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A Delphi method on the positive impact of COVID-19 on higher education institutions: Perceptions of academics from Malaysia

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The COVID-19 pandemic has drastically altered the education sector. Rather than the impact of COVID-19, many higher education institutions (HEIs) are on the verge of insolvency due to a lack of digital transformation readiness and poor business models. The bleak financial future many HEIs will face while others may be forced to close their doors completely will erode HEIs' ability to fulfil their societal responsibilities. However, HEIs that have survived and maintained their operations anticipate the transition to online learning or the effects of any economic crisis, including university closures in the short, medium, or long term. The entire educational ecosystem was forced to transform its operations quickly and entirely to an online teaching-learning scenario in just a few weeks. Notably, HEIs that have long offered online courses worldwide can easily transition to digital teaching and learning when necessary. The second roundtable session's result of the International Higher Education Conference, organized by INTI International University on March 31 2022, was used to organize a Delphi method to identify further factors that positively impact HEIs by COVID-19. The importance of these factors was then determined using Kendall's coefficient of concordance. Recommendations on how HEIs should move towards institutional sustainability during the endemic phase are presented accordingly.

KEYWORDS

Delphi method, Kendall's coefficient of concordance, COVID-19, sustainability, higher education institutions

Introduction

When the COVID-19 pandemic started, everyone was in a state of fear. Statistics related to deaths, illness, depression, and discomfort called for lockdown and social distancing. Family members faced burnout and pressure when they realized that they must work and care for their children when schools suddenly closed and manage the 24/7 nature of

working from home. Most service-related industries were adversely affected by COVID-19, particularly the tourism industry. The drop in international tourism caused by the coronavirus pandemic could cost the global economy more than USD 4 trillion in 2020 and 2021 (Unctad.org, 2022). Within a year of the coronavirus global pandemic, the World Economic Forum reported that USD 1.5 trillion in global business events such as trade shows, cultural, and sporting events had been postponed, virtualized, or cancelled entirely (Ibrahim, 2022). The education sector was equally affected. Many Higher Education Institutions (HEIs) were virtually caught with their pants down. They were not prepared to operate in different modes, from face-to-face interaction to online and distance learning platforms. Academics who are digital migrants and lack information technology competencies face much stress and discomfort in quickly mastering online teaching and learning tools.

According to UNESCO, 185 countries' HEIs were closed by April 2020, affecting over 1,000 million students globally (Marinoni et al., 2020). Other than increasing health-related symptoms such as psychiatric and eating disorders, researchers uncovered a range of factors related to COVID-19, such as the academic performance of the students (García and Weiss, 2020), internet connectivity (Uil.unesco.org, 2022), and IT readiness (Un.org, 2022).

Furthermore, several researchers also found some negative impacts when the lockdown measure intensified the digitalization process in HEIs with online learning. For example, regarding the students' experience during the Covid-19 pandemic, lack of student interactions (Khan, 2021) and personal adaptation (Oliveira et al., 2021) was treated as a negative experience. Regarding the challenges perceived by the HEIs, Nurhas et al. (2021) illustrate nine challenges HEIs encounter. These challenges were categorized into four main patterns: digital-nomad enterprise, corporate-collectivism, well-being-oriented, and pluralistic. Despite the negative impact, it is worth mentioning that these researchers also found optimistic results. Some notable impacts are the flexible assessments and digital content (Khan, 2021), ICT platform usage (Oliveira et al., 2021), compatibility with online mode and new opportunities (Gardas and Navimipour, 2022), and positive work-life balance between work and family (Rashmi et al., 2021). Undoubtedly, when educators balance a healthy work-life, the teaching pedagogy to the student group is sustainable. Eventually, the adverse impacts of the COVID-19 pandemic could be relieved when the HEI stakeholders acquire the necessary skills and knowledge and be resilient to adapt to the changes caused by the global pandemic (Karademir et al., 2020; Nandy et al., 2021).

