Lesson Learned: Hosting Sixth International Conference on Chemical Engineering Virtually in the Midst of Pandemic

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Abstract

The Sixth International Conference on Chemical Engineering organized by the Department of Chemical Engineering, Bangladesh University of Engineering and Technology (BUET) was scheduled to be held on 19-22 December, 2020. When COVID-19 caused cancellation of all large in-person gatherings across the world as well as international travel, the organizing committee of ICChE 2020 decided to switch to complete virtual mode in September 2020. Soon after, the committee faced the biggest challenge as to how to deal with 250+ participants joining from fourteen different countries to attend five plenary lectures, fourteen keynotes and seventy-five technical papers, and a poster session in a two full and two half day program keeping the sense of engagement and connection in a virtual environment. In this paper the journey from preparatory stage through setting the virtual platform to conducting the conference in real time is described including the choice of online platform, mode of conduct, manpower allocation, trial sessions and preparation of guidelines. The difficulties faced by the organizers and lesson learned are discussed based on detail analysis of the event. Additionally, a survey result of the participants showing that conference was more or less successful in terms of knowledge dissemination and meeting the expectations of participants and speakers is also presented.

Keywords: Virtual conference, Zoom platform, virtual poster, COVID-19, pandemic

1.0 Introduction

International conferences are important for developing knowledge, researchers as well as accomplishing institutional objectives. Since the beginning of 2020, hundreds of conferences have been cancelled, postponed or moved online because of the COVID-19 pandemic. As the world is facing second and third wave of virus spread conducting physical conferences is unlikely in near future. Furthermore, since it is possible to meet the purpose of physical conferences virtually to some degree, online conferences are becoming the order of the day. Moving conferences online has additional benefits, such as, making access easier for people having limited budgets, family commitments or disabilities. It also means saving time and less travel for the participants, and reduce their carbon emissions.

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The main drawback of a virtual conference is evidently the lack of the chance encounters and networking that take place at physical events. Despite the limitations, video-conferencing technologies are becoming more familiar and a market analysis of Current Trends and Future Growth of Telepresence and Videoconferencing Market 2017- 2025 shows that virtual conferences are here to stay.

In present paper we intend to share the experience and lesson learned of a recently held virtual conference with 250+ participants from 15 different countries and time zones. There are numerous websites that offers tips on organizing virtual conferences and share generic perspectives. The present paper for the first time is reporting detail analysis of a real event with recommendations based on the firsthand experience of the organizers that can serve as a reference and starting point for others who are planning to organize virtual conference in near future.

2.0 Background

The International Conference on Chemical Engineering (ICChE) is a triannual conference organized by the Department of Chemical Engineering of Bangladesh University of Engineering and Technology (BUET). The goal of the ICChE 20208, sixth in the series, was to emphasize the solutions of the grand challenges facing the world in terms of energy, water, food, health-safety and environment. The conference was scheduled to be held on 19-22 December, 2020. The call for paper was out in January 2020 with four plenary speakers, travelling from UK, US and Switzerland to the conference venue Dhaka, Bangladesh, confirmed. Before long, fourteen keynote speakers from Mexico, Malaysia, UK, Australia, US and Bangladesh were also confirmed. By June 2020, 115 abstracts were received. By the end of August, 85 abstracts were selected for oral presentation and 46 were for poster presentation with an option to publish full articles in a special issue of Chemical Engineering Research Bulletin (CERB). As the covid situation unfolds the organizers decided to announce ICChE 2020 a fully virtual conference in September 2020. The dates and schedule of the conference remained unchanged.

