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# Online technology: Sustainable higher education or diploma disease for emerging society during emergency—comparison between pre and during COVID-19

Gazi Mahabubul Alam<sup>\*</sup>, Soaib Asimiran

Department of Foundation of Education, Faculty of Educational Studies, University Universiti Putra Malaysia, Persiaran Masjid, 43400 Serdang, Selangor, Malaysia

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## ABSTRACT

Even as the pandemic rages on across the globe, the notion of shutting down higher education has never been an option; instead, finding ways to circumvent it has led to a greater reliance on online technology delivery of courses and programs. Although this is not meant as a complete substitute, critics argue that online education has widened the ‘diploma disease’ crisis. They argued that this would lead to serious long-term problems which may become irreversible. This comparative study was conducted using an ‘empirical survey’ with 120 students from each group (before and during COVID-19, giving a total of 240 samples/students) to conduct an in-depth study of the academic and job-ready performance of graduates. Findings show that pre-pandemic students did poorly academically compared to during-pandemic counterparts. On the other hand, pre-pandemic graduates achieved better job-readiness scores which included both aptitude and practicum. Moreover, both groups achieved well in terms of academic performance compared to their job-readiness scores. This leads to the question: is it the role of HE to value the concept of sustainable production or to produce certificates/qualifications? Apparently, the HE system has used COVID-19 as an excuse to extend the “diploma disease crisis”, a situation that must be addressed by devising a proper policy framework.

## 1. Introduction

Higher education produces knowledge—a common proposition often asserted to identify the role of HE (Alam, 2021). Quality publication and ‘graduates’ employability’ are the fundamental parameters to measure a university’s ability to produce fine scholars (Pool and Sewell, 2007). Universities of all kinds (i.e., polytechnic, research and teaching universities) should ideally contribute to producing employable graduates, while getting research published is deemed to be the core task of the ‘elite counterpart’ (Zimmerman, 2016). However, universities are not substantially producing job-ready graduates—this is an on-going debate (Alam et al., 2020b). Nonetheless the role of universities to develop and to produce graduates is undoubtedly important as acknowledged by key parties such as academics, industrialists, politicians and social leaders (Tomlinson, 2012).

Acknowledging the important role that universities play, it is also advocated that universities should closely work in collaboration with their industry counterparts to fulfil expectations as much as possible (Sjöo and Hellström, 2019). For a number of reasons (cultural, social,

economic and time constraints), collaboration between university and industry does merit much attention so that a better and more effective regulatory mechanism is put in place to satisfy the expectations of industry (Al-Tabbaa and Ankras, 2018). While a ‘full-fledged face-to-face’ delivery mode often faces challenges to ensure such a mechanism would work, it is important to see if the higher education delivered via online technology would either mitigate or worsen such challenges.

On one hand, technology in fact changes the society for the betterment of human beings (Coccia, 2019; Roßmann et al., 2018); on the other hand, technological adaptation is needed to ensure better outcomes in an ever-changing society of the 21st century as argued by Managi et al., 2021; Arocena and Sutz, 2021, Abdel-Basset et al., 2021. Under such circumstances, technology has become an important tool for survival in the era of globalisation, where the advanced economies are taking the greater advantages as claimed by Amankwah-Amoah et al., 2021; Kleba and Reina-Rozo, 2021. On the other hand, Soluk et al. (2021) noted that technology can help to address the contextual constraints that a particular nation (especially developing countries) may face to compete in the global arena. However, Alam and Parvin (2021)

<sup>\*</sup> Corresponding author.

E-mail address: [gazimalamb@yahoo.com](mailto:gazimalamb@yahoo.com) (G.M. Alam).

argued that many developing countries may not be able to use the full potential of their technological competitive advantages especially in higher education due to a number of constraints developed by political, economic, cultural and traditional reasons. Under such circumstances, technological intervention may be mis-used or a particular group of people who are considered as elites in an emerging nation may unfairly reap the advantages of education using a privileged concept labelled as technology (Hensmans, 2021).

The above discussion confirms that an ample number of updated researches have been conducted to understand the impact of technology on social changes—yet little evidences are available that have investigated the impact of online technology on higher education especially for mainstream provision in an emerging nation. Despite the shortage of literatures, a few studies (Agasisti and Soncin, 2021; García-Peñalvo et al., 2021 and Daniel, 2020) have hypothetically examined the effectiveness of online delivery during COVID-19 without empirically comparing two groups of students who studied before and during COVID-19; this is what the present study seeks to compare. Moreover, earlier studies have used data from developed countries, while this study is conducted in a developing country, namely Bangladesh. Hence, this research aims to draw a substantial regulatory mechanism for higher education in developing countries to ensure that there is a sustainable technological adaptation during times of emergency.

After the introductory statement, the research problem and questions are identified, followed by the literature review, research context and design. The findings and discussions are then presented, before drawing conclusions at the end of this paper.

### 1.1. Research problem, aim, objectives and questions

The relationship between HE and employment is reciprocally symbiotic (Alam and Forhad, 2021). While HE injects employable skills, employment of graduates in particular areas often motivates them to continue further education in a chosen area or vocation (Clarke, 2017). Despite this tenet, the unemployment rate amongst highly educated graduates is actually increasing (Jackson and Bridgstock, 2020). For example, the global index of graduates' unemployment was 7% in 2010 but this has risen by 15% in the last 10 years (Alam and Forhad, 2021). The unemployment rate of highly educated graduates is a grave concern for developing countries. For example, the current unemployment rates of graduates in southern Asia and sub-Saharan Africa are, respectively, 25% and 32% which represent increases of 14% and 16% in the last five years (Alam, 2021).

Rapid expansion of HE institutions is considered to be the main cause for the increase in the unemployment rate amongst graduates because more graduates are being produced than positions available for them, and the changing nature of prevailing economic demands (Kopycka, 2021). Therefore, the suggestion is made to maintain a steady production curve following a substantial projection mechanism. Conversely, opponents have argued that graduates are increasingly unemployable because they are incompetent and do not yet have the skills required for the workplace (Nghia et al., 2019). They claimed that graduates are not correctly trained, and their lack of appropriate skills makes them an economic burden. If the graduates were skilled enough, their productive engagements would naturally vibrant the economy. A vibrant and diversified economy could ideally fulfil the demands of the job market and expand it. Hence, graduates' competencies are the key to address the unemployment crisis (Nghia et al., 2019).

An emergency can lead to both the economy and education system collapsing (Hossain, 2020). COVID-19 has been identified recently as the 'toughest-ever pandemic' and it is a very challenging global emergency (Hossain, 2020). The global economy has been effectively damaged and had produced huge unemployment and under-employment (Gautam and Hens, 2020). For the recovery phase that involves solving this global pandemic, only competent and well-trained human resources will lead to success (Agasisti and Soncin,

2021). Consequently, the globe will need more solidly trained people than what it had earlier (Daniel, 2020).