As the saying goes, there is a silver lining behind every cloud. We need to relook at what COVID-19 has brought to us. We must learn from past mistakes to be better prepared and more resilient to future disruptions. To do this, we embarked on a Delphi method to seek the opinions of academicians from universities in Malaysia to get firsthand perceptions of their experience during COVID-19.

Methodology

A two-round Delphi method was used to identify factors that positively impact HEIs by COVID-19. Thompson (1990) defines the Delphi method as a technique for combining expert opinions assuming that the experts are statistically independent. The Delphi method is a procedure to solicit opinion, judgement, and consensus from a group of experts using carefully designed instruments. It can also be a predictive tool (Miller, 1995). Supplementary Figure 1 presents the flowchart of the Delphi method.

To achieve an acceptable degree of reliability, the authors identified the following characteristics as important to the study: (1) Anonymity: The expert participants remain anonymous to one another; they interact only with the authors; (2) controlled feedback: All information is gathered and redistributed through the authors; (3) group response: Individuals contribute information into a group response; (4) Delphi method: Panelists are selected based on knowledge of the field; and (5) reduced cost and time limitations: The structure of the technique eliminates the need for the participants to arrange costly and time-consuming face-to-face interactions.

Developing the Delphi method instrument

The output from the second roundtable session of the International Higher Education Conference, which was organized by INTI International University on March 312,022, was further used to organize a Delphi method. In the roundtable session, five prominent experts from universities in Europe, South Asia and Southeast Asia deliberated on an issue that could result in institutional resilience after COVID-19. Some of the themes generated from the roundtable session include the following: (1) Digital transformation; (2) education reform; (3) student inclusivity; (4) competency enhancement; (5) collaboration and networking; (6) flexible education and learning; (7) better business model; (8) entrepreneurship; (9) personalized learning; (10) alternative assessment; (11) outcome based education; (12) online learning and assessment; (13) translational research; (14) technology optimization; (15) online repository system; and (16) application of simulation tools for training.

Forty academicians or professionals who experienced the impact of COVID-19 and are knowledgeable on the subject were invited to become the panel of experts for the study. The first-round survey asked only one question: "List as many factors that have a positive impact on HEIs by COVID-19." Remember to use the term "factors that have a positive impact on HEIs' in a broad sense." The question allows the experts to have a more significant role in responding by proposing the factors (themes) and agreeing to the dimensions (grouping of themes). The authors also shared the 16 themes from the IHEC conference as a reference and invited the 40 experts to comment on the aforementioned factors and contribute other new factors.

The responses to this question were analyzed, and common answers were reworded to avoid duplication. A list of the responses was compiled and used in the second-round instrument. The second-round survey presented a synthesized list of responses from the first round. The experts were asked to rank each factor based on its order of importance.

The mean and group rank for each factor were calculated in the second round of the Delphi method. The attrition among experts is expected, albeit our constant reminders. Due to the diversity of rounds conducted, the Delphi instrument was considered valid, as the same experts were continuously provided with the outcomes of the previous rounds.

Though the Delphi method has problems maintaining secrecy among the participating experts and possible attrition as the Delphi method progresses, it was an efficient tool to gather quick results. The study took a maximum of 1 month to complete.

Kendall's coefficient of concordance

Following the second-round completion of the Delphi method, Kendall's Coefficient of Concordance (W) was computed for the scored ranking to measure the level of consensus among the experts for the factors proposed. Kendall's Coefficients of Concordance (W) will be tested for statistical significance by observing the value of p and comparing the Chi-square test statistics with the critical value. Kendall's Coefficients of Concordance (W) is a measure designed to determine the agreed score set of rank (Siegel, 1957). A significant Kendall's Coefficient of Concordance (W) indicates that the participants are essentially applying the same standard in judging the importance of the factors and are in consensus. It is more appealing when a high W (close to 1) and a low value of p (less than 0.05). Therefore, the null hypothesis that there is no consistency in response from the experts can be rejected:

Ho: the rankings of the experts are not consistent (disagreement of responses).

