reliability of the statistics theories. To check the reliability & consistency of each theory, correlation of the corrected item-total and Cronbach alpha standards were used. For every item tentative factor investigation for theories and validity were inspected. Secondly, where the five-point Likert measure was used, descriptive analysis was shown to calculate the means of the frequency of each theory. For some graphical representations, ratio analysis has also been accomplished.

Demographic data of the contributors

The demographic data of the contributors are given in **Table 1** and **Fig. 2**.

Age

From **Fig. 2**, it can be expounded that the largest number of the contributors were below age of 35. Under 25 male contributors' ratio was 14.6%, 43% were under 35 & 26.80%, 8.30%, and 2% of male participants were below 45, below 55, and correspondingly. Nevertheless, 17.10% of women contributors were under 25 years, 46.60% were under 35 years & 21.90%, and 8.90% of women contributors were under 45, and under 55 correspondingly.

Gender

Table 1 directs 63.5% of men contributors and 36.5% of women contributors.

Education

Among the 400 contributors in **Table 1**, 6.5% belong to secondary education, 16% belong to higher secondary, 28.5% belong to graduation, 34.5% belong to post-graduation & Ph.D., and 15% belong to other.

Occupation

Based on the skills contributors were requested to choose their occupation. **Table 2** indicates that the majority of the contributors (17%) were from the private sector, 15.8% students, 13% engineer, 12.5% bankers, 11.8% university teachers, 8.5% school/college teacher, 7.8% doctor, 7% public/Govt. organization and 6.8% belonged to others.

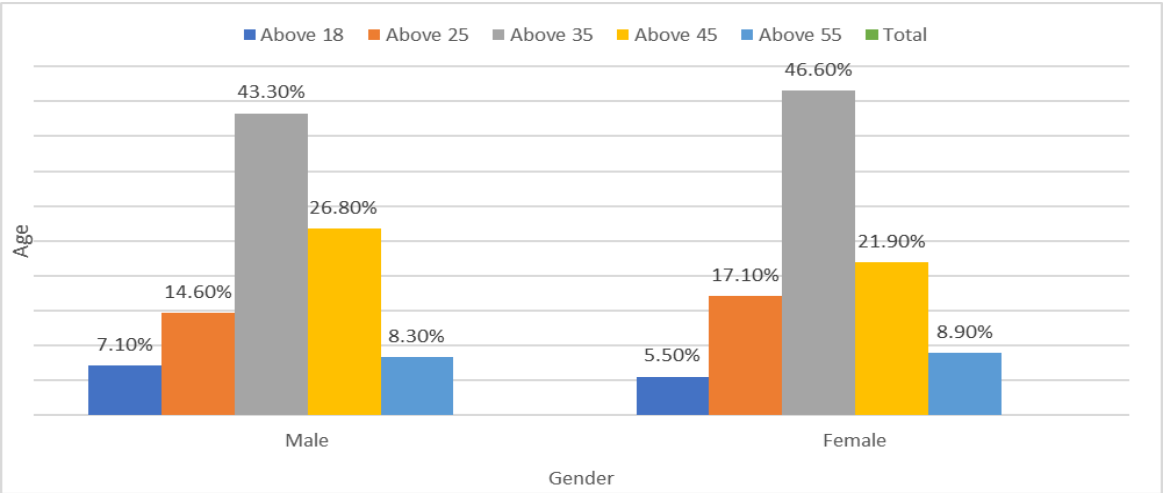

Fig. 2: Participants' Age.

Table 2: Profile of the participants.

Question	Frequency (n = 400)	Percentage
Gender		
Male	254	63.5%
Female	146	36.5%
Education		
Passed secondary	26	6.5%
Passed higher Secondary	64	16.0%
Completed graduation	114	28.5%
Completed post-graduation or doctoral	138	34.5%
Others	58	15%
Occupation		
Doctor	31	7.8%
Others	27	6.8%
Banker	50	12.5%
Engineer	52	13.0%
Service holder at Govt. organization	28	7.0%
Service holder at private organization	68	17.0%
University Teacher	47	11.8%
School/College Teacher	34	8.5%
Student	63	15.8%

Result Analysis

In terms of familiarity & inspiring ideas and achieved approaches, the contributors were requested to selects more than one area of that they think are inspiring people in developing countries. **Table 3** illustrated that the most of the contributors (44.5%) think that innovative domestic resources can encourage more people to use technologies, a notable number of users think introducing commercial and modern agricultural technologies (25.3%) helps the farmers, approximately 16% think the national voluntary pension scheme also inspires them using it, integrated water resource management and building decentralized micro-grids for electricity and sharing solar power holds the percentage of 8.3% and 6.5 %. Some tactics that developing countries can take to persuade more people to use modern days technologies to achieve the SDGs. **Table 3** also shows that 22.5% of global partnerships can improve the relationship between countries which can also help achieve the SDGs. Approximately, 19% of people think that the source of sustainable energy can change the SDGs scenario. Economic growth and freedom (17.5%) also play a major role in SDGs in developing countries. Reducing inequalities between countries and inclusive education holds 13.5 and 13%. Nearly 9% of people think that recovering climate transformation technologies can play a significant role. 6.3 % of people want an improved healthy life.

Table 3: Frequencies and percents result summary.