Those nations whose human resources have the right training should eventually enjoy the benefits while countries with inappropriately trained graduates will lag behind in many ways (Agasisti and Soncin, 2021). Hence, HE institutions cannot afford to be generous and compassionate at the cost of graduates' competence to do the job for which they aspire to through their training and learning. Evidence suggests that some institutions are compromising the quality of their education delivered via 'online technology' by providing qualifications too easily, in an effort to show their 'compassionate' credentials (Shahzad et al., 2020). The rapidly expanding private sector universities in developing nations is making this crisis more severe. Alam and Parvin (2021) argued that higher education delivered via online technology during emergency is a weapon to earn revenue for many private universities by aggravating the crisis of 'diploma disease'.

Keeping the above stated view in mind, this research aims to understand whether the graduates' job-readiness competencies are compromised in the delivery of higher education via online technology during the COVID-19 pandemic. The following objectives were developed to achieve the aim: firstly, to compare the academic performance of before and during COVID-19 graduates; secondly, to understand the difference between academic achievement and job-readiness of these two groups; and thirdly, to analyse the impact of COVID-19 on academic performance and job-readiness. In pursuing these objectives, the following research questions are stated to delve into the heart of this important matter:

- Does HE delivery via online technology theatrically influence academic performance?
- What is the impact of this theatrically influenced performance on sustainable HE?
- How can the concept of sustainable production of HE be valued during an emergency?

## 2. Literature review

Firstly, this section aims to map the concept of online technology in higher education and its role on sustainable production of HE. It will further explore the best concept of sustainable production applicable to HE in order to develop the conceptual framework.

### 2.1. Online technology in HE: agent of change or aggravator of diploma disease

Online education is a misinterpreted concept and one that has been abused in attempts to gain market popularity and leverage (Daniel, 2020). The COVID-19 pandemic has intentionally or unintentionally helped this situation to arise (Alam and Parvin, 2021). Online technological learning may function as an incomplete substitute for the face-to-face mode (García-Peñalvo et al., 2021). Communication is not the fundamental aspect of production. A sustainable production system needs a complete production cycle that involve raw materials,<sup>1</sup> processors<sup>2</sup> and delivery (Tanco et al., 2021). A delivery should only take place if the right product<sup>3</sup> is made in the first place.

Different modes of delivery might take place in different circumstances. However, physical delivery is the end phase of any mode of delivery (Tanco et al., 2021). For example, we may order food online without visiting the restaurant in person but neither its production nor its delivery can be done without physical movement. Moreover, physical

<sup>1</sup> Course curricula are referred as raw materials of education.

<sup>2</sup> Human resources and infrastructure.

<sup>3</sup> Hence the right product offered by education is one that generates knowledge and skills.

presence is needed for some orders due to their unique nature/feature and for better usability. Hence, online technology can be forms of logistical resources which should not be a substitute for certain production and delivery methods (Tanco et al., 2021).

Production processes and sensitive delivery are the key to a quality product and this requires dealing with people, while online technological methods make act simply as a process management tool. The product of education remains an ambiguous entity, for example Unterhalter and Howell (2021) argued that graduates are the products of the education system, while Chankselian et al. (2021) explained that knowledge and skills are the products. While the debate on the product of education generates heat, little discourse is made to demarcate the demand and supply sides and the roles they play to ensure active learning in education (Alam et al., 2020a).

In this scenario, knowledge discovery purely depends on research (Alam and Parvin, 2021). Research is the core business of higher education and the product known as knowledge/skills is made possible by teaching and practice (Stauss et al., 2018). Many teaching aids might be used for effective delivery. Some of these aids might benefit if implemented via online technology but a complete change to online education is a misleading step to take (Alam and Parvin, 2021). Higher education and its unique product knowledges/skills discovered through the research process will be jeopardised by the passive agent, namely 'online education' (Alam and Parvin, 2021). A passive agent should not dominate an active learning model in higher education, yet many internal and external agencies are advocating to transform the paradigm into online technological learning, its vested interests and especially in the private sector (Wieser and Seeler, 2018).

The effectiveness of an active learning process is often measured by its contribution to graduates' development (Stauss et al., 2018). In doing so, academic performance is considered as the main parameter which is predominantly applicable for primary and secondary education (Wieser and Seeler, 2018). While academic performance is also used as one of the indicators, production of knowledge and job-ready graduates are the key indicators for measuring the efficacy of an active learning process of HE (Alam and Forhad, 2021).

In order to examine whether online education is an active agent to change, we compare both academic knowledge and job-readiness competencies of students who studied before and during COVID-19. Hence, a greater response towards job-readiness competencies would be considered as a positive correlation for active learning in HE. Academic performance scores provided by the university's internal evaluation unit will be considered as a secondary indicator for the effectiveness of active higher education since 'fabricated grades' are being provided in an era of 'commodification in higher education' where higher education has become the part of 'diploma disease' (Alam, 2021). Given the research time framework, comparing the production of knowledge through the university before and during COVID-19 is not feasible because evaluating it requires longer time series data. It is therefore this research examines quality of graduates produced via online technology delivery mode to justify the concept of sustainable higher education. Before explaining the concept of sustainable higher education, let us note the particular challenges that the emerging nations face delivering higher education via online technology.

## 2.2. HE delivered by online technology: challenges for emerging nations

Three central challenges have been identified especially applicable for HE delivered via online technology in an emerging society. Firstly, infrastructural facilities of online education technology in an emerging society are quite disappointing (García-Peñalvo et al., 2021). Both the accessibility and speed of internet in developing countries are yet to be standardised so that students from both urban and rural areas having diverse socioeconomic backgrounds can accrue higher education delivered via online technology by ensuring an equal advantage (Daniel, 2020). Daniel (2020) further noted that a major portion of the students

doesn't have access to an adequate device that is fundamentally important to accrue education delivered via online technology.

Secondly, online education is a new culture in the emerging nations (Alam and Parvin, 2021). Given the nature of new norms, course contents are yet to be prepared reflecting the needs of online technology delivery; restricting the emerging nations to depend on developed counterparts (García-Peñalvo et al., 2021). García-Peñalvo et al. (2021) also noted that students often fail to find the relevant references that can fulfil the contextual needs. Moreover, most of the online delivery platforms are also developed and designed by the developed countries. These platforms are thus mainly feasible for the internet speed and devices used in developed countries (Tanco et al., 2021). Hence, the major portion of students experiences difficulties in using such platforms.