If Kendall's Coefficient of Concordance (W) is low, automatically, the value of p would be high (more than 0.05), thus implying the inconsistency of the ranking by the experts. Consequently, a third round of the Delphi method would be necessary.

Findings

First round of the Delphi method

From June 1 2022, 40 experts were sent invitation letters to participate in the Delphi method. However, only 31 experts responded positively to the first round of the Delphi method (Supplementary Table 1). They provided 53 themes which were further synthesized and categorized into 7 dimensions. After several hours of brainstorming to group the themes into

dimensions, twelve themes represent Technology Optimization, 13 themes represent Education Reform, 9 themes represent Student Inclusivity, 9 themes represent Work-life Balance/Humanities, 14 themes represent Organization Restructuring, 4 themes represent Translational Research, and 12 themes represent Competency Building and Enhancement. The themes are compiled and illustrated in Supplementary Table 2. With this information, the authors are ready to start the second round of the Delphi method.

Of the 31 experts who participated in the first round of the Delphi method, 17 experts (E1 to E17) are from the university in Nilai, Malaysia. The remaining experts are from various locations in Malaysia, including Sabah and Sarawak. The selection of these respondents was by design, albeit the convenient nature of selection, i.e., the 30 selected are PhD holders, with one who is about to complete her doctoral studies. Furthermore, homogeneity (Jager et al., 2017) can be assumed as all the experts who participated are experienced academicians impacted by the lockdown and social distancing brought about by the COVID-19 pandemic. Out of the 9 experts who did not respond to the invitation, 2 are our faculty members, implying there is no compulsion to participate in the Delphi method.

Second round of the Delphi method

The second round of the Delphi method commenced on June 30, 2022. The responses from the expert who participated in the first round were synthesized and grouped into 7 dimensions (refer to Supplementary Table 3). The same experts were contacted and requested to answer the following question: Please rank the dimensions identified that positively impact COVID-19 on HEIs. The experts were reminded that their answers were their expert opinions.

An importance scale from 1 (most important) to 7 (least important) was used to rank the dimensions. A Likert scale primarily used to measure agreement (Li, 2013) was not used in this study as the study seeks to rank the importance of the dimensions based on the experts' opinions. Before ranking the dimensions in round two, the grouping of themes into dimensions was shared with all the experts to assure them that their contributions in the first round were duly considered. As shown in the Delphi process flow in Supplementary Figure 1, the thematic analysis results were shared with the experts before the commencement of the second round.

There are no right or wrong answers when using the following numbers from 1 (most important) to 7 (least important) to rank the dimensions. The experts were required to use each number only once for each factor, i.e., repetition of ranking is not allowed as this will cause problems during statistical analyses. The authors received 29 responses from the experts who completed ranking the 7 dimensions for the second round of the Delphi method (refer to Supplementary Table 3). In any Delphi method, there will always be attrition, as in the case of this study, two experts (E11

and E23) did not participate. According to Keeney (2010), a zero-attrition rate in a Delphi method is scarce.

The attrition rate and potential lack of participant engagement in any empirical study involving direct input from participants is a concern, particularly in studies requiring multiple stages of participant input over a long period of time. This is especially true in a Delphi process, in which participants must provide feedback over a number of rounds or iterations (Boukdedid et al., 2011; Rowe and Wright, 2011). Prior to embarking on the Delphi method, we were aware of the issues surrounding attrition and strived to prevent experts from withdrawing from the study at an early stage, particularly after receiving the themes that were derived and subsequent dimensions proposed from the first round. We were also concerned that the attrition rates might influence the types and consistency of responses obtained and the agreement produced over subsequent Delphi rounds (Toma and Piciooreanu, 2016). The two experts who did not participate in the second round of this study indicate the robustness of our Delphi method. In the first round, we had nine experts who did not continue. As attrition will affect the Delphi method outcome, we believe that the minimum number of participants required to ensure good group performance depends on the study design. Many ranges have been suggested, i.e., 5–20 (Rowe and Wright, 2001), 15–30 for homogenous Delphi panels (Clayton, 1997), or 5–10 for heterogeneous panels (Delbecq et al., 1975). Since the number of experts in the second round was reduced to 29, is homogenous in nature and fits in the range proposed by Clayton (1997), we believe that our Delphi method is appropriately conducted.