3.0 Selection of Virtual Platform and Mode of Operation

There are a number of online platforms available for virtual conferencing including Zoom Meetings, Microsoft Teams, Google Meets, Cisco WebEx and many others. These apps are currently experiencing a huge surge in adoption. The selection of the right virtual platform was critical for the conference. The most important features the organizers were looking for in the virtual platform were:

- Live and pre-recorded video streaming
- Mobile accessibility

- Shared screen4
- Chat messaging
- Breakout rooms
- Audio and video recording
- Active speaker view
- User friendly access

Considering all the above-mentioned feature Zoom and WebEx were the two options that satisfied the requirements. Based on consumer feedback, Zoom is more user-friendly as compared to WebEx. Zoom allows users to instantly join an online video conference or meeting, with common features across all devices. WebEx requires a lengthier registration and check-in process compared to Zoom. Additionally, only Zoom platform has the effective breakout room feature by September 2020. Apart from the features the platforms provide, the bandwidth requirement and device-compatibility were also considered. Zoom has clients for all major operating systems and is available on mobile devices. Zoom also comes with accessibility features complaint with WCAG 2.1 AA Standards, Revised Section 508 Standards and EN 301 549 Accessibility requirements.

The next step was selecting the mode of conduct. Zoom can be run in both meeting and webinar modes. Zoom webinar is not included for licensed users and it can be purchases as an add-on. It works in a broadcasting mode and works better for one way communication. On the other hand, the zoom meeting i.e., the non-webinar version is more of a collaborative approach and users may interact in real-time, if allowed by the host of the meeting. Zoom's professional non-webinar version includes meetings that can host up to 500 participants with unlimited meetings, group collaboration features, and security.

The organizers wanted to make the conference participant oriented, in which participants would interact actively with speakers and other participants by chat, audio, or video, and network. Based on the popularity, user-friendliness, number of users at any moment, procurement cost and most importantly, breakout room feature, non-webinar version of Zoom professional platform was purchased for the conference.

4.0 Setting the Online Platform

Attending a conference in-person provides multifaceted opportunities for the participants in communication and collaboration. There are scopes of interaction in-session usually at the end of the presentation through the traditional Q & A

sessions. Also, the participants have the freedom to settle in the session of ones' own interest or to move around and listen to another during parallel sessions. Apart from these, the participants also interact at the conference lobby in between the sessions.

For an online conference, simple way to switch from a single session to concurrent multiple sessions is to branch out with multiple meeting links. While this may not be an issue for the tech savvy participants, it may create confusions among non-tech savvy ones. Multiple links increase the probability of entering the wrong meeting link, and with changing number of concurrent sessions along the day may increase the chances even more, leading to participants, dissatisfaction. The organizers figured out that managing the entire conference with a single meeting link would closely emulate the traditional in-person conferences as well as avoid confusions. Thus, only one meeting link was provided for the entire conference, including all pre-conference "mock sessions".

For access control, participant registration using Zoom's own registration was enabled. Upon registration, a unique meeting link was generated for each user, which was then forwarded to the users' email. Three mock sessions were organized for the participants to acquaint them with the online platform of the Conference. In addition, a "Zoom User Guide" for the participants was prepared and circulated via email. The guide provided step by step instructions on updating the Zoom desktop client, registration process on the Zoom for the conference, and switch among the sessions through breakout rooms during the conference.

The mode of operation used for the conference is illustrated in the framework given in Figure 1. The participants would enter the Lobby with the provided meeting link. The inauguration, plenary and closing sessions were conducted in this Lobby. When more than one meeting was needed, breakout rooms were used. The breakout rooms were named according to the parallel sessions. In addition, a breakout room named, "Speaker Trial Room" was provided, where the speakers could enter and trial their presentation and get acquainted with the platform. Three user groups were used for assigning the roles of the participants during the conference sessions. The Admin or the Host added the key personnel (e.g., session chairs and co-chairs, speakers) of a session as co-hosts. While moving from the plenary sessions to parallel keynotes or technical sessions always $(n+1)$ breakout rooms were opened, where n is the number of concurrent sessions with the additional room for speakers' trial.

In order to get into a concurrent parallel session, participants would need to enter the Lobby using the meeting link and consequently, find the respective breakout room. Several organizers with co-host role were present at the Lobby to guide the participants in case there was an issue in entering the breakout rooms. These co-hosts were named as

"Technical Help x", x being 1, 2 or 3. A Power Point Slide was put up in the Lobby highlighting the names of the breakout rooms of the running sessions. The slide also provided directions on how to seek technical help. The key sessions were recorded by the host or co-hosts using the Zoom's own *"record the meeting in local computer"* option.

