

Forced Virtualization for Research Activities at the Universities: Challenges and Solutions

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Abstract: The article is focused on the possibility to continue research activities as an important part of higher education in the period of pandemic. The purpose of the article is to identify key challenges and the implemented solutions in the process of conducting research activities during the period of COVID-19 quarantine by the scientific teams at the selected HEIs. The article presents the results empirical research conducted in the format of online focus-group with 40 researchers, members of the scientific project teams that are currently implemented at the HEIs. In the conclusions the authors defined the influenced factors of the implementation of scientific research.

Keywords: *pandemic; research; higher education institution; distance learning; communication.*

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1. Introduction

The COVID-19 pandemic has significantly altered the usual way of life of most countries in the world. The higher education system has not been overlooked. It has switched to distance learning for the period quarantine. The distance learning has become a challenging issue for some universities, but most of them effectively continue the study process performing virtual tools. It is not a first time that universities face the remote study - the elements of distance learning have been integrating into the higher education system due to the global digitalization and the intention to make the study process more inclusive. Science and research are an important part of higher education (Ashworth 2009; Sushchenko et al., 2020). What is more challenging instead of distance learning, it is the possibility to continue research activities in the period of pandemic.

The purpose of the article is to identify key challenges and the implemented solutions in the process of conducting research activities during the period of COVID-19 quarantine by the scientific teams at the selected HEIs.

2. Literature review

The topic of pandemic is not new for scientific community. School closure was considered as an effective measure to prevent H1N1 pandemic influenza (Kawano & Kakehashi, 2015; Luca et al., 2018; Qiu et al., 2017). Attitudes, risk perceptions and adoption of health behaviour interventions against seasonal and pandemic influenza were studied (Seale et al., 2012). Developing an effective plan at an academic institution to mitigate the consequences of an influenza pandemic was considered (Atchison et al., 2008).

The issues of the educational challenges in COVID-19 pandemic situations is quite fresh for the global research community. However, scientists quickly react and study the impact of coronavirus on the academic environment (Sahu, 2020; Strielkowski, 2020; Viner et al., 2020).

Last study of Rumbley (2020) within the EAIE is a quick reaction of the European international higher education community on the effects of a public health crisis on the educational sector. Similar results shows QS Survey (2020) on crisis management across the higher education sector.

There is a further need in urgent scientific research regarding the pandemic as a mean of virtual constriction of social distancing (Erduran, 2020).

3. Methodology

The research was carried during the quarantine period in March-May, 2020. The research methods are analysis of the scientific literature and qualified data collection involving respondents' opinions during online focus group discussion in 4 groups. The method of questioning in the format of online focus-group has been used to conduct the empirical research. In the course of the empirical research to determine the challenges that face scientific project teams at the universities and solutions to meet those challenges the method of questioning (online focus-group via ZOOM programme) was used. The focus group discussion included five questions:

- 1) *At what stage is the project currently underway?*
- 2) *Which of the mobility\communication\integration activities were planned and occurred at the quarantine period?*
- 3) *Describe briefly whether the activities referred in the previous question have been carried out and how (postponed, revised online, etc.)?*
- 4) *Is the use of equipment located in the laboratories of the University foreseen for this period of the project implementation? If yes, how is the pandemic and quarantine laboratory research process organized?*
- 5) *How quarantine affected the organization of the purchase of research materials, what changes have occurred?*

Participants

The research sample comprised 40 scientists who are the members of the scientific project teams that are currently implemented at the HEIs. Participants' gender distribution was 17 females and 23 males, participants' age was between 25 and 65 years old. The participants were selected among the national and international partners of Chernihiv Polytechnic National University (Ukraine) with a focus on research fields' differentiation and the geographic locations. The participants were distributed between 4 focus groups by the fields of study conditionally divided to technical and social-humanitarian studies (2 focus groups for each field); Ukrainian scientists were invited for the first and second focus groups, foreign scientists participated for the third and fourth focus groups.

The research sample was the following:

- 1) 1st focus group (11 participants): 9 participants from Chernihiv Polytechnic National University (Ukraine) and 2 participants from Chernivtsi National University (Ukraine). Participants' gender distribution was 1 female and 10 males, participants' age was between 25 and 45 years old. Research fields: Power Electronics, Welding; Chemistry;

2) 2nd focus group (10 participants): 8 participants from Chernihiv Polytechnic National University (Ukraine), 1 participant from Berdiansk State University (Ukraine) and 1 participant from Zhytomyr Agrarian University (Ukraine). Participants` gender distribution was 9 females and 1 male, participants` age was between 30 and 50 years old. Research fields: Economics; Humanities;