Supplementary Table 3 shows that the seven dimensions' mean ranking ranges from 1.9655 to 5.6552. The sequence of the importance of the dimensions starts with Education Reform (1.9655), Technology Optimization (2.4138), Student Inclusivity as well as Competency Building and Enhancement (4.2069), Organizational Restructuring (4.4828), Work-life Balance/Humanities (5.0690) and finally Translational Research (5.6552). What is more critical is Kendall's W of 0.387719 and value of p of 0.000, which means the ranking of the experts who participated in the second round is consistent. Thus, there is no requirement to conduct the third round of the Delphi method.

Discussion

Kendall's Coefficient of Concordance (W) was computed to measure the level of consensus among the experts for the dimensions proposed following the completion of the second round of the study. For the second round of the Delphi method, Kendall's Coefficients of Concordance and value of p for scored ranking were 0.387719 and 0.000, respectively. Therefore, the study was statistically significant (value of $p < 0.05$) in the second round. As such, the order of importance for the seven dimensions are as follows: (1) Education reform; (2) technology optimization;

(3) competency building and enhancement; and student inclusivity; (5) organization restructuring; (6) work-life balance/humanities; and (7) translational research.

Education Reform is the most crucial outcome of COVID-19 from HEIs' perspective. Interestingly, this dimension implicates the academics and the students.

Education reform

As shown in Supplementary Table 2, thirteen themes have been identified in the dimension of Education Reform. Many studies (Ożadowicz, 2020; Zheng et al., 2021; Bamoallem and Altarteer, 2022; Bozkurt, 2022; Finlay et al., 2022; Razali et al., 2022) seem to support the findings of hybrid, blended, and online learning as an essential positive consequence of Education Reform during COVID-19 lockdown. Observations and a case study conducted by Ożadowicz (2020) have shown that hybrid and blended learning approaches can improve students' abilities to acquire knowledge. Besides, the approach can train students to work in a hybrid method, and the abilities gained will be necessary for their future professional careers. Students can be trained well through face-to-face meetings and online learning in their program of study. The latest definition of hybrid and blended learning approaches should include three types of learning methods: face-to-face, asynchronous online and synchronous (real-time) online learning (Müller and Mildemberger, 2021; Zheng et al., 2021). The approach can support independent, personalized, and collaborative learning and offer flexible learning anytime and anywhere (Yustina et al., 2020). The COVID-19 pandemic has changed the mindset of university students and influenced the students' perception and acceptance of blended learning (Bamoallem and Altarteer, 2022). Notably, the researchers have mentioned that lectures were preferable in online classes. At the same time, tutorials will be more influential for students in face-to-face classes. While designing blended learning pedagogy, it is essential to embed social elements with active, interactive communication channels to enhance students' learning experience (Karma et al., 2021; Mali and Lim, 2021). Online and blended learning development during the COVID-19 pandemic initiates flexible elements that can support students' learning styles (auditory, visual and read/write) (Razali et al., 2022).

Moreover, the COVID-19 pandemic creates positive outcomes for university teachers too. Yustina et al. (2020) found that blended and project-based learning effectively enhances teachers' creative and flexible thinking. Besides, the COVID-19 pandemic emphasized the vital need for a more sustainable future. HEIs must reform and incorporate sustainability into the curriculum (Gigauri et al., 2022). Education for sustainability-pedagogical approach in online learning settings during the COVID-19 lockdown can positively impact society and transform students' decision-making, attitude, and responsible behaviour toward sustainability (Nousheen and Kalsoom, 2022).