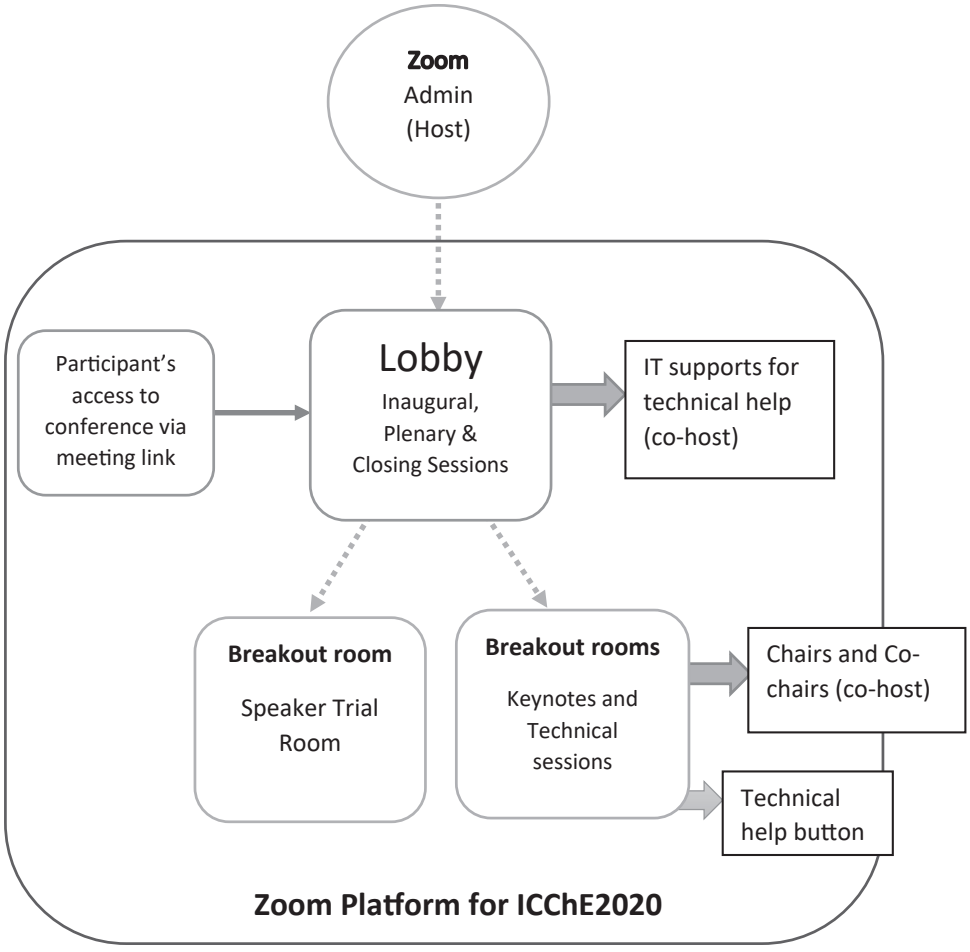

Figure 1: Framework illustrating the mode of operation of the virtual conference

5.0 Impact on Different Aspects of Conference

Apart from missing out the face-to-face contact, there are other aspects of the conference that gets affected once physical conference transformed to a virtual one. Some of the key areas of the conference that got impacted are described below:

5.1 Budget and Registration

The budget of the virtual conference was reduced to one fourth of the physical conference as there was no expenditure for venue, food, hotels and entertainment.

The manual work and staff involvement were also decreased significantly. Major expenses were due to purchasing of the online platform, and for establishing stable connectivity. A video conferencing system to complement the online platform was also procured.

The expenses were covered by only two sponsoring organizations in contrast to 10 to 20 needed for the sponsorship of the physical events, which also necessitated major fund-raising drivesby the organizers. Additionally, the registration fee for the delegates was reduced to one fifth of the original fee for physical conference and was made free for students for early bird registration.