Thirdly, online technology delivery has psychologically challenged the students of emerging society. With the cultural norm that prevails in developing countries has traditionally created gap between teachers and students; whereby students are reluctant to ask questions (Alam and Parvin, 2021). The interactive learning culture is greatly missing in the universities in developing nations. Online technology delivery mode is not ideally helpful to minimise the gap, it may rather exacerbate (García-Peñalvo et al., 2021). Having said that none can ignore the role of campus life on fostering both the physical and psychological maturity of students.

## 3. Concept of sustainable production and quality

The meaning and definition of sustainable production and its schemata have evolved out of historical social and cultural practices, traditions and developments in policies and economic systems (Alayón et al., 2017). These connotations are often influenced by a number of parameters (Azat et al., 2019). One of them is known as the 'product perspective'. One school of thought suggests producing a 'durable product' that lasts longer since a long-lasting product is less harmful to the environment or to people, thus helping the 'sustainability crisis' (Azat et al., 2019). For example, if a type of infrastructure lasts for two centuries when others do not, the former would be a 'sustainable product' compared to the latter. It is argued that each production system causes a lot of 'environmental hazards' so the concept of 'long-lastingness' becomes key to 'sustainable production'.

The modernists consider that being fashionable and modern are to the key characteristics of products and goods or services (Adloff and Neckel, 2019). For instance, Azat et al. (2019) noted that modernists often consider economic growth depends on a continuous production cycle. Here the production cycle is like a 'wheel' that needs to keep rolling forward to keep the economy going. Consequently, they considered that the concept of 'durability' would upset the 'liquidity' concept forcing the economy to shrink if new products or goods/services are not being purchased (Adloff and Neckel, 2019). This ideology motivates the idea of 'comfortability' as the basis for determining a product's quality and sustainability (Zarte et al., 2019). This is something that simply undermines the arguments made about 'environmental sustainability' (Azat et al., 2019). A new concept termed the 'sustainable production process' has been recently introduced to ensure 'environmental sustainability' (Karimov, 2020). The kernel of this concept is to maintain an 'environmentally friendly production function' so that sustainability is guaranteed.

The liberalists aim to draw a balance between the two concepts. Bartkowiak and Bartkowiak (2017), Azat et al. (2019) and Karimov (2020) argued that the purpose of sustainable production is to ensure modernisation and economic progress are retained without compromising the ability of future generations to meet their own needs. They therefore emphasise the idea of sustainable technological innovation, of which the key premise is to produce eco-friendly sustainable products which would balance both (Karimov, 2020). One of them is being fashionable and the other is 'eco-sustainability'. This means that these products would theoretically ensure two qualities without emphasising

the ‘durability concept’ (Doll, 2021).

The concepts discussed above are primarily applicable to ‘tangible products’ produced by the manufacturing industries (Joung et al., 2012). These industries process the tangible raw materials/ingredients to create another tangible product (Tanco et al., 2021). While only the processing formulas used in manufacturing industries might be abstract in nature, both the raw materials/ingredients and processing formulas used by the service industries to produce an intangible product are rigidly conjectural (Joung et al., 2012; Tanco et al., 2021). This often leads to a ‘complex production function’ for an intangible product (Williams and Radnor, 2021). Under such a ‘complex production function’ scenario, none of the concepts of sustainable production function discussed earlier would work well (Zhang et al., 2021). Since education is a complex intangible product, its sustainable production function is simply different, which is discussed in more detail below.

### 3.1. Demand and supply sides of higher education: sustainable production

Intangible goods produced by the service industries are often identifiable (Zhang et al., 2021). The demand and supply sides of these items are also well-defined and their roles are demarcated but this is not the case for the education sector (Alam et al., 2014). The identified product and demarcated roles of stakeholders often help a service industry or a company operating within it, to define its sustainable production function (Hossain et al., 2021). The product of education remains an ambiguous entity. For example, Unterhalter and Howell (2021) argued that graduates are the products of the education system, while Chankelian et al. (2021) explained that knowledge and skills are the products. While the debate on what the education system produces generates heat, little discourse is made to demarcate the demand and supply sides of an education system and the roles they play (Alam and Parvin, 2021).

The existing literature fails to reach a consensus on the demand and supply sides of education and their roles. For example, Suleman (2018) argued that students and parents are the core demand sides, while teachers and the system which includes both the public and private sectors represent the supply side. These views are further challenged as Biagi et al. (2020) argued that industries and societies are the final demand sides where both parents and students are part of the supply side and in fact the beneficiaries. For example, Alam et al. (2020a) argued that not just graduates but knowledge and skills produced by the HE system would help industries boost the economy and in turn a nation’s progress. Hence, the nation is suggested to be the final demand side of education.

These undefined and ambiguous roles might have created an ‘unaccountable atmosphere’ in some education systems especially in developing nations where each party wants to take advantage using the ‘blame-game theory’. This is a graver concern to ‘sustainable production function’ (Alam and Parvin, 2021). Consequently, the desired ‘sustainable product of HE’ is in question (Suleman, 2018). Despite this debate, a consensus appeared whereby different provisions of education such as primary, secondary, and tertiary schooling bear a reciprocally symbiotic relationship (Marginson, 2019). This confirms that each provision acts as both supply and demand sides for the others. For example, primary and secondary school act as ‘supply sides’ by providing competent ‘inputs’ for tertiary education (Alam and Parvin, 2021). Vice versa, the former is also the demand sides for the latter as they rely on higher education to supply them with competent teachers and well-devised course curricula. This symbiotic relationship amongst different provisions serves to act as the ‘sustainable production function of education’ (Kieran and Anderson, 2019).

The above-mentioned symbiotic relationship in the edge of commodification in education has been misplaced in many ways. For example, Alam et al. (2020b) noted that HE often asserts that the right inputs have not been received from primary and secondary education, which compromises universities’ ability to generate the quality outputs. Similarly, Egerton (2020) argued that HE in many countries experiences

the sterility of knowledge discovery, forcing the primary and secondary levels of schooling to rely on poorly trained people and obsolete course curricula which make it impossible to generate a sustainable product. In this kind of scenario, the ‘inputs and outputs model’ designed to examine the quality of sustainable products becomes unfunctional (Alam et al., 2014).

### 3.2. Higher education: quality assurance vs sustainable production function

Unidentified and ambiguous demand and supply sides plus their non-demarcated roles might have restricted the ‘sustainable production function cycle’ in HE (Alam and Parvin, 2021). Under such a limitation, the ‘quality assurance’ concept has become topical for investigating whether HE passes the ‘realism test’ or otherwise (Rahmat et al., 2018). Several approaches are considered to test the ‘quality of HE’ of which three are well regarded globally. One of them is ‘inputs and outputs tests,’ another is ‘functional test’ and the last one is ‘job-market validity’ (Alam and Parvin, 2021).