Technology optimization

Technology Optimization is the second critical positive consequence of the COVID-19 crisis, which is supported by some recent findings (Al-Ansi et al., 2021; Ćurčić et al., 2022). As shown in [Supplementary Table 2](#), 12 themes have been identified in the dimension of Technology Optimization. The COVID-19 pandemic accelerated digital transformation in HEIs. The digital transformation with Technology Optimization is supported by e-learning infrastructure and online learning tools such as internet accessibility, interconnected networks and systems, digitized materials, increased data centre capacity, web-based platforms, massive open online courses, video-conferencing tools and so on (García-Morales et al., 2021). The rapid digital development and emergence of the digital learning space in HEIs enable more engagement with the broader society (Bygstad et al., 2022), eventually benefiting today's cyber-society ecosystem (Nurhas et al., 2021).

Implementing digital educational technologies focusing on flexible, personalized and project-based learning for an online degree can positively influence students' grades, satisfaction, educational productivity and learning experience (Lamo et al., 2022; Rof et al., 2022). Razali et al. (2022) have proved that accessibility of learning through innovative technological solutions can improve the development of blended learning and teaching quality in HEIs. The blended approach is becoming more common, and the benefits from digital technologies can ensure continuing use of blended and online learning in HEIs (Lester and Crawford Lee, 2022). Moreover, advanced digital technologies used in teaching and learning have positively affected digital innovation and contributed to the flexible learning environment in HEIs (Yustina et al., 2020; Zawacki-Richter, 2021). Besides, improving teachers' digital literacy contributes to recognizing teachers' professional role and increase teachers' career satisfaction (Li and Yu, 2022).

Competency building and enhancement

The dimension of Competency Building and Enhancement, together with the dimension of Student Inclusivity, are the third important positive outcome of the COVID-19 pandemic. As shown in [Supplementary Table 2](#), there are different skills and attributes in the Competency Building and Enhancement dimension. Competency consists of three components: knowledge, skills, and ability/attitude. Issues regarding competency building related to digital proficiency during COVID-19 focused primarily on students (Joshi et al., 2020; Capone et al., 2021; Mok et al., 2021) and teaching staff (Moorhouse and Kohnke, 2021; Paliwal and Singh, 2021). Equally affected are the university administrators who are forced to work from home. Many administrative processes, such as student registration, examination, and assessment, are becoming entirely online (Almazova et al., 2020; AbuJarour et al., 2021). HEIs are

forced to relook into their training and development programs (Almaiah et al., 2020; Llerena-Izquierdo and Ayala-Carabajo, 2021) to ensure that the students, teaching staff, and administrators are technically competent and the university could still function to disseminate and manage the academic process.

Interestingly, the three groups (students, teaching staff and administrators) learn to enhance skills in multi-tasking (Kaup et al., 2020; Lee et al., 2020), time management (Matthew and Chung, 2020; Stewart et al., 2020; Cengizhan, 2021) and innovativeness (Lee and Jung, 2021; Edem Adzovie and Jibril, 2022) and at the same time becoming more self-disciplined (Xie et al., 2020; Su and Guo, 2021), developing a higher level of academic self-efficacy (Talsma et al., 2021; Berman et al., 2022) and self-leadership (Bakker et al., 2021; Sjöblom et al., 2022). Such positive outcomes become more critical as HEIs strive to become resilient.