5.2 Agenda Planning

Oral presentations: While building the agenda it was decided that presentations in all technical sessions will be streamed live followed by a live Q&A session. The plenary/keynote speakers were given a choice to present live or submit a prerecorded presentation and be present online for the Q&A session. The key factor needed to be considered was the time zone difference of the speakers. Planning of a virtual live sessions with speakers/participants joining from different time zones is undoubtedly a challenging job. The original conference operating time, 9 AM – 5 PM local time (GMT+6), was kept as it is. The time slots for the speakers were adjusted according to their time zones. The speakers from Europe were allocated the afternoon slots, which is morning at the speakers' zone, and those from Americas were given the early morning slots, which is late evening in the speakers' Zone. Participants from Asia and Australia were included without much difficulty. While selecting the chair and co-chair for different sessions, at least one in each session was kept from the host university.

Poster session: A virtual poster session was organized using a separate platform 12. The presenters uploaded their poster upon invitation and made themselves available for chat and video conferencing at the allocated time. Conference attendees needed to login separately to the virtual poster platform to attend the poster session.

5.3 Visibility and Participation

In previous physical conferences, visibility was created by distributing printed copies of conference poster and leaflets, call for paper and registration form to different office for display and circulation, and by putting up large banners and decorations at the venue. Additionally, conference information was circulated by email, social and professional media. Conference participants would receive a registration package that would contain different souvenirs showcasing the

conference agenda and sponsors. This time for the virtual conference, the venue was decorated with large hanging and stand-banners, although there were not many to observe them physically. On the other hand, a lot of virtual activities were carried out through emails, social media and online platforms, which caused manifold increase in the visibility since most of the people during pandemic were sitting at home spending considerable time online. The impact on visibility was reflected in the number of participants from different parts of the world which increased significantly. In previous years printed copy of book of abstract along with soft copy in a pen drive were delivered to the participants in the registration package.

This time the book of abstract was published online at the conference website13 one day prior to the conference. A few hard copies of book of abstract were printed later to send to different key organizations.

5.4 Data Collection

Data collection regarding participation required manual work for physical meetings. In previous physical conferences one or two staff were assigned to collect data and feedback manually. It used to take a long time for the staff to enter data to the database. In virtual conference the attendance data were automatically collected by the system, organizers were able to track and collect attendees' data, and receive feedback, which provided useful insights.

6.0 Lesson Learned from Hosting the Conference

The organizers had prior experience of hosting online seminars and panel discussions. However, it was the first time that they were hosting a full-fledged international conference virtually for two/three days. A number of suggestions came up in meetings of the organizing committee as to what could go wrong and what kind of preventive measures should be taken. The most anticipated issues were connectivity interruption, problem in accessing breakout rooms and file sharing. Besides, there was a concern of using Avaya video conferencing system in combination with Zoom as the organizers decided to broadcast the plenary lecture 1 using Avaya from the conference venue of the host organization.

Uninterrupted connectivity was successfully achieved by purchasing additional internet service despite the unforeseen break-down of central internet service of the host organization. The connectivity of plenary, keynote and invited speakers were satisfactory. During technical sessions there were minor issues of connectivity from the presenters' side, which were overcome without much difficulties.

On the first day of the conference only Lobby was used for inaugural session and plenary lecture 1. Using Avaya proved well for broadcasting the lecture but was troublesome for two-way communication during Q & A session. On the second day, the plenary lecture 2 took place in the Lobby followed by four parallel technical sessions assigned to four breakout rooms. Many participants faced problems in accessing the parallel sessions from the Lobby through breakout rooms. This was caused by the older version of the zoom app that needed to be updated. The direction to update the Zoom app was included in the "Zoom User Guide" circulated earlier among the participants as well as was reminded during the trial sessions. Many participants were too comfortable in using Zoom app to read the guideline and failed to update the app. For the same reason, some speakers had problems in sharing their presentations on screen. The problem was solved quickly by the intervention of technical support and were handled smoothly for the rest of the conference. Additionally, the technical sessions were set back-to-back without time gap presuming that there will not be any time lag as no physical movement was involved. It was observed that for switching from Lobby to the breakout sessions or vice versa, a gap of at least 5 minutes after each session is required.