3) 3rd focus group (11 participants): 2 participant from Tallinn University of Technology (Estonia), 2 participants from Anna University (India), 2 scientists from Riga Technical University (Latvia), 2 participants from the research centre “UNINOVA” (Portugal), 2 participants from Georgia State University (U.S.) and 1 participant from National & Kapodistrian University of Athens (Greece). Participants` gender distribution was 9 males and 2 females, participants` age was between 27 and 55 years old. Research fields: Power Electronics; Engineering; Storage Technologies, Control, Operation, Integration; Energy & Power Engineering; E-Health; IT;

4) 4th focus-group (8 participants): 1 participant from Fil. Dr. J.-U. Sandal Institute (Norway), 2 participants from the FHS St. Gallen University of Applied Sciences (Switzerland), 4 participants from Batumi Navigation Teaching University (Georgia), 1 scientist from Maria Curie-Skłodowska University (Poland). Participant`s gender distribution was 3 males and 5 females, participant`s age was between 40 and 65 years old. Research fields: Education; Economics; Social Work; Humanities.

Validity and reliability of the research data is confirmed by the fact of alignment of the results of empirical research conducted by the focus-group as well as the participants` self-assessment. Participants of the focus group agreed to participate on their free will. The experimental research was conducted in compliance with the respect to human rights and ethical principles.

4. Results

The data collected from the focus group discussions revealed the peculiarities of the scientific projects` implementation in the period of pandemic COVID-19 from the point of view of the involved researchers. According to the asked questions during the discussions we obtained the following results.

1) *The stages of the projects` implementation quarantined.* Among the respondents there are the following projects: projects at the preparation phase – 7 participants are involved (17,5% from the general participants

body); first year projects – 10 participants are involved (25% from the general participants body); projects in the middle of the implementation – 13 participants are involved (32,5% from the general participants body); projects at finishing stage – 10 participants are involved (25% from the general participants body).

2) *The options for mobility\communication\integration and other events quarantined.* The participants of the focus group discussions mentioned the following planned events in their HEIs within the scientific projects and the solutions for their carrying out:

- conferences have been moved to the distance format; exchange visits and scientific spring school have been moved to the online format at Chernihiv Polytechnic National University (Ukraine);

- conferences have been moved to the distance format Chernivtsi National University (Ukraine), Berdiansk State University (Ukraine) and Zhytomyr Agrarian University (Ukraine);

- working meetings, doctoral school have been moved to a virtual format at Tallinn University of Technology (Estonia);

- conferences and exchange visits have been moved to a virtual format at Riga Technical University (Latvia) and National & Kapodistrian University of Athens (Greece);

- conducting joint research activities, quality monitoring activities are remotely; conferences, exchange visits, citizens engagement event and test sites activities have been postponed at Anna University (India) and the research centre “UNINOVA” (Portugal);

- project meetings have been moved to online format at Georgia State University (U.S.) and Maria Curie-Skłodowska University (Poland);

- spring school IBS, research visits were postponed at Fil. Dr. J.-U. Sandal Institute (Norway);

- working meeting have been moved to online format; mobility activities have been postponed at the FHS St. Gallen University of Applied Sciences (Switzerland);

- conferences have been postponed; working meetings have been moved to the online format at Batumi Navigation Teaching University (Georgia).

3) *The organization of laboratory research process during quarantine.* Among 4 focus groups only participants of the 1st and the 3rd focus groups (22 researchers - 55 % of the general respondents` body) mentioned that they need to use the equipment located in the laboratories of the university for quarantine period of the project implementation. As for the organization of

the research process scientists from Anna University (India), the research centre “UNINOVA” (Portugal), Georgia State University (U.S.) and National & Kapodistrian University of Athens (Greece) pointed that their research was postponed (32% from 22 respondents of this section). The participant from Tallinn University of Technology (Estonia), Riga Technical University (Latvia), Chernivtsi National University (Ukraine) and Chernihiv Polytechnic National University (Ukraine) (68% from the respondents of this section) mentioned that they can use the equipment located in the laboratories with the special conditions: limited amount of people who can work in the lab in one period of time.

4) *Quarantine impact on the organization of the purchase of research materials for the scientific projects.* Among the general body of focus discussion’s participants 17 respondents (42,5 %) mentioned that for their project any purchases have not been planned for the quarantine period as the projects are at the preparation or the first implementation stages. Scientists from Anna University (India) and the research centre “UNINOVA” (Portugal) (10%) pointed that such purchases have been postponed until the changes in the situation. Other participants (47,5%) highlighted the overall suspension of procurement or delays in delivery of electronics components and equipment.