To verify the ‘quality of HE’ the ‘inputs and outputs tests’ model is widely used and in fact an orthodox approach to the subject (Alam et al., 2014). The HE institution uses this model without the participation of demand sides (Rahmat et al., 2018). This model uses both continuous and terminal examinations as fundamental parameters. The total scores achieved by the ‘outputs’ are deducted from the scores at the ‘inputs’ stage. In the event of a surplus, positive correlation is justified (Alam et al., 2021). In an era of ‘commodification in education,’ the novelty of this model is challenged (Rumana et al., 2019).

The second approach mainly emphasises the aim, objectives, mission (s) and vision(s) that a particular institute/sector or a system have identified (Nghia et al., 2019). Critical examination is made to validate their accuracy. Upon the validation being successful, the precise or exact nature of raw materials (known as curricula) and of processors (such as academics, infrastructure, logistics and support services) are examined to understand the ‘quality assurance mechanism’ (Nghia et al., 2019). This approach can only provide a signal whether a benchmark is met or not but is unable to provide a confirmation on the integrity of the said benchmark (Alam, 2021). The settings and execution of the benchmark are rather subjective, and the influence of cultural and economic affairs cannot be denied (Daniel, 2020).

The HE sector should ideally inject job skills to boost the economy and therefore ‘job-market validity’ is seen as another important parameter (Marginson, 2019). In examining ‘job-market validity’ the wage/salary of graduates is considered to reflect the quality of a particular HE institution (Alam, 2021). The higher the salary is, the better the quality is—a fundamental postulate identified by Spence’s (1973) concept known as ‘signalling theory’. This theory might work well in advanced economies where a salient link exists in the job market, higher education and skills through substantial mapping and projection (Alam and Forhad, 2021).

Factually, obtaining jobs and the wages or salaries that go with them in developing nations are often prejudiced by political connections, social networking and socioeconomic contexts or circumstances (Alam, 2021). Consequently, ‘job-market validity’ through the wage scale is these days considered to be obsolete. Moreover, this model is ‘incompetent’ and not able to ensure that employed graduates have the right job-skills. Poon (2020) and Al-Tabbaa and Ankrah (2018) argued that if an education system does not produce proficient graduates, employers literally have no choice but to pick from the existing pool that the system has made available.

### 3.3. Sustainable production function in HE: need of industry collaborative model

Whether industries or the nation-state are the final arbiters of the demand sides of HE is an unsettled debate (Al-Tabbaa and Ankrah,

2018). However, industries should be considered the most important stakeholder of HE (Lucena and Schneider, 2008). The ongoing expansion of graduates' employment in the private sector has forced the HE system to accept that industries constitute the most important demand side (Alam et al., 2020b). Consequently, it is contended that industries should be rigorously involved in what HE produces. This participation includes preparing raw materials (course curricula) and infrastructure (laboratories), setting up lectures and assessing graduates (Alam et al., 2014). Al-Tabbaa and Ankras (2018) argued that to ensure participation is meaningful, 'financial engagement of industries in the HE production process is a must' because the absence of industry would make a marked difference.

Some countries have introduced 'HE levies' to ensure industries' financial participation and as a result, some concepts (such as 'factory-driven learning,' 'work-place learning centre', and 'industry assessment hat') have taken place where industries and the HE have collaborated (Alam et al., 2020a). Adherents label such involvement as a sustainable production function in HE, while opponents argue that this would destroy the philosophy, traditions and rationale of HE (Suleman, 2018). Many countries and especially developing ones heavily protest against industries' participation in 'HE production' (Alam et al., 2020b). However, this tension might have arisen from a 'cultural complexity' existing in a particular country where both academics and people working in industry suffer a 'cultural complexity disease' to identify which group is superior (Alam et al., 2020b). This restricts the ability to create an alliance between industries and HE institutions. The HE system would indeed remove this 'cultural complexity' gradually for its own sustainability as argued by Jackson and Bridgstock (2020).

### 3.4. HE and emergency situation

The HE system often functions as an apex body dealing with an emergency because it has the intellectual capabilities required (Alam et al., 2020a). An emergency either refers to a political crisis or natural disaster that needs urgent and important attention and this could mean having to halt other activities (James and Alihodzic, 2020). Political conflict may lead to an emergency situation such as a war, civil unrest, serious natural disaster, etc., which may call for emergency measures to be implemented (James and Alihodzic, 2020). Here the intellectual and dedicated communities or resources connected to HE institutions can be dedicated to saving their country (García-Peñalvo et al., 2021).

An emergency situation may temporarily halt the HE system but it should not compromise quality assurance (García-Peñalvo et al., 2021). Higher education is a sensible public good that can serve to put public sentiment to good use, so that – motivated by the HE community - an emergency endangering the state can be collectively faced (García-Peñalvo et al., 2021). This psychological motivation might not allow the HE sector to take advantage of 'diploma disease' when an emergency situation emerges (García-Peñalvo et al., 2021). Introducing concepts linked to neoliberalism into the HE has the implication that universities and their communities might primarily be committed to their own 'vested interests', and subsequently the national interest becomes secondary (Alam and Parvin, 2021). This kind of psychological change might support how HE institutions currently operate, yet undermine the quality of knowledge produced (Alam, 2021). Such compromising may be a permanent setback for HE which would challenge its philosophy and its role in shaping the global economy (García-Peñalvo et al., 2021). This would in turn put the HE sector into a serious crisis. Therefore, sustainability of HE is important if the whole system is to be saved since HE greatly influences how a nation functions (Alam et al., 2020b).

## 4. The research context

Before becoming an independent nation in 1971, Bangladesh had been a British colony and then a part of Pakistan (Chowdhury and Sarkar, 2018). The university community in the Bengal region especially

Dhaka University (DU) played a key role in the movement towards independence by bringing to an end British and Pakistani rule of what was known as East India Company and 'East Pakistan' regimes (Alam et al., 2014). Other public universities also supported the major emergency movements led by the DU. Despite the heavy involvement with the 'emergency movements,' the DU and its allies never compromised the quality of knowledge produced in the HE (Alam et al., 2020b). For this reason, DU "gained a reputation as the Oxford of the East" and made a significant contribution to the historical development of the new state, Bangladesh (Chowdhury and Sarkar, 2018).

The DU has lately failed to secure its position within the bottom 300 universities on the Asian university ranking league table, and neither is it globally competitive. This decline in the country's premier and pioneer university symbolises the overall HE scenario in Bangladesh. The ability to produce job-ready graduates in Bangladesh is seriously disappointing. For example, one study conducted by the Bangladesh Institute of Development Studies (BIDS) in 2018 found that the unemployment rate of university graduates was 43%. Of these, the private university graduates were a higher proportion (Mahmud et al., 2018).