There were a number of unforeseen problems, for example, if a chair or co-chair gets out of the meeting, they lose their co-host status. Also, a few times chairs /co-chairs of different sessions closed the whole conference by pressing "End meeting for all" by mistake. In later version of Zoom there is a second warning before ending the meeting for all by a co-host in the breakout room. All the issues raised during conference were handled case by case as the conference proceeded. The organizers as well as the presenters/participants learned fast and remained more prepared to handle probable technical glitches.

The attendance in the virtual poster sessions were less than expected. In previous years there were poster competitions in which the participants and visitors took part physically. This time due to uncertainty with the virtual conference, poster competition was dropped. Besides, access to virtual poster sessions was separate from the main conference access, which might have discouraged some of the participants from joining the poster session.

Table 1 summarizes the lesson learned from hosting the event in the form of anticipatory event analysis. The key recommendations of the analysis are given below;

- Keeping alternative and independent internet connections is critical to ensure uninterrupted connectivity.
- An online demonstration at the beginning of the conference explaining key

features and issues of the virtual participation is recommended in addition to prior circulation of written guideline.

- Involving two different video conferencing systems in a single event is not recommended
- Keeping 5-10 minutes gap after each virtual session is recommended to allow time for reorganizing the set-up and people.
- Being ready for any kind of technical glitch and having tech support handy to fix them in shortest possible time is essential.

Table 1: Anticipatory event analysis

	Setting	What could go wrong?	Measures taken	What really happened?	Lesson learned
1	Same zoom link was used for the Trial runs and actual conference program	Participants could get confused with trials and actual conference dates	Email notifications sent to participants with daily program during conference	Both trial runs and conference sessions were well attended	Using the same link for trial runs and actual conference worked well
2	A separate video conferencing system (Avaya) was connected to Zoom platform for broadcasting plenary 1	Co-ordination between two different systems could fail	A number of trials were done before conference	Switching to Avaya from Zoom took a few minutes; the presentation was broadcasted well; however, during Q&A session speaker could not hear the audience or see the chat box	Involving two different video conferencing systems in a single event is not recommended
3	Parallel technical sessions were set in breakout rooms and updated version of zoom was required to access the breakout rooms from main the Lobby	People may not have updated zoom and would fail to access Breakout rooms	User Guideline on to how to access breakout rooms was sent to all participants	On the second day many participants could not get in or get out from breakout rooms due to old version of Zoom app and needed technical help.	Not many people read the Zoom user guideline sent to them prior to the conference. Therefore, a demonstration at the beginning of the conference is recommended for future programs
4	Updated zoom was required for file sharing by speakers	Speakers may not have updated zoom and may face problems with sharing files	Circulation of Guideline with instructions to update Zoom app, trial runs with speakers; and provision of trial room for practicing during conference	On the second day in the morning parallel sessions a few of the presenters faced difficulty in file sharing due to old version of the Zoom app	
5	The chairs and co-chairs were set as Zoom co-host in parallel technical sessions in breakout rooms	Host and co-host may not be able to handle technical issues in break out rooms	Guideline on how to host/co-host were circulated, there were trial runs with chairs and co- chair	New login of chairs/cochairs removed their co-host status. There were accidental closings of breakout session by co-hosts. The problems were solved immediately, and the second half of second day and rest of the program went smoothly	There will be always unforeseen problems and one need to be ready to handle them in shortest possible time
6.	Uninterrupted online connectivity is required	BUET internet may fail or get unstable	Procurement of 12 sets of dongle and independent internet service for the conference	Coincidentally, during the conference there were server break down of BUET central connection, but due to independent internet service, there was No significant problem with connectivity	Keeping alternative connectivity option(s) is critical for a virtual program

7.0 Conference Statistics

The statistical summary of technical contributions in the conference is shown in Table 2. There were five plenary lectures delivered by leading experts from United States, United Kingdom, Switzerland and Bangladesh. Also, among the fourteen keynote speakers four were from United States, one from United Kingdom, one from Australia, one from Mexico, two from Malaysia and the rest were from Bangladesh. The share of international plenary and keynote lectures is a good indication of the value and acceptance of the conference in the international scientific community. The regular technical presentations were distributed over fourteen technical and a virtual poster session. The presenters of these sessions joined from fourteen different countries. The total number of the oral and poster presentations were 65 and 29, respectively. An additional number of abstracts were accepted initially for presentation. Due to the interruption of on-going research works by the pandemic, a number of accepted abstracts were withdrawn by the authors later.