Questions		Frequency (n=400)	Percent
Familiarity with the UN Sustainable Development Goals.	Yes	316	79.0%
	No	84	21.0%
	Total	400	100.0%
What innovative ideas are inspiring more and more people in Bangladesh?	Sharing solar power and building decentralized micro-grids for electricity	26	6.5%
	Introduction of the national voluntary pension scheme	62	15.5%
	Local resources utilization innovations	178	44.5%
	Concentration on innovative and commercial cultivation of peasants	101	25.3%
	Integrated water resources management	33	8.3%

Which approaches should be achieved to gain technological advance in developing countries?	Safeguarding healthy lifestyles	25	6.3%
	Guarantying comprehensive education systems	52	13.0%
	Confirm access to renewable resources	74	18.5%
	Promote inclusive economic growth and Freedom	70	17.5%
	Reduce inequality among countries	54	13.5%
	Urgent action to combat climate change	35	8.8%
	Strengthen the global partnership	90	22.5%

Reliability and rationality of research tool

According to ((DeVellis, 2021; Hinkin, 1995), construct reliability assessing confirms the grade to which study tools are unerring and for assessing the reliability point inside it symbolize a pointer. Cronbach's Alpha (α) is most used for the internal consistency and scale reliability (Vaske, 2017). The total score of each theory with the relating number of each measure can be calculated by Cronbach alpha, it can also be com-pared with each item variance (Goforth, 2015). The scientific equation of this is:

$$\alpha = \frac{k \times \bar{c}}{\bar{v} + (k-1)\bar{c}}$$

Here, k = the number of measured items, c = covariance of average of all covariances between items, and v = Items average variance.

In this study, I measured the reliability and consistency of two constructs and showed Cronbach's Alpha (α) value for the correlated total elements correlation and Cronbach's Alpha (α) if the element was removed. In **Table 4**, the Cronbach alpha constant value for the improvement approaches was 0.761, and for the limitations or challenges, it was 0.761. Cronbach's Alpha (α) values above the alpha factor of 0.7 show reliability signs as the inner reliability balances the quantity (Rivard, 1988).

Table 4: Reliability Assessment results summary.

Theory	Elements Number	Mean	Cronbach Alpha	Variety of Cronbach's Alpha if Element Removed	Variety of corrected Total-element association
Improvement Approaches	9	3.578	0.761	0.737-0.747	0.417-0.497
Limitations or Challenges	9	3.578	0.761	0.730-0.747	0.388-0.497

The concept is more consistent with the theory if the Cronbach alpha is close to 1 (Kemp, 2003). It can be determined that the study instruments in this study a tremendously consistent research instrument as the two concepts or theory are significantly higher than 0.7 in the Cronbach alpha coefficient. If one element removed from the theories, the intended Cronbach alpha was 0.74- 0.75 & 0.73-0.75 which were also higher than the standard of 0.70. In the two constructs, all items for the correlated total element association standards were also calculated. In **Table 5**, except for one item (correlated total element association=.388) in the first theory applied, the other eight elements' total association values fluctuated from 0.406 to 0.497. In the next theory, eight elements of total association values fluctuated from 0.406 to 0.497, and an element (correlated total element association=.388). According to (Gliem, 2003), total elements association standards should be a minimum of 0.40. Maximum items of the total elements associated with the two theories are higher than 0.40, which shows decent inside reliability mid most of the applied scale elements. To inspect the rationality of the theories, exploratory factor analysis (major element) was used.

Table 5: Validity testing through factor loading.

Correlation among corrected total items	B1	B2	B3	B4	B5	B6	B7	B8	B9
Improvement Approaches	0.456	0.417	0.426	0.388	0.405	0.469	0.416	0.496	0.489

	C1	C2	C3	C4	C5	C6	C7	C8	C9
Limitations or Challenges	.406	.469	.417	.457	.497	.489	.418	.426	.388

Table 6: Approaches and challenges of Technology on the SDGs goals.

Approaches	Mean	Rank	Challenges	Mean	Rank
B1	3.67	3	C1	3.59	7
B2	3.75	1	C2	3.62	6
B3	3.48	8	C3	3.16	9
B4	3.67	2	C4	3.67	3
B5	3.59	7	C5	3.64	4
B6	3.62	6	C6	3.64	5
B7	3.16	9	C7	3.75	1
B8	3.64	4	C8	3.48	8
B9	3.64	5	C9	3.67	2

CONCLUSION:

For a sustainable future, SDGs are made for global people where no one is left behind. Implementation of SDGs explored separately in developed and developing countries (Berawi, 2017). Adoption of the SDGs should be monitored and report on the progress to ensure that everyone gets the right benefit, the target of SDGs is being met, everyone gets adequate technology for their future role, and make themselves responsible. As it is development planning for the global people, it tries to increase the skills and knowledge among the people and try to involve them to solve the present problem and prepare for future challenges. (Dr. Chirag M. Patel, 2020) stated that to make these things happen, technological advancement is the only key focus for development such as these challenges. Technological advancement is key because it will play an important role in producing economic and digital growth. SDGs are made for global people for a sustainable future where no one is left behind. The results of my paper have equally practical and theoretical inferences.

Theoretical implication

For future researchers, this paper offers a base to learn the impact of applying technological advancement tools during the SDGs development goal phase. There are very few studies found regarding the impact of one goal of SDGs on a developing country like Bangladesh. This study will assist in finding factors like economic freedom, innovations, investments, globalization, and human development greatly impacted by technological progression. Further research can consider more variables in future research and get an entire scenario of impacts on different genres of people by increasing the sample size.

Practical Implication

In emerging countries (like Bangladesh) the finding performs as an accurate instruction that helps use technologies for economic expansion. This study helps organizations and humans cope up swiftly and retort promptly to the growth of innovations, investments, economic freedom, human development, and globalization (HAQUE, 2019). Technology creates more opportunities and job markets than reducing jobs. The impact and uses of technological advancement on the SDGs goal will benefit further applications and will upsurge the practice of more technology (S. Vyas-Doorgapersad, 2022). This result may help other sectors (Like financial organizations, education, and hospitals) of Bangladesh to acquire knowledge from the observation of this study.

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CONFLICTS OF INTEREST:

The author declares no conflicts of interest.

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