Some findings (Heo et al., 2021; Alamri, 2022; Punjani and Mahadevan, 2022) supported the importance of self-efficacy as a positive outcome during the COVID-19 crisis. Heo et al. (2021) confirmed that during the COVID-19 lockdown, undergraduate students' self-efficacy in time management and technology use had an indirect positive influence on online learning and learning engagement. Besides, Punjani and Mahadevan (2022) have concluded that self-efficacy on computers and the internet has a partially significant positive relationship with students' intention toward online learning. Moreover, academic self-efficacy will directly and positively influence the success of learning engagement and persistence of university students (Alamri, 2022). Hence, based on the earlier findings, improving students' self-efficacy is an important ability gained during the COVID-19 pandemic. Enhanced digital proficiency is the next set of skills and competencies earned by students and academics. Nadzir (2022) pointed out that university students learned digital literacy competencies during the COVID-19 pandemic. In addition, teachers' digital literacy is improved along with the shift in the educational environment during the COVID-19 crisis (Sánchez-Cruzado et al., 2021). Besides improving digital competency, students strengthen their independent learning skills during the COVID-19 lockdown (Cranfield et al., 2021). Moreover, high engagement in the digital educational environment, such as synchronous online discussion, encourages higher-order critical thinking skills and thoughtful reflection in university students (Almazova et al., 2020; Rinekso and Muslim, 2020). Educational leadership aspects such as networking, calmness, empathy, enhanced educational practices, analytical and strategical thinking, and transparency have also been stimulated during the COVID-19 crisis (Yokuş, 2022).

Student inclusivity

Student Inclusivity is also the third important positive outcome of the COVID-19 lockdown, which consists of various themes (refer to [Supplementary Table 2](#)). The digital era fosters an

autonomy-focused method for self-regulated learning (Dumulescu et al., 2021). Digital transformation during the COVID-19 pandemic enables students to make their own choices and to be empowered in their learning process (Diaz-Noguera et al., 2022). For example, during the COVID-19 pandemic, healthcare professional students are assigned to solve critical healthcare problems which can match their education to practice too (Russo et al., 2022). Besides, the COVID-19 crisis presents opportunities to equalize the inequalities in HEIs, such as empowering female university students' leadership (Wu et al., 2021). An online degree option is available too during the COVID-19 pandemic. For example, an online Degree in Computer Engineering with proper pedagogy and curriculum design can guarantee students' accessibility to the online educational environment (Lamo et al., 2022). Furthermore, the global COVID-19 pandemic brings societal change. There is growing agreement with society's values on entrepreneurship, increased university students' entrepreneurial intention and a greater aptitude for entrepreneurial activity (Lopes et al., 2021). Hence, HEIs can utilize the transformational opportunity to redesign a new entrepreneurial education that can deal with the change and global impact of COVID-19, such as technology-based, digital-supported, and innovative entrepreneurship education programs (Ratten and Jones, 2021; Secundo et al., 2021). During the COVID-19 lockdown, inequalities in higher education happened in internationalization and low-income nations, especially while the teaching and learning process shifted to fully online education (Tasci, 2021). However, the hybrid education method can be an intermediate solution while the lockdown is lifted (Yildirim et al., 2021). Besides, some tools are being introduced during the COVID-19 pandemic to allow greater participation from students with diverse backgrounds and capacities to ensure equitable and inclusive education for all (Pichardo et al., 2021).

Organization restructuring

Organization Restructuring after a disruption is necessary to ensure operational sustainability (Brammer and Clark, 2020; Sá and Serpa, 2020) and higher resilience (Marshman and Larkins, 2020; Sánchez Ruiz et al., 2021). Many HEIs that were unprepared for COVID-19 suffered tremendous losses (Dhawan, 2020) from economic well-being and social capital perspectives. For example, many private HEIs were forced to close down in Malaysia, while some merged or acquired. Inevitably, HEIs must plan for a better business model (Brammer and Clark, 2020; Krishnamurthy, 2020), many of which focus on cost-effectiveness strategies (Bardesi et al., 2021; Mohammadi et al., 2021). HEIs are also exploring collaboration with each other and the industry (Hechenbleikner et al., 2020; Mohamed et al., 2020) as new marketing strategies that promote learning flexibility and education reforms (Huang et al., 2020; Whalley et al., 2021) as part of their new business model. For example, an analysis conducted by Woldegiyorgis and Adamu (2022) has shown that the COVID-19 pandemic has provided opportunities for Ethiopian

HEIs to improve their public relations and establish partnerships with different stakeholders to get a better business model and earn higher competencies. Moreover, Seturidze and Topuria (2021) developed an online system to improve efficient cooperation between universities and businesses as the researchers discovered the high importance and positive impact of collaborative work between universities and businesses during the global pandemic.