Table 2: Summary of technical contributions

Category of Content		Number	Country representation
Plenary Lectures:		5 International: 4 Local: 1	*United States, United Kingdom, Switzerland and Bangladesh* *= 4 Countries*
Keynote Lectures:		14 International: 9 Local: 5	*United States, United Kingdom Australia, Mexico, Malaysia, and Bangladesh* *= 6 Countries*
Regular Technical Sessions & Posters:	*Oral Presentations under 14 parallel sessions*	65	*Australia, Bangladesh, China, Canada, Denmark, Germany, India, Iraq, Japan, Malaysia, Qatar, Thailand, United Kingdom, and United States* *= 14 Countries*
	Virtual Posters	29	
TOTAL		**113**	

The breakdown of regular technical sessions is presented in Table 3. The regular technical sessions were organized under nine groups, namely safety, modeling, bio-chemical, environment, materials, general chemical engineering, air pollution, petroleum, and energy. There were fourteen regular technical sessions in total. Environment and petroleum had the highest and lowest numbers of papers, respectively. The rest were fairly distributed. The last column in Table 3 indicates the number of no-show paper/presentation. The total number of no-show papers was eight against sixty-five total papers in the conference. This is somewhat higher than the direct in-person conferences.

Table 3: Breakdown of regular technical sessions

Group	No. of Technical Session	No. of Papers	No. of No-Show
Safety	1	7	Nil
Modeling	1	6	Nil
Biochemical	1	6	1
Environment	3	14	2
Materials	2	9	1
General Chemical Engineering	2	8	1
Air Pollution	1	5	1
Petroleum	1	3	Nil
Energy	2	7	2

The breakdown of registrations is shown in Figure 2. There were three types of registrations: authors/presenters, nominated delegates from industries/organizations, and individuals with personal interest. There were one hundred twenty-seven registered authors as more than one author registered for a number of presentations. ICChE is historically attended by a handsome number of delegates nominated from local industries and organizations. This yearseventy-five delegates were nominated and got registered for the conference, which is lower than the usual number. This is largely due to the fact that nomination for in-person conference was usually accompanied by station leave and travel to the venue of the conference, which is not the case for the virtual conference. The number of individual registrations was twenty, which is also affected significantly by COVID-19 pandemic. Addtionally, there were a number of honorary registrations for international and local experts, alumni and industrialists.

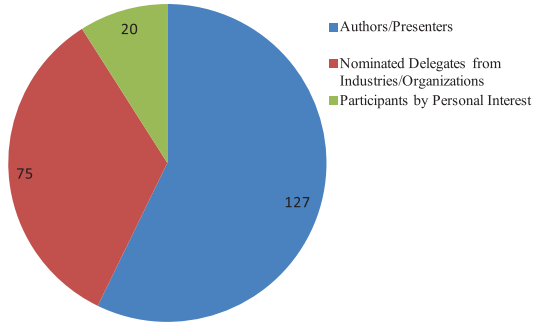

Figure 2: Breakdown of regular registrations

The breakdown of participations in different sessions of the conference is summarized in Table 4. The participation in each session was significantly higher than the participation of previous in-person conferences, which has been the key positive impact of the virtual conference over the previous in-person ones.

Table 4: Breakdown of session participants

Session	Participants/per session
Inaugural Ceremony, Plenary 1 (Consecutive sessions)	187
Plenary 2, Plenary 3, Plenary 4	125, 72, 55
Keynotes 1-12 (Two Parallel Sessions)	35-50
Technical Session 1-12 (Four Parallel Sessions)	20-55
Plenary 5, Keynote 13 and 14, and Closing Ceremony (consecutive sessions)	100

8.0 Online Feedback Collection and Analysis

In order to receive feedback from the participants, an online Google survey form was circulated. The form contained thirteen questions under two major groups. The first part contained queries about the participants'satisfaction and ease of accessing the virtual sessions. The second part asked for feedback on the achievements of the ICChE2020 as an international conference. A total of 106 responses were received of which 27% was from the industry and 73% was from the academia. Responses to a few key questions are shown below. The detail survey result is presented as charts in the Supplementary Section.

