

EFFECT OF COVID-19 EPIDEMIC ON RESEARCH ACTIVITY OF RESEARCHER IN PAKISTAN ENGINEERING UNIVERSITY AND ITS SOLUTION VIA TECHNOLOGY

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Recepción: 07/01/2020 **Aceptación:** 31/03/2020 **Publicación:** 30/04/2020

Citación sugerida Suggested citation

Massan, S., Shaikh, M. M., y Dahri, A. S. (2020). Effect of COVID-19 epidemic on research activity of researcher in Pakistan Engineering University and its solution via technology. *3C Tecnología. Glosas de innovación aplicadas a la pyme. Edición Especial, Abril 2020*, 249-263. <http://doi.org/10.17993/3ctecno.2020.specialissue5.249-263>

ABSTRACT

This work focuses on taking the research from impact factor to impact which means that it would propose the best interventions required at both public and private sector universities to improve the research scenario in times of emergency. The timing of this work coincides with the current corona virus pandemic and it encompasses the best practices for such an era in modern times. It proposes the requisite revamping and careful reworking of the university towards becoming a research enabler for the students at a time of crisis.

This article analyzes the effects of the Coronavirus disease on the researchers who must maintain social distance during confinement at the university and yet be able to carry out meaningful research by utilizing videoconferencing and other facilities.

KEYWORDS

Novel Coronavirus-19 (2019-NCov) or (COVID-19), Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), Research, Private Sector University (PRV), Public Sector University (PSU), Higher Education Commission (HEC), National Academy for Higher Education (NAHE), Research goals (RG), Video conferencing (VF), WhatsApp (WA).

1. INTRODUCTION

The corona pandemic was declared in January 2020 by the World Health Organization (WHO) (Bastola *et al.*, 2020; Li *et al.*, 2020). The WHO also shared the guidelines for meeting the requirements posed by this pandemic (World Health Organization, n.d.-a), the procedures for overcoming the overwhelming efficient human transmission of this disease are discussed in Huang *et al.* (2020) China, was caused by a novel betacoronavirus, the 2019 novel coronavirus (2019-nCoV), and Lee & Hsueh (2020). The day-by-day details, situation reports and advice is enlisted in Chiodini (2020).

We have never been more prepared yet so indecisive in dealing with the corona pandemic. It pertinent that the entire humanity does not lock down all of its intellect over a single problem, we must continue to evolve in all spheres of life if we are to move ahead. Let the biologists do their job while the rest of the humanity prepares itself for many such a challenge in all other spheres of life.

Knowledge has become the cornerstone and the most important aspect of any organization (Numprasertchai & Igel, 2005). The question of producing high impact research has never been so profound as we must face such a magnanimous disease. According to international reports about 54 academic papers in English language were published about COVID-19 by 30th January 2020 and by 3rd February 2020, just 23 Chinese-language papers were contributed. When faced with such looming figures of developed nations, the response of Pakistani and South Asian countries is still far from adequate (Siddique, 2020).

The focus of research is to inculcate effective, critical, analytical and communication skills for the changing global paradigm. The current issue has placed new constraints on all sectors that must now evolve to overcome the barriers to effective mitigation. Whilst, the job sectors have to evolve with traditional jobs giving way to new and non-traditional forms of work. The manager-subordinate paradigm is also under skepticism with more direct forms of hierarchy being placed. Hence, many an employee may find himself directly reporting to the Group head or the CEO without any intermediaries. This has been possible due to the extreme specialization required at some levels of the newly evolving job structures. The depletion of the traditional manager-subordinate model the graduates have to arm themselves with new techniques and methods of being useful in the pandemic infused

millennial economy. The importance of being able to carry out work independently or to improve a certain segment of the work has never been greater.

Presently, Pakistan is undergoing the second resurgence of its education sector. The first influx of researchers from abroad has contributed to a secondary, yet meaningful second influx of local researchers. This second pool of researchers shall form the next broad base for the local proliferation of the technologies in the country. This is the time when this pool of researchers shall be tested for their worth and contribution. This work focuses on the best practices for adherence to gear-up the graduates of today and tomorrow towards meeting the challenges of facing such a pandemic and the subsequent job paradigm change.