Responding to the rising global economy in recent decades, Bangladesh expanded its university system internationally along the lines of the US model (Alam and Forhad, 2021). The monopolised public sector university system was changed by the growth of all types of universities commonly known as 'man as man,' 'land-grants' and 'machine-grants' delivery modes (Alam et al., 2020b). While being the largest 'man as man' delivery method, DU is the apex ambassador of Bangladesh HE, Bangladesh University of Engineering and Technology (BUET) and Bangladesh University of Agriculture, respectively, represent the ambassadorship for 'machine-grants' and 'land-grants' delivery modes (Alam et al., 2020c).

Following the GATS agreement and the prescription of WTO to accept neoliberal ideas and practices in the HE sector, Bangladesh introduced the private university sector to end the 'anarchy' of the government monopolised system in 1992 (Alam et al., 2020c). Currently, 46 public and 111 private universities are operating (BAN-BIES, 2020). In addition to these private universities, many public establishments opened a private wing where weekend and evening services are available for students who can pay the requisite fees (Alam and Parvin, 2021). The definition of universities and what they produce in the name of HE was challenged in many ways and a number of paradigm transformations took place (Alam et al., 2020b). Critics argue that these paradigm transformations have developed a CGPA-driven HE. Providing and acquiring knowledge has become an optional part of the demand and supply sides of HE (Alam and Parvin, 2021). Both sides are harvesting the 'crops of reputation' of higher education without cultivating it for future generations.

Most of the public universities were closed down during COVID-19 for several reasons but in fact the private wings of public universities did not close and they delivered online education. The Private University Association claims that the private university sector managed to deliver extraordinary services during the pandemic and was able to overcome the problems of not having face-to-face delivery: 'both the attendance and academic success rates have dramatically improved'.<sup>4</sup> The association is now advocating for the rules and regulations to be revised, so that local private universities can offer HE online as a normal part of education. It is interesting to note that the Private University Association strongly opposed the online and distance mode of education offered by international universities at the start of 2020 because they believed online delivery would greatly endanger the HE quality. The sudden change of heart by the Private University Association may be due to realising that the online delivery mode is more profitable compared to

<sup>4</sup> A statement given by the Private University Association at a round-table meeting involving members of the UGC, MOE, journalists and local leaders. The news was published in several local daily newspapers.

face-to-face delivery. This change is not acceptable for many reasons and one of the most important is that it is unprofessional to allow neoliberal concepts to dominate the HE and ignore the role of public policy.

## 5. Research design and method

Two groups of students (pre and during Covid-19) hold a complex endogeneity characteristic. Although both groups received the same form of education, the mode of delivery and education atmosphere were completely different. Under such circumstances, Merriam and Tisdell (2016) discouraged developing dependant or independent variables to draw a causal relationship and make a comparison between these two groups since they might experience some 'heterogeneousness' under the conditional climate of endogeneity. Therefore, given the normative and narrative forms, this research is a qualitative one which has used a differentiated research instrument<sup>5</sup> to collect data as suggested by Creswell and Creswell (2017). The fundamental data of this research are the scores of academic results and job-readiness competences of these two groups of students (pre- and during Covid-19).

The secondary data known as academic results of students and collected from the university are used for evaluating academic performance. Student's job-ready performance is examined through primary data collected using standardised tools developed by professional bodies. These tools include the results of 'experimental tests' and apprenticeship scores. To analyse the data and present them in the findings, simple statistical parameters known as 'mean' and 'median' are used. The educational grading system, such as CGPA/GPA and scoring in examinations, follows a standard procedure set up that does not essentially require the *t*-test value to justify the significance. In the event of perception survey, *t*-test value is generally used to define the 'standard deviation' and its significance, which may not ineludibly be needed for the scores achieved via scholastic and aptitude tests as argued by Alam and Parvin, 2021. Since this research compares the 'grades' achieved by the two groups of students (before and during COVID-19) in the three domains, namely academic, aptitude and practicum, the *t*-test value was not the key focus here.

### 5.1. Instrument development and scoring

Neither the regulations nor practices in Bangladesh support industries' participation in producing or assessing the HE. Only academics produce, deliver and assess the curricula. Academic performance measured by the universities is the only scale that justifies the competencies of graduates. Given the nature of this research enquiry, both the academic and job-ready performance of the two groups of students is compared. Consequently, to have a scores for job-ready performance, we needed to develop a new instrument. The following writing explains the processes that were maintained to develop the instrument to collect primary data.

The subject-wise academic results of each counterpart were collected from the registrar's office. The syllabuses of 'Computer Science Application' and 'Electrical and Electronics Communication' were provided to the Bangladesh Computer Council, which is the premier professional body working on the development of Computer Business in the country. The council was requested to design an aptitude-based questionnaire to test the competencies of both groups. They conducted the tests and tabulated the scores of both groups which are to be used to compare job competencies labelled as 'Aptitude score'. Similarly, the Bangladesh Institute of Bank Management (BIBM) and Bangladesh Bar Council were consulted on the testing of both counterparts from the business and arts streams, respectively. To ensure freedom from bias, coding was assigned to prevent the students being identified.

The top seven students from each group (science, business, arts) of

before and during COVID-19 were assigned a supervisor to work for five days. One professional from each respective field having more than 10 years of industry experience was deployed as the supervisor. Upon completion of the tasks, this supervisor graded each student with what is called a practicum score. Hence, aptitude and practicum scores are combined and served as the parameters for job-ready competencies. The university uses a calculation software to convert the obtained marks of each subject into CGPA which is here referred to as the academic score. We used the same calculation to convert the marks attained in the aptitude and practicum tests. This alignment of three types of scores confirms the ability to make a better comparison.

### 5.2. Selection of institution and sampling

Most of the universities in Bangladesh neither qualify for an international ranking (such QS, THE) nor compete for it. In the absence of an international ranking, some local agencies (such as StudyBarta.com, UniRank) often publish local ranking and as a basis, employ the criteria developed by the University Grants Commission-Bangladesh. We consulted 3 local agencies' ranking for the last 10 years to select one university. The sampled university is a private one which has ranked itself within the top 5 for the last 10 years under the combined category<sup>6</sup> of each ranking body that we consulted. Since we wanted to compare between before and during COVID-19 students, a private institution was suitable because public sector ones were not operating during the COVID-19 pandemic. The trimester academic calendar with an 'open credit system' is followed by the sampled university as a result of which two semesters were completed during COVID-19, while one was ongoing when this research was conducted. Students from the two completed semesters and who studied online were sampled as were their during COVID-19 counterparts. Many sections<sup>7</sup> of a subject were offered each semester.