Figure 3 shows participants' level of satisfaction with various technical aspects of the conference. The figure shows that on an average 40% responders were satisfied with the event while less than 4% of them were unsatisfied with networking and other issues.

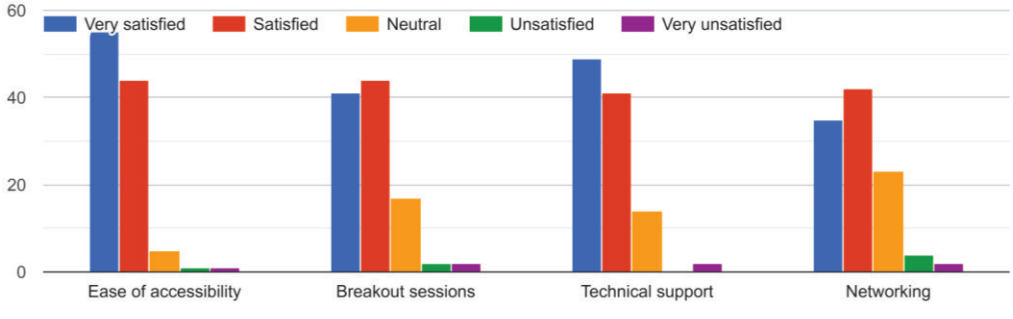

Figure 3: Participants' level of satisfaction with various technical aspects of the conference.

While inquired particularly about the use of breakout rooms, almost 90% of the responders said breakout rooms made the navigation easier whilst only 10% found it confusing. (Figure 4)

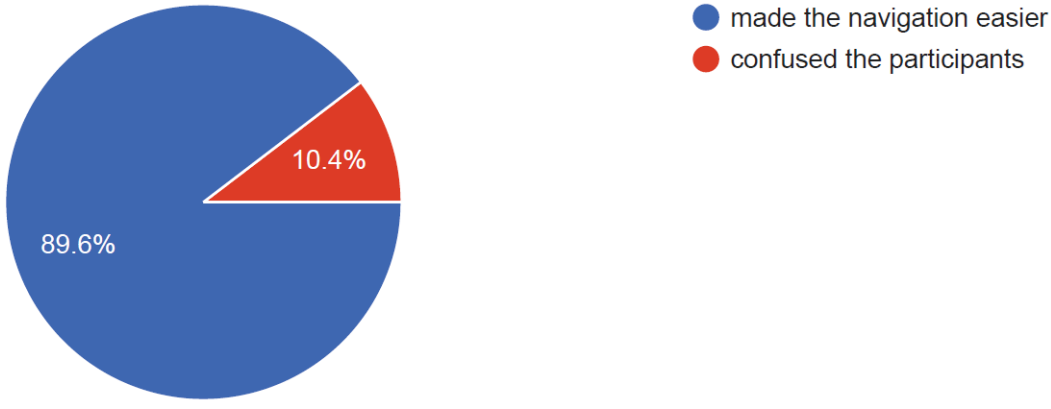

Figure 4: Participants' feedback about the use of breakout rooms.

In response to the question "How would you rate the event's overall organization in terms of communication with the participants, use of IT facilities, convenience for the attendees, virtual environment and maintaining the schedule?" 52.8% participants rated the event as excellent and 43.4 % rated as good (Figure 5).