The impact of research on government policies has never been greater as it formulates the foundations of policy. The 177 universities of Pakistan have more than 12,000 faculty members with PhD degrees and annually about 1500 PhD scholars are added to the research stream (Siddique, 2020). However, the need for external knowledge and knowledge sharing is key towards removing insular adaptations to acquire, integrate and share knowledge (Numprasertchai & Igel, 2005).

The universities must now increase productivity and efficiency through strategy and tacit knowledge (Numprasertchai & Igel, 2005). The success of today's academia shall be tested on how well they have adapted to the changing times. The interventions shall be required at the development, process, transfer, utilization, and validation of knowledge (Numprasertchai & Igel, 2005). Online teaching shall be new standard and the academia shall have to invariably change forever in this new paradigm. While the research paradigm has to shift from quantity to quality and from student grades to actual service towards humanity. Hence, the important role of ICT is stressed for knowledge proliferation and attainment of research goals (Numprasertchai & Igel, 2005).

It is all too evident that job descriptions have changed in this era of emergency, we must now work from home and at home, interaction is digital. So in this era of technology, where will the daily wage laborer go? One answer is that personification of tasks is individual while their execution is to be ensured by manual labor.

The objective of this work is to take a view point of a university's situation and formulate the areas that need improvement. This work underlines the importance and the interventions undertaken throughout Pakistan to meet the situation arising out of the Corona epidemic. This work enumerates the best practices for managing research and its timelines.

The data is analyzed for only one department and faculty. This data is not the final word on this chapter as it pertains to evaluation before the mid-semester research presentations. The situation is improving with more students opting for online methods of communication with their supervisors and for research.

A good number of recommendations have been enumerated for improving the research scenario in the present circumstances and an avid conclusion is drawn.

2. FROM IMPACT FACTOR TO IMPACT

This paper focuses on the specific aspect of creating high value research in a developing country like Pakistan where there are many financial limitations towards meaningful research. There is a general concept that the universities of Pakistan are not as well developed or have not been able to produce credible science. However, this is not true as some examples quoted here show the resilient efforts of our scientists.

The first National Center for Virology is has been envisaged at the University of Karachi at its prestigious International Center for Chemical and Biological Sciences with the collaboration of Wuhan Institute of Virology and three institutions from Germany namely Medidiagnost, Tuebingen University, and Eberhard Karls-University of Tuebingen (Siddique).

Researchers from the Mehran University of Engineering and Technology have designed a fully automated ventilator. Whereas the UET Lahore is also pursuing this cause of designing ventilators with great fervor and zeal through the Higher Education Commission's RAPID Research and Innovation grant (Siddique, 2020).

The National University of Science and Technology has developed coronavirus diagnostic KITS at cost effective prices with high accuracy and sensitivity. The price of this kit is deemed to be one-fourth as compared to a foreign kit. The NUST Atta-ur-Rahman School

of Applied Biosciences (ASAB) has successfully developed Molecular Diagnostic Assays for the detection of (2019-nCoV). These kits have been developed in collaboration with Armed Forces Institute of Pathology (AFIP) Rawalpindi, in collaboration with Columbia University USA, DZIF Germany, and Wuhan Institute of Virology China. These kits are field tested and reliable (Siddique, 2020).

In another recent development, the Punjab University has also a low-price kit for Coronavirus diagnosis at its center of Excellence in Molecular Biology. The price of conducting the test on this kit is a mere 5 USD or 800 PKR only. The university plans to develop thousands of kits within a week for the benefit of the masses (Siddique, 2020).

The universities of Pakistan have adapted well to the changing paradigm of ‘flipping the classes’; this term was coined by Salman Khan of the world renowned Khan academy. The online classes paradigm has been accepted countrywide and high quality instruction is being carried out at all major universities around the country (Siddique, 2020).

The role of the Higher Education Commission as the catalyst and benefactor of many funded researches going on in the country cannot be denied. The HEC Rapid research initiative is one such method that has been devised to meet the urgent needs of the country (Higher Education Commission, 2020b).

The HEC has also put forward its guidelines for the universities for online teaching and these are available at (Higher Education Commission, 2020a). However, the modus operandi for conducting and orchestrating research remotely has still to be formulated.