To confirm the similar demographic and socioeconomic features of both before and during COVID-19 counterparts, parents' income, social status, previous academic results (such as secondary school certificate, higher secondary school certificate) were examined to ensure that students in each category shared similar features. 40 before and during COVID-19 undergraduate students who are qualified bearing common demographic and socioeconomic features were randomly selected from each of the three categories. These categories are labelled as science, business and arts. In total, 240 students were sampled of which 120 from each group (before and during COVID-19). Within the science category, 40 students were selected who studied two subjects, namely 'Computer Science Application' and 'Electrical and Electronics Communication' before COVID-19 and another 40 students were chosen who studied these two subjects during the pandemic but did so online.

Following the same principle, students from business and arts streams were sampled. For instance, Applied Financial Accounting, Business Communication and Civil Law, Language for Law Communication subjects were respectively considered for business and arts streams. Meanwhile, to make triangulation of the findings possible, various areas were selected, and practical-driven subjects were selected to maintain the research focus.

### 5.3. Data collection and analysis

Data collection and analysis were conducted in sequence to remove personal subjectivity and ensure objectivity. Thus, phase-wise data collection and analysis were considered (Fig.-1) which are explained below. Without collecting the academic results in the first phase,

<sup>6</sup> Both public and private sector.

<sup>7</sup> We found that each sampled subject has more than one section which were up to five in some cases. Each section had a minimum of 30 to a maximum of 45 students.

<sup>5</sup> explained in sub-section 4.2

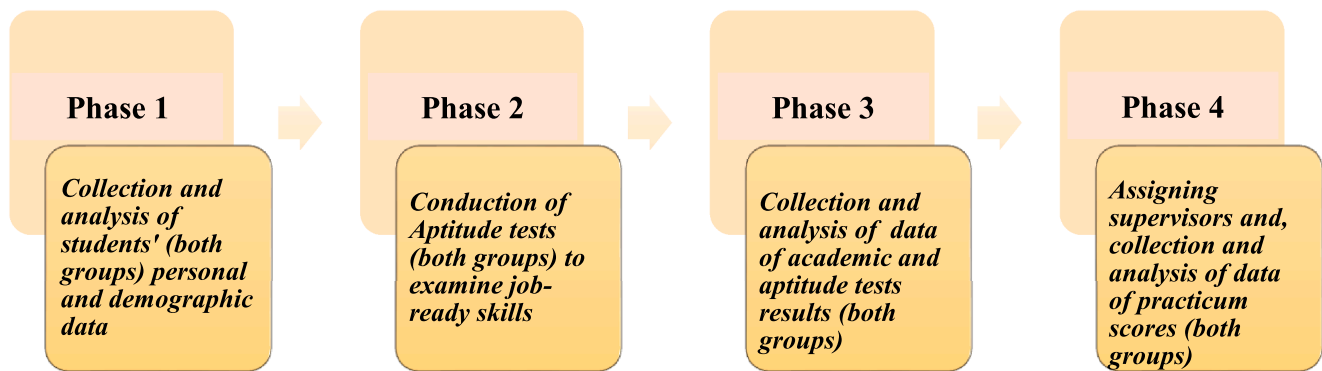


Fig. 1. Data collection and analysis process flowchart.

students' personal data were collected and analysed to ensure that both groups (pre and during Covid-19) hold common features in their demographic and socioeconomic status. Aptitude tests to examine job-ready skills were conducted in the second phase. Data of academic results and aptitude tests were collected and analysed at the same time during the third phase to avoid the possible influences of academic results that may bias the researchers. Combining both scores, the top seven students from the before and during COVID-19 groups were selected to assign the supervisors. Both the students and supervisors were unaware about the criteria for the allocation of supervisors; this provided a feeling that others might have been assigned with different supervisors. Hence, the supervisors' scores were not influenced by a graduate's earlier performance. Similarly, students could do a job freely and fairly.

## 6. Findings and discussion

This section examines the responses that Bangladesh HE enacted to produce a sustainable HE culture. Both the academic results, aptitude-based competencies and job-ready performance are analysed. The particular focus is on comparing two groups of students: before and during COVID-19. First, let us illuminate the generic situation to explain the following: how does HE in Bangladesh function in such a way that quality assurance results in a sustainable product?

### 6.1. Sustainable production of HE: academic results vs job-readiness

Table 1 explains that the overall academic results are always better than aptitude-based competencies. The practicum scores are slimmer compared to both academic results and aptitude-based competencies. For example, the average academic score is 3.39 which is slimmed down to 2.93 and 2.26, respectively, for aptitude-based and practicum scores. No streams are exempted from it. Although the science stream also declined performance-wise, it was slightly better compared to business and the arts. To have an in-depth understanding of this issue, we further investigated the reasons of the science students' better academic performance.

The academic results cover two criteria, the first being the theoretical and the second covering practical knowledge. In order to obtain an academic score, both types of knowledge are delivered and tested exclusively by academic advisors but without their counterparts who

**Table 1**  
Collective scores of both groups.

Stream	Academic		Aptitude		Practicum	
	Mean	Median	Mean	Median	Mean	Median
Science	3.56	3.57	3.20	3.15	2.58	2.55
Business	3.38	3.36	2.85	2.94	2.16	2.22
Arts	3.24	3.30	2.74	2.90	2.06	2.14
<b>Overall</b>	<b>3.39</b>	<b>3.48</b>	<b>2.93</b>	<b>2.99</b>	<b>2.26</b>	<b>2.30</b>

work in industry. It is very interesting to find that most students achieved higher grades for the practical as compared to the theoretical part. The higher grades achieved in the former contributed to better academic performance of science students compared to students in business and arts courses. However, the scores for aptitude-based competencies and practicum of science graduates drastically declined (see Tables 2 and 3).

It was anticipated that since science graduates achieved higher academic scores through practical knowledge, their scores provided by academic and industry professionals for aptitude-based competencies and practicum would ideally not decline. We are surprised to note that both scores for science students did in fact do so. This finding generates several graver concerns: do the academics provide 'fabricated' practical grade?; are these laboratories obsolete compared to modern industrial settings?; are academics and others trained to inject practical knowledge?; and does practical knowledge require specialised settings in terms of infrastructure and human resources?

These fundamental questions must be resolved in order to ensure the sustainable production of higher education which is not limited to the science stream because graduates from the business and arts streams also need practical knowledge. This tenet is evident since the business and arts streams students' performance in the aptitude-based and practicum scores also declined. Having noted a non-satisfactory generic picture of sustainable production in HE, let us examine if online education during COVID-19 has added further concerns.