Work-life balance/humanities

When students were forced to work or study from home, many complained about how their lives changed, i.e., their Work-life Balance was threatened (Hjálmsdóttir and Bjarnadóttir, 2021; Wan Mohd Yunus et al., 2021). Kotini-Shah et al. (2022) identified four latent classes of faculty based on their studies on the Work-life Balance among female teaching staff and students who faced more 'work-life imbalance' as they must juggle work and parental duties during COVID-19. Class 1 faculty were more likely to be women, non-tenured assistant professors with high work and home stress; Class 2 faculty were more likely to be associate professors, women, tenured, with high home and work stress; Class 3 faculty were more likely to be men, tenured professors with moderate work but low home stress; and Class 4 faculty were more likely adjunct professors, non-tenured, with low home and work stress. Class 2 students reported significantly increased administrative and clinical responsibilities, lower scholarly productivity, and postponed self-care.

HEIs have empowered their employees (Alonazi, 2021; Faulks et al., 2021) and created online community engagement for the teaching staff and students to ensure inclusivity and interaction. Interestingly, Faulks et al. (2021) indicated that during COVID-19, innovative work behaviour is a mediator between empowering leadership and sustainable economic performance. Ultimately, the main concerns are the assurance of emotional stability and ensuring integrity and ethics among students, teaching staff and administrators (Eaton, 2020; Gamage et al., 2020). Finally, some studies indicate that people have become more spiritually conscious and have developed a more humanistic outlook toward life due to COVID-19. COVID-19, for all of its challenges, has also created invaluable opportunities to understand the necessity and importance of spiritual health and care in epidemics and critical situations was a significant opportunity (Heidari et al., 2020). Spirituality is vital to well-being as it helps people deal with major life stressors, particularly during the COVID-19 pandemic (Del Castillo, 2021). HEIs should implement human resource activities to ensure staff can adjust to disruptions such as COVID-19 accordingly (Carnevale and Hatak, 2020).

Translational research

As expected, most experts who participated in the Delphi method rated Translational Research as the lowest priority. This

could be due to the shortage of research grants by the government and the industry. However, research and development activities at HEIs should continue despite the many barriers and obstacles (Sohrabi et al., 2021) by exploring collaboration with other local and abroad entities (Lee and Kim, 2021).

Conclusion and recommendations

The authors believe most initiatives mentioned above should be viewed from an integrated perspective. For example, HEI organizational restructuring in the post-COVID-19 era would depend on information technology competencies and infrastructures. Similarly, Education Reform, Translational Research, and Technology Optimization planning should ensure Student Inclusivity and Competency Building and Enhancement at all levels. Finally, any Organizational Restructuring must safeguard a Work-life Balance within the HEI ecosystem.

Despite its many strengths, this study has several limitations. The first is that data was obtained from Malaysian academic staff only. Future researchers could conduct studies in other universities in other countries based on the current instruments used in this study to compare. In addition, the researchers anticipate that future researchers could develop survey questionnaires that measure the seven dimensions and incorporate other dimensions to perform meaningful quantitative analysis. Finally, the data used and analyzed was cross-sectional, i.e., the Delphi method was a snapshot of what was happening during two rounds. We strongly suggest that future studies use qualitative and quantitative data, i.e., mixed methods research, for a more in-depth understanding and to reduce biasedness through triangulation.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

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Author contributions

AR conceived of the presented idea and planned the research methodology. AR, MT, and JT carried out the Delphi method. AR, MT, FZ, CL and IA contributed to the writing of manuscript. AR, MT, JT, FZ, CL and IA provided feedback and contributed to the final version of manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.1013974/full#supplementary-material>

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