The HEC has defined two methods to meet the present situation either (“HEC asks universities to start online teaching”, 2020),

- 1) The universities must remain closed till May 31 and treat this period as summer vacation or,
- 2) The universities must resort to online teaching and utilize the publicly available platforms such as Teams etc.

The HEC has stressed that the quality of instruction must not be compromised in these online interactions (“HEC asks universities to start online teaching”, 2020). The HEC

is also establishing an National Knowledge Bank (NKB) for providing online access to a range of materials and lectures etc. (“HEC asks universities to start online teaching”, 2020). Moreover, the best online tutorials and materials shall be gathered by the National Academy for Higher Education (NAHE) (“HEC asks universities to start online teaching”, 2020).

3. MANAGING RESEARCH

3.1. OBJECTIVES

The work describes the best practices for proliferation of research geared towards meaningful output in times of pandemic or emergency.

From the literature at hand and from the experience gained it is evident that the universities need to react fast in these times to take the research to world-class standards. A research policy that has to be thought out and implemented by letter and spirit.

From the experience of the research work submitted it can be concluded that most of the research work shows that short term measures have taken precedence over long term gains. Past projects show that definite goals have not been set and lip service has been done on the completion of short term research projects. Research is not the top priority of the students who must understand that improving the current scenario at every level is the key to success in every challenge that they must face in life.

The economic costs of indecisiveness and short term tenures of previous research team will culminate into unstructured and below standard publications unless corrected at this juncture.

The universities with semester system have mainly three types of research credits i.e.,

- 1) 3 credits that must be completed in one semester for the undergraduate students
- 2) 6 credits which must be completed in one or two semesters for the graduate students and
- 3) 30 credits for PhD students that must be completed in chunks of 6 credits.

Thus the universities have the burden to minimize the human contact while conducting meaningful research in these times.

3.2. RESEARCH FRAMEWORK FOR UNIVERSITIES

There are three distinct levels or layers of work involved in managing a university wide research network and are described as under,

A. Policy framework layer

All the requirements of policy level and the setting out of the goals under the university vision and mission are the responsibility at this layer. The Director of the Research Division reports and sets out the goals for his department to be attained during the course of the year in the Academic Council held earlier. These goals have to be tracked, met and the reasons for any shortfall defined in the upcoming AC meeting.

The primary objective of this layer is to ensure that the deadlines are endorsed by the relevant AC meeting at the beginning of the year. This is because a wide disparity is seen in department's perspectives on when to collect the research works and when to conduct the viva etc.

B. Management framework layer

All the management tasks and adherence to the timelines are to be ensured at this level. This is to be managed by the Deputy Director/Manager of research at the university level.

C. Human layer

All the human interaction tasks and contacts with the relevant departments are to be performed at the is layer This layer may be headed by an Assistant Manager who would ensure that the human side of things are amicably managed.

4. MANAGING THE TIMELINES

It is proposed to adhere to the following timelines in principle,

- 1) Registration of research credits should be done normally at the beginning of the semester.

- 2) Research meeting should be held at the beginning of the first week, preferable first Sunday after the commencement of the classes.
- 3) Selection of research supervisors should be completed at the end of the third week.
- 4) Selection of research titles and the students should stick to this title till the end of the semester. This should be ideally completed by the end of the third week.
- 5) Submission of Chapters 1, 2 and 3 should be completed by early seventh week.
- 6) Mid-term evaluation should be conducted by the end of the seventh week.
- 7) Preview copy or spiral copy should be submitted by fourteenth week.
- 8) Final presentation should be held online by the end of the sixteenth week.
- 9) Hardbound copies should be submitted by the end of the seventeenth week.

5. METHODOLOGY

This study emanates from the authors knowledge and experience and encompasses all the best practices for the promulgation of a research centered mindset at the university level.

For the prevention of bias in this research, the recommendations and the results were peer-reviewed by a senior researcher. The recommendations for the research units pertain to Bio-Sciences, Business Administration, Computer Science and Engineering.

To also remove the bias the evaluation levels for the Supervisor, Externals and Internals should be set with the following recommendations,

- 1) Timely submission on deadlines – 20% marks allocated by the research unit
- 2) Midterm – Internal 10%, Supervisor 10%
- 3) Final term – Supervisor 30%, External 30%

It is also recommended to have two layers of corrections, one at the content level by the internals and the other to view the formatting of the final thesis to be done by the respective library division.