### 6.2. Academic results vs job-readiness: comparison between before and during COVID-19

Following the earlier section, it was expected to observe that both groups of students (before and during COVID-19) would do better performance-wise in their academic results compared to the scores of the aptitude-based competencies and practicum. At a glance, Tables 2 and 3 do not surprise us as both indicate that academic performance of both groups are better than aptitude-based competencies and practicum scores, which was expected. The results shown in Table 4 are quite astounding as the group studying online during COVID-19 did well compared to the before group who did their learning face-to-face. This situation was the same for all streams (science, business and arts). So online education is relatively better than the usual face-to-face method of teaching. Consequently, better performance by the during COVID-19

**Table 2**  
Collective scores of before COVID-19 group.

Stream	Academic		Aptitude		Practicum	
	Mean	Median	Mean	Median	Mean	Median
Science	3.48	3.63	3.33	3.48	2.75	2.88
Business	3.23	3.25	2.96	3.05	2.28	2.35
Arts	3.17	3.27	2.90	2.99	2.21	2.32
<b>Overall</b>	<b>3.29</b>	<b>3.33</b>	<b>3.07</b>	<b>3.12</b>	<b>2.41</b>	<b>2.42</b>



**Table 3**  
Collective scores of during COVID-19 group.

Stream	Academic		Aptitude		Practicum	
	Mean	Median	Mean	Median	Mean	Median
Science	3.64	3.62	3.07	3.06	2.41	2.44
Business	3.54	3.67	2.74	2.74	2.03	2.09
Arts	3.30	3.40	2.58	2.67	1.91	1.99
<b>Overall</b>	<b>3.49</b>	<b>3.57</b>	<b>2.80</b>	<b>2.86</b>	<b>2.11</b>	<b>2.17</b>

**Table 4**  
Academic scores of the two groups.

Stream	Pre COVID-19		During COVID –19	
	Mean	Median	Mean	Median
Science	3.48	3.63	3.64	3.62
Business	3.23	3.25	3.54	3.67
Arts	3.17	3.27	3.30	3.40
<b>Overall</b>	<b>3.29</b>	<b>3.33</b>	<b>3.49</b>	<b>3.57</b>

group was anticipated for aptitude-based competencies and practicum scores.

Further investigation proves that our anticipation was in fact wrong. The before group scored much higher than their during COVID-19 counterpart for both aptitude-based competencies and practicum scores (Tables 5 and 6). This may suggest that the salient link between higher education and production of job-ready graduates is often dysfunctional and the COVID-19 outbreak simply added more problems. For example, the overall academic performance of the before group was an average of 3.29 for the three streams, but this increased to 3.49 for during COVID-19 group (Table 4). The academic performance of the business stream for this particular group rose to extremely high levels (Table 4).

The aptitude-based competencies and practicum scores of all streams of the ‘during COVID-19 group’ sharply declined. For example, the overall aptitude-based competencies and practicum scores for the before group were, respectively, 3.07 and 2.41 which further dropped to 2.80 and 2.11 for the ‘during COVID-19 group’ (Tables 5 and 6). This decline is more evident for the business stream (Tables 5 and 6). This may imply that ‘commodification in HE’ could be one of the potential reasons for this unexpected outcome as the business stream is currently an example of ‘commercial products’ (Alam et al., 2020c). Therefore, to value the demand of the extended market, such fabrication in grading may be made during COVID –19.

### 6.3. Emergency situation and call for policy-framework

The above facts may raise questions about the effectiveness of online delivery. However, we need to ask whether the HE system has been very generous during COVID-19 in providing better grades. Since this function is not proportionately linked with aptitude-based competencies and practicum scores, it generates a few vital concerns: are the higher education institutions ethical and true to their philosophy during COVID-19?; is this online mode of learning acceptable for long-term planning strategy?; and does this ad-hoc measure taken during COVID-19 help or hinder the institution’s philosophy and sustainable production of graduates?

**Table 5**  
Aptitude test scores of the two groups.

Stream	Pre COVID-19		During COVID –19	
	Mean	Median	Mean	Median
Science	3.33	3.48	3.07	3.06
Business	2.96	3.05	2.74	2.74
Arts	2.90	2.99	2.58	2.67
<b>Overall</b>	<b>3.07</b>	<b>3.12</b>	<b>2.80</b>	<b>2.86</b>

**Table 6**  
Practicum scores of the two groups.

Stream	Pre COVID-19		During COVID –19	
	Mean	Median	Mean	Median
Science	2.75	2.88	2.41	2.44
Business	2.28	2.35	2.03	2.09
Arts	2.21	2.32	1.91	1.99
<b>Overall</b>	<b>2.41</b>	<b>2.42</b>	<b>2.11</b>	<b>2.17</b>

García-Peñalvo et al. (2021) argued that when the most appropriate action is missing because of an emergency, a better strategy should be used. This approach is ideally acceptable to serve the needs but not at the cost of destroying the fundamental character of HE. The most alarming fact is the ‘fabrication of grading’ because this would tarnish the good image of higher education permanently which would be impossible to restore. If the gradings which are provided by the universities do not reflect the job market’s reality or what employers want, the HE institutions will lose their heritage and reputation. Graduates and their certificates or qualifications are relatively short-term property compared to the reputation of HE. However, its reputation relies on the collective efforts made by its stakeholders. Under any circumstances, we need to uphold the reputation of HE by protecting against the ‘commodification in education’.

While a higher education program such as a Bachelor degree does have a specified focus, it should also be able to train students in different areas because of the required multiple skills demanded by the job market. Moreover, graduates do need to be more flexible and adaptable in the workplace and able to change their skills quite quickly. Further, the job market is in a state of flux which forces the graduates to compete for a number of jobs in both the private and public sectors. Under such circumstances, graduates must be provided a way to learn diversified skills covering a significant number of occupations and industries. This approach suggests the universities should deliver both theoretical and practical courses that lead to graduates getting employment.

Some theoretical courses or aspects of them might be very effective if delivered in the online mode. Academics will value the time that is saved by working with students in this way. The profit-driven HE system has overly valued the concept of ‘commodification in HE’ which has ultimately transformed ‘sustainable production’ into something that is not desired. A specialised policy framework might support the production of sustainable HE during an emergency (see Fig. 2 below).