5. Limitations and discussions

Shifting from face-to-face to online academic activities is a typical reaction of the university community to pandemic of COVID-19 (Sahu, 2020). Such novel approach comes due to the availability of digital tools and promotion of distance learning in higher education environment. In previous pandemics the study process mostly was just closed and postponed (Qiu, 2017).

Last surveys (QS, 2020; Rumbley, 2020) proves our focus group findings on the continuing of academic activities in online or remote format in most HEIS. We agree with the results of QS Survey (2020) that research engagement is a crucial driver of advanced education. Without research activities HEI could not completely fulfil its academic and social mission (QS, 2020).

Scientific research in the field of technical sciences, as a rule, is carried out on the basis of scientific laboratories of universities. Accordingly, during quarantine, there is the problem of visiting laboratories, businesses, companies, etc. Universities that continue to do research are limited only in the amount of people who can work in the lab in one period of time. For

example, the lab's work schedule: no more than two scientists work before lunch, then disinfection activities, and two other employees work after lunch. Scientific research in the field of engineering also sometimes requires the purchase of specialized equipment, materials, components. The results of the survey indicate either overall suspension of procurement or delays in delivery of electronics components, equipment.

An important component of conducting research is exchange visits and participation in conferences to present and discuss scientific findings. We find the results of QS Survey (2020) as absolutely reasonable as the closure of research communication and collaboration during a crisis may damage relationships, making it harder for the HEI to return to business as usual after the crisis has subsided. Such statement confirms the participants of our focus group as most of them continue conducting their research. Similarly to the study of Sahu (2020) at the period of COVID-19 pandemic, asked on the focus group HEIs cancel or postpone workshops, conferences and other events. Instead of face-to-face meetings, they conduct online meetings and discussions.

Limitations of the research are related to that fact that we did not focus on the COVID-19 response plans among the questioned HEIs. As there are other limitations, we emphasize that the results of the focus-group based on participants' experiences, apply only to selected scientific fields. The research results could be extrapolated to the global dimension. The research highlights the general trends in cases of scientific project implementation during the pandemic period.

6. Conclusions

The empirical research defined the following *general impact of quarantine on the research activity (whether it is possible or not to continue the research process)*: termination of all academic and research related activities; suspended situation for most laboratory activity; continuing of carry out the research process with the changes into the organizational process and calendar plan. *The challenges and barriers in conducting research activity during the period of quarantine COVID-19*: the problem of the access to the laboratories, companies, enterprises; pause in the process of procurement or delays in delivery of electronics components, equipment.

The implemented solutions in the process of conducting research activities during the period of COVID-19 quarantine: moving of the working meetings, events, scientific schools, conferences and exchange visits to a virtual and online format; conducting joint research activities, quality monitoring activities

remotely; postponing of the mobilities and exchange visits, citizens engagement events, test sites activities.

It is not possible to develop a common unified procedure for organizing research activity in quarantine even for the projects from the similar area of science. The following solutions for carrying out of the research in the pandemic situation can be recommended:

- research in laboratories with the observance of sanitary and epidemiological requirements: the number of R&D performers who can be in the room at the same time is calculated depending on the area of the laboratory (in Ukraine it is 1 person per 10 square meters). Accordingly, work schedules are drawn up in laboratories. If possible, remote control of equipment could be used;

- exchange visits, conferences, seminars and other communication events could be organized online using appropriate tools: Google Meet, Zoom, GoToMeeting, Skype, ooVoo, Google+Hangouts, WebEx, ON24, VideoMost, FreeConferenceHall, All Conferencing, Mind, MyOwnConference and others;

- research visits, where it is planned to visit laboratories and conduct research using laboratories could be rescheduled;

- conducting surveys as a part of the research could be switched either online or the adjustments made to the project calendar plan.

It should be noted that the changes made in the project calendar plan could impact on the final result of R&D. In certain situations, for example, if the research is focused on a specific target group that cannot be conducted online, such as people aged under 60, or foreign citizens, and so on, the reporting to the project foundation is needed. To prevent such situations the risk management strategies should become the part of the organizational culture of the project teams.

In general, the implementation of scientific research is influenced by: restrictive measures taken by each country for the quarantine period (closure of all establishments or authorization to operate in compliance with certain requirements, features of functioning of public transport, etc.); specifics and scope of the study (need to use of laboratory equipment, focus group surveys, testing conditions, purchase of necessary components and materials for the study, etc.); technical capabilities of the university (availability of remote control equipment, availability of all necessary components and materials for conducting the research, ensuring compliance with restrictive measures during the quarantine period (number of persons in a certain area, providing workers with personal protective equipment, transporting workers to the research site), possibility of organizing and conducting events

(conferences, seminars, scientific schools, defending of PhD theses) online, etc.); others (possibility of making purchases online).

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