Minimal human to human interaction should be observed with all manual submissions handled with proper care or through mail. Sanitization of all surfaces and contacts are to be ensured.

6. DATA ANALYSIS

The data was analyzed for one faculty at a prominent university and it was found that initially out of 18 research faculty, almost 16% have been successful in developing contact with research candidates without any compromise on the time lapse in the time university was off. On the other hand, out of 17 students registered to these 16% supervisors, 41% have successfully kept the project on track and have been completing assignments and progressing in their research work, whereas 59% are yet to maintain facilities to continue their work.

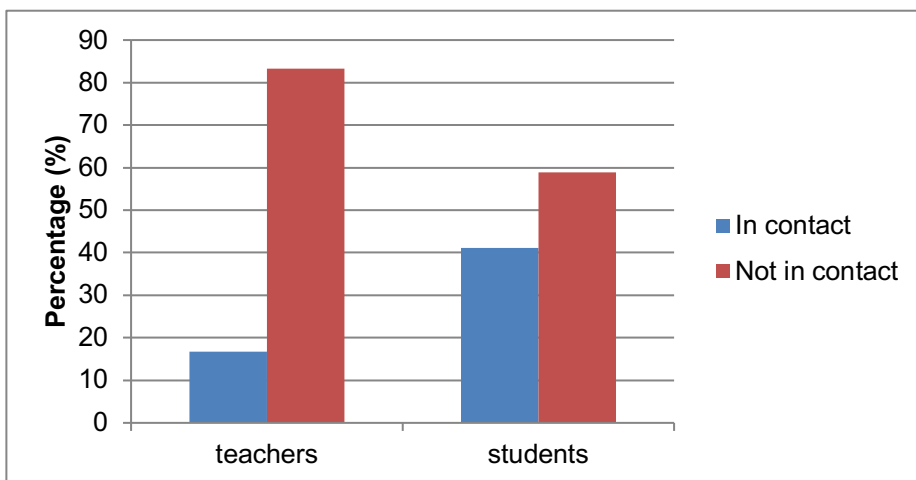


Figure 1. The percentage of supervisors and research candidates whether in active contact or not from March 07, 2020 to April 06, 2020.

In the event of successful contact of supervisors with the candidates, so far 28 active contacts have been reported online. The mode of contact was mostly through WhatsApp and mobile calls since the research projects of masters and doctorate level have one candidate registered per topic. 89% of the established online meetings have been through WhatsApp and calls, whereas 11% of the times zoom meetings were used for detailed discussion and analysis of results.

However, the situation is yet to improve following a very strict follow-up by the university authorities so that each and every student is able to complete his research on time. In this regard the mid-term presentations are to be held online and the record maintained on a google sheet. The video presentations shall be saved for assessment and regulatory authorities.

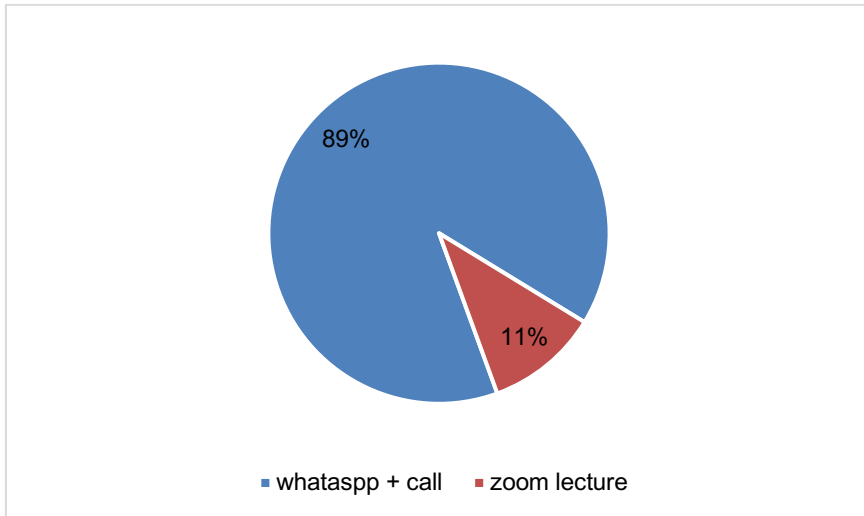


Figure 2. Mode of contact in the active online meetings.