A specialised taskforce combining experts from various sectors (ICT, HE philosophy and policy, private and public sector industry specialists, etc.) should be formed to ensure that the HE sector functions sustainably during an emergency. This taskforce should ideally develop a well-devised and timed pilot project able to face the ongoing challenges. To avoid being overly influenced by commercial forces, the pilot project should be funded by a public sector agency and one in which the governance and regulatory mechanisms are not compromised. The HE institutions with a record of proven worth should be the only ones permitted to participate in the pilot phase. After the successful completion of the pilot phase, a series of internal and external evaluations must be made. Based on these evaluations’ recommendations, a steady expansion of the pilot project might help limit a market-driven approach to how the HE sector behaves during an emergency. A totally market-driven approach may endanger the sustainability of HE.

### 6.4. Implications, limitations and further research

Most of the studies (such as Coccia, 2019; Roßmann et al., 2018; Managi et al., 2021; Arocena and Sutz, 2021; Abdel-Basset et al., 2021; Amankwah-Amoah et al., 2021; Kleba and Reina-Rozo, 2021; Soluk et al., 2021) have found that technological adaptation and social change hold a reciprocal relationship. The areas of concentration for these studies were various, such as business industry, social media, health,

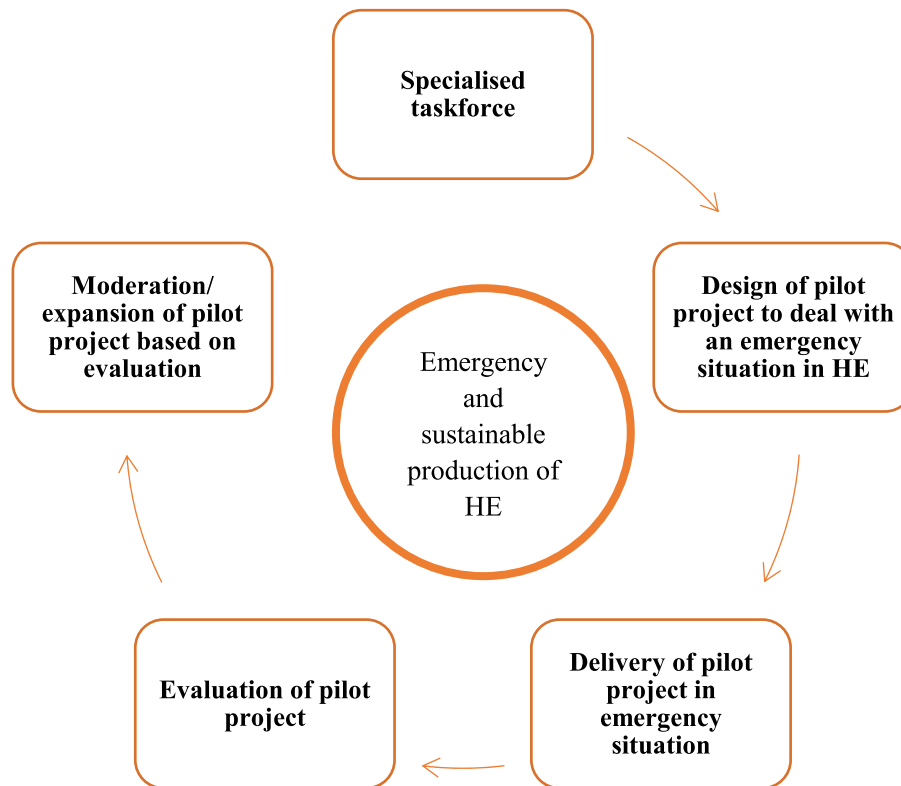


Fig. 2. Policy framework for HE to use in an emergency scenario.

medical care, transportations sector, etc. Research for this paper, the first of its kind carried out in Bangladesh's higher education sector during Covid-19—found that online technology is used as a tool primarily to earn money without ensuring a sustainable higher education system that a society badly needs for its development. In the absence of an identified demand and supply cycle, online technology is beguiling the youths in the name of education. If this continues, the role of higher education in developing human capital theory would be seriously jeopardised.

To ensure the sustainability of higher education during an emergency, an application-driven regulatory framework is suggested by this project. Although, this regulatory framework may require continuous revisionary work, its implementation is essential to ensure a decent functionality of HE during an emergency period. The limitations of this study and what future analyses could do are noted here. This case study was conducted in one developing nation, Bangladesh. Due to non-availability of data, it was not possible to compare what actually happened to the HE sector in terms of technology usage in Bangladesh with other developing countries. While this case study provides some generic insights into a widespread problem in developing nations, a larger-scale research project that encompasses several such countries could generate more concrete comparative evidences.

## 7. Conclusion

The core agenda of higher education is to develop the human capital for a country. A salient collaboration between the higher education sector and industry can ensure a decent production function for higher education and its delivery. A well-established collaborative mechanism between higher education and industry may be able to ensure sustainable HE by subsiding the diploma disease crisis. Given the generic norms and role that the technology customarily plays, it was anticipated that online technology in HE would develop a substantial mechanism for a greater collaboration between the HE and industry sectors. Challenging this tenet, online technology, as an exclusive mode of delivery, has

questioned the philosophical underpinning of higher education which is a threat to sustainable production of higher education for an emerging nation like Bangladesh.

If the sustainable production of HE programs is interrupted and diploma diseases crisis is aggravated because of online technology delivery in higher education, then it is most likely that the industries will not value the concept of sustainable production. This would also hinder the collaboration between industry and institutes of higher education. Under any circumstances, a system should not be prevented from delivering sustainable HE programs, courses, subjects, etc. More comprehensive research should be conducted to discover a better pathway to deliver sustainable HE programs via online technology in an emergency situation. An experimental or a pilot project should be conducted and validated before the strategy is implemented on a much larger scale.

## Declaration of Competing Interest

The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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**Professor Gazi Mahabubul Alam**, PhD, FRSA is an internationally recognised Public Policy Analyst with an especial focus to Higher Education. Countries of his work experience include Malaysia, Bangladesh, UK and the USA. He works for both institute of Higher Education and Partner for Development. Before he moved to the University Putra Malaysia, He was a professor at the University of Malaya and East West University. Alam acquired MA in International Education and Development from the University of Sussex and a PhD from the University of Nottingham. He received a distinguished fellowship from the Royal Society of Arts. He has published a number of papers and they received a notable amount of citation in the Scopus and ISI indexed. His-paper on private Higher Education received best citation award from the Web of Science.

**Associate Professor Dr. Soaib Asimiran** serves at the Faculty of Educational Studies, Universiti Putra Malaysia. His-research interests are: University Governance, Educational Policies & Planning, Higher Education Management/Leadership, Quality Management in Higher Education and Entrepreneurship Education. He has published in academic journals, presented papers in international and local conferences, reviewed papers and written books in his area of research. Currently, he is the Deputy Dean (Academic, Students and Alumni) at the Faculty of Educational Studies, Universiti Putra Malaysia