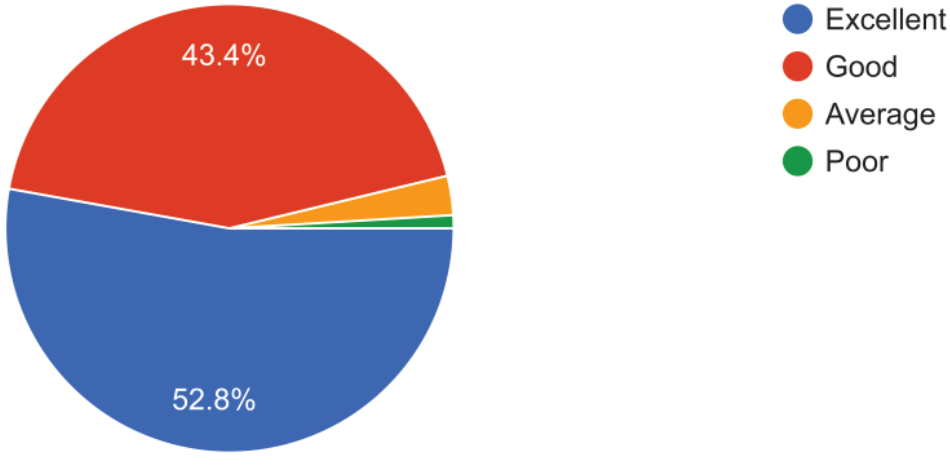

Figure 5: Response to the question "How would you rate the event's overall organization in terms of communication with the participants, use of IT facilities, convenience for the attendees, virtual environment and maintaining the schedule?

While asked "Would you recommended the next ICCHE to a colleague?" 93.4% of the participants said they would likely do so (Figure 6).

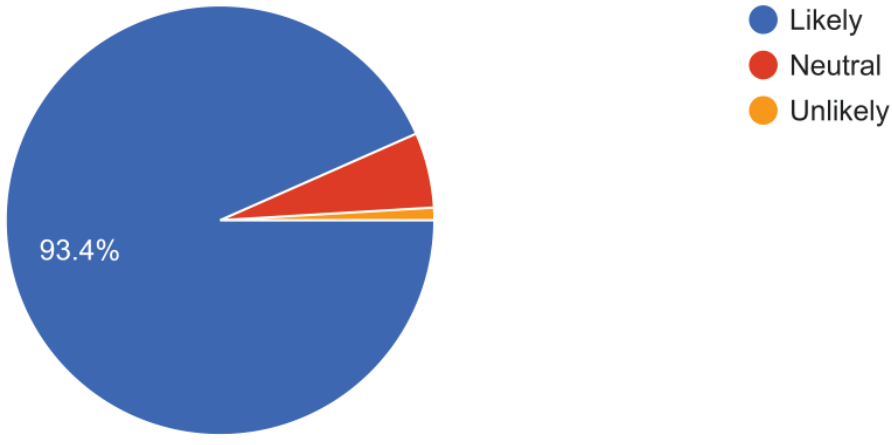

Figure 6: Response to the question "Would you recommended the next ICCHE to a colleague?"

The last section of the survey requested for additional comments on how to improve the future events. A total 37 participants responded to this question. About 27% participants appreciated the event as it was; 24% suggested more contribution from the industry as well as to focus on contemporary issues like renewable energy and waste management. Only 15% suggested to improve the technical support, presenters' quality and overall management. About 14% recommended to arrange ICChE biennially where the participants would join in person. Some 11% participants were concerned about the tight schedule of the 3 daylong conference and advised to breakdown the sessions over few more days. About 9% responders said that they have to improve their own technical skills to attend virtual events like ICChE 2020.

9.0 Conclusion

Even before covid pandemic unfolded, people were searching alternatives to the in-person conference that brings delegates together in a single 'destination' and demands costly international travel and often with high registration fees. The forcing hand of COVID-19 has opened an opportunity to trial online formats and to reinvent conferences as a core institution of research and practice with respect to inclusivity and sustainability. The organizers of ICChE2020 admitted that transforming the conference from a physical to an online event in two months made for a steep learning curve. Handling technical glitches, assisting 250+ participants to use the virtual platform properly as well as facilitating speakers and attendees to network

and engage meaningfully in virtual platform were some of the most challenging parts of the conference. The feedback shows that the online form of conference was more or less successful. Finally, it is predicted that both online and in-person conferences will exist in the future, but that more and more attendees will probably be joining the online conferences. In this regard, the experience of ICChE2020 virtual conference will be invaluable for conference organizers in coming days.

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