It was noticed that the predominant mode of contact was through Telecom and WhatsApp and a minority of students were approached through Zoom software.

7. RECOMMENDATIONS

There are many recommendations that can be submitted in view of this pandemic. However, the main outlines are as follows. In principle the research entity / institution is geared up towards these guidelines,

- 1) Appointment of a focal person to guide and manage all research related activities at the university level.
- 2) All people entering the university premises must wear masks, apply sanitizer and be screened for body temperature (Chen, Pradhan, & Xue, 2020) with a focus on early screening and detection (Alburikan & Abuelizz, 2020).

- 3) All infected people are advised rest, medical care or appropriate home care (Zhang *et al.*, 2020) and need to recover before attempting to undertake research at the university.
- 4) To apply safety and health guidelines that have been proposed by the World Health Organization (World Health Organization, n.d.-b; Ronco, Navalesi, & Vincent, 2020; Jansson, Liao, & Rello, 2020).
- 5) Gain experience of professional management of research activities particularly assessment methods.
- 6) To reduce academic losses due to lack of focus and co-ordination amongst the students. To particularly manage the chaos and un-certainty of the Coronavirus era.
- 7) Integrated software and platform for managing the student information and various complex interactions such as change of supervisor and change of thesis title.
- 8) Formulation of standard SOP's and formats for establishment of clear chain of command.
- 9) Grade visibility to the student at different levels.
- 10) Availability of standard templates for assessment of various theses.
- 11) Marks distribution to be well known to the students in advance.
- 12) To initiate online presentations for creating industry exposure and linkages.
- 13) To invite current research from the industry and on the Coronavirus pandemic through forward looking office of industrial liaison.
- 14) Enactment of an online students' rights council on WhatsApp for paper writing.
- 15) Online thesis formatting help to be extended to the students during the semester.
- 16) Online workshops and presentations on different software packages that are utilized in research such as reference managers and SPSS, SmartPLS, MATLAB, Minitab etc.
- 17) Online Workshops and sessions known as work-at-homes to be held to help the students finish their theses in time and with collaboration.

- 18) To manage and mitigate the effects of any panic like situation or eventuality and to ensure emergency readiness at all quarters.
- 19) And the last but not the least to improve the one to one interaction between the students and the supervisors through online modes of interaction.

8. CONCLUSION

It has been concluded in various studies that more invasive quarantines and adept social distancing will be required to mitigate the effects of the Coronavirus COVID-19 pandemic (Elmousalami & Hassanien, n.d.). Hence, the value of the above recommendations is pertinent with an end to overcome the present global pandemic.

Continuity of good practices, effective command, clear and lucid communication of instructions is to be ensured at all levels. The validity and reliability of all results and examination methods also have to be ensured since most interaction is online. The standard of evaluation has to rise at a higher level to meet this situation.

ACKNOWLEDGEMENT

The authors wish to thank Dr. Ghulam Rasool Shaikh for his guidance and support.

REFERENCES

- Alburikan, K. A., & Abuelizz, H. A.** (2020). Identifying factors and target preventive therapies for Middle East Respiratory Syndrome susceptible patients. *Saudi Pharmaceutical Journal*, 28(2), 161–164. <https://doi.org/10.1016/J.JSPS.2019.11.016>
- Bastola, A., Sah, R., Rodriguez-Morales, A. J., Lal, B. K., Jha, R., Ojha, H. C., Shrestha, B., Chu, D. K. W., Poon, L. L. M., Costello, A., Morita, K., & Pandey, B. D.** (2020). The first 2019 novel coronavirus case in Nepal. *The Lancet Infectious Diseases*, 20(3), 279–280. [https://doi.org/10.1016/S1473-3099\(20\)30067-0](https://doi.org/10.1016/S1473-3099(20)30067-0)
- Chen, Y., Pradhan, S., & Xue, S.** (2020). What are we doing in the dermatology outpatient department amidst the raging of the 2019 novel coronavirus? *Journal of the American Academy of Dermatology*, 82(4), 1034. <https://doi.org/10.1016/J.JAAD.2020.02.030>

- Chiodini, J.** (2020). Maps, masks and media – Traveller and practitioner resources for 2019 novel coronavirus (2019-nCoV) acute respiratory virus. *Travel Medicine and Infectious Disease*, 33, 101574. <https://doi.org/10.1016/J.TMAID.2020.101574>
- Elmousalami, H. H., & Hassanien, A. E.** (n.d.). *Day Level Forecasting for Coronavirus Disease (COVID-19) Spread: Analysis, Modeling and Recommendations*. Cornell University. arXiv:2003.07778.
- HEC asks universities to start online teaching.** (2020, March 30). The News International. <https://www.thenews.com.pk/print/636738-hec-asks-universities-to-start-online-teaching>
- Higher Education Comission.** (2020a). *HEC Covid-19 guidance 1-4*. <https://hec.gov.pk/english/Pages/Covid-19-Guidance.aspx>
- Higher Education Comission.** (2020b). *RAPID Research and Innovation Initiative (RRII)*. <https://www.hec.gov.pk/english/services/RnD/RRIF/Pages/default.aspx>
- Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., Zhang, L., Fan, G., Xu, J., Gu, X., Cheng, Z., Yu, T., Xia, J., Wei, Y., Wu, W., Xie, X., Yin, W., Li, H., Liu, M., ... & Cao, B.** (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*, 395(10223), 497–506. [https://doi.org/10.1016/S0140-6736\(20\)30183-5](https://doi.org/10.1016/S0140-6736(20)30183-5)
- Jansson, M., Liao, X., & Rello, J.** (2020). Strengthening ICU health security for a coronavirus epidemic. *Intensive and Critical Care Nursing*, 57, 102812. <https://doi.org/10.1016/J.ICCN.2020.102812>
- Lee, P.-I., & Hsueh, P.-R.** (2020). Emerging threats from zoonotic coronaviruses—from SARS and MERS to 2019-nCoV. *Journal of Microbiology, Immunology and Infection*. <https://doi.org/10.1016/J.JMII.2020.02.001>
- Li, J., Li, J. (Justin), Xie, X., Cai, X., Huang, J., Tian, X., & Zhu, H.** (2020). Game consumption and the 2019 novel coronavirus. *The Lancet Infectious Diseases*, 20(3), 275–276. [https://doi.org/10.1016/S1473-3099\(20\)30063-3](https://doi.org/10.1016/S1473-3099(20)30063-3)

- Numprasertchai, S., & Igel, B.** (2005). Managing knowledge through collaboration: multiple case studies of managing research in university laboratories in Thailand. *Technovation*, 25(10), 1173–1182. <https://doi.org/10.1016/j.technovation.2004.03.001>
- Ronco, C., Navalesi, P., & Vincent, J. L.** (2020). Coronavirus epidemic: preparing for extracorporeal organ support in intensive care. *The Lancet Respiratory Medicine*, 8(3), 240–241. [https://doi.org/10.1016/S2213-2600\(20\)30060-6](https://doi.org/10.1016/S2213-2600(20)30060-6)
- Siddique, M. A.** (2020, April 1). *Where Pakistani universities stand*. Daily Times. <https://dailymtimes.com.pk/586590/where-pakistani-universities-stand/>
- World Health Organization.** (n.d.-a). *Infection prevention and control during health care when COVID-19 is suspected*. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/infection-prevention-and-control>
- World Health Organization.** (n.d.-b). *WHO guidelines on hand hygiene in health care: first global patient safety challenge – clean care is safer care*. Geneva. https://www.who.int/gpsc/5may/tools/who_guidelines-handhygiene_summary.pdf
- Zhang, J., Zhou, L., Yang, Y., Peng, W., Wang, W., & Chen, X.** (2020). Therapeutic and triage strategies for 2019 novel coronavirus disease in fever clinics. *The Lancet Respiratory Medicine*, 8(3), e11–e12. [https://doi.org/10.1016/S2213-2600\(20\)30071-0](https://doi.org/10.1016/S2213-2600(20)30071-0)