



Analysing The Impact Of ICT On Performance Of Research Supervisors Of Public Sector Universities

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ABSTRACT

The basic aim of the current study was to find that to what extent the research supervisors of universities used Information and Communication Technology (ICT) for their academic and research activities and investigated its impact on their performance. The quantitative method utilized in this investigation. The population of the study included teachers of public sector universities of Rawalpindi and Islamabad. Multistage purposive sampling technique was applied to draw the sample size. Thus, 300 research supervisors (lecturers, assistant professors, associate professors, professors) were drawn. Questionnaire was used for assembling data. This survey found that research supervisors used ICT at average extent. It is concluded that research supervisors didn't use ICT effectively for academic and research purposes, as they use it at average extent. Moreover, it implied that with the increase of ICT utilization, performance of research supervisors enhanced. The study recommended that university administration ought to give sufficient resources of ICT and training (workshops, conferences, and seminars) that will expose them to best practices of proper utilization of ICT to utilize very high for their academic activities to enhance their performance.

KEYWORDS: Utilization, ICT, Teaching, Performance

INTRODUCTION

Information and Communication Technology is indispensable for numerous arenas of life, comprising education (Pavel, Fruth & Neacsu, 2015). It encompassed communication devices just as with their application like laptops, computers, hardware, smartphones, internet, software, search engines as well as video conferencing which are used to save, process, create, activate, recover, allocate, just as communicate information (Lawal & Olawale, 2020). Consequently, with the assistance of such intuitive communication devices, it has transformed the customary methods of working in all fields. Thus, it has likewise done the same in education, from the administration level to the classroom and individual level. It significantly affects the higher education sector of almost every country (Chakraborty, Dhara & Santra, 2018).

Accordingly, by considering great importance of ICT in enhancing, changing into cloud-based services for example; storage of information, Google classrooms, e-portals, digital course books, and reforming the education sector in terms of the process of teaching-learning (Siddiquah & Salim, 2017). Therefore, teachers use ICT to keep knowledgeable with innovative information, heighten capabilities and academic research, make lectures and presentations, and make course material (Bhattacharjee & Deb, 2016).

Along these lines, the usage of ICT has a noteworthy and optimistic effect on the teaching-learning process (Appiahene, Kesse & Ninfaakang, 2016). In this way, by efficiently using ICT in the areas referenced above by means of teachers to increase their instruction, which may be extremely helpful in improving their performance (Shamim & Raihan, 2016). Hence, research supervisors of tertiary education utilize ICT for their general educational and research purposes to upgrade their level of performance.

Likewise, research supervisors use ICT devices to carry out their jobs efficiently and effectively. Benitez, Cabay and Encalada (2017) identify teachers' performance as noticeable academic practice. It shows itself when teachers present their ability and partakes to do with the anticipated learning accomplishments, i.e., the determination of instruction similarly as implementation of responsibilities appointed. While, as indicated by Hernandez (2012), the teachers' performance is basically reliant upon the accompanying components: data, elements of students (like; learning, academic work), qualities of teaching (like; the arrangement of the lesson, correspondence), learning features (e.g., management, classroom phenomena), their obligation just as creative mind.

Besides, as per Das and Chattopadhyay (2014), the teachers' performance is considered in three categories; category I underline teaching-learning and evaluation-related activities, category II give emphasis to educational administration and co-curricular activities, category III

encompasses research output. Along these lines, as demonstrated by the previous study of Das and Chattopadhyay, this study measures the research supervisors' performance by means of three indicators: teaching, academic administration and management, and research supervision.

Moreover, ICT improves motivation, teaching skills, professional skills, technical skills, and teachers' performance. Teachers perform more effectively due to utilizing ICT; it had an optimistic, similarly noteworthy impact on performance of teachers (Zafar & Ullah, 2020; Mugizi & Amwine, 2020; Olokoba, Abdullahi, & Omosidi, 2014). Hence, the present study explores the use of Information and Communication Technology by supervisors and find its impact on performance. Numerous previous studies nationally and internationally conducted in this perspective. However, notwithstanding its effects or relationship with research supervisors' performance, ICT usage was not clear in previous studies. For example, in terms of teachers' performance study was conducted. This study just explored the utilization of Information and Communication in lessons' preparation and presentation by teachers yet in primary schools of Nigeria (Okon & Uwatt, 2015).

These days, ICT has changed just as invaded various aspects of our lives. It is indispensable for the teaching and research of research supervisors of universities. It is among the most addressable areas of research that has been reliably the pivotal point all over the world. The impact of Information and Communication Technology on performance of supervisors was surveyed in other countries. Though, minute research studied the impact of Information and Communication Technology on the performance of supervisors in Pakistan. Yet, still it is not evident how research supervisors utilize the ICT in their academic as well as research matters, and what impact its utilization has on their performance. Thus, in these regards, this is yet needed to be investigated regarding Pakistan.

Objectives of the Study

- TO determine the extent of utilization of Information and Communication Technology by research supervisors for general academic activities.
- To find out performance of research supervisors.
- To analyse the impact of ICT devices on performance of research supervisors.

Hypothesis of the Study

H₁: There is significant effect of ICT on performance of research supervisors.

REVIEW OF RELATED LITERATURE

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

As demonstrated by previous studies, ICT turned out to be an indistinguishable entity in whole fields. The usage of ICT has transformed the acts of business, associations, just as of education. Verifiably, it has influenced quality in addition extent of teaching-learning, similarly as research in higher education (Adeoye, Oluwole & Blessing, 2013). In another investigation, it is found that in the education system, usage of Information and Communication Technology has acquired recognition for over 20 years, and it has an effect not only in the teaching and learning method, just as in administration and organization of institutions of higher education (Juma, Raihan & Clement, 2016). Moreover, in the process of education, utilization of ICT has been partitioned into two general categories; first, ICT for education which indicates to the improvement of Information and Communication Technology unequivocally for teaching-learning, as well as second ICT in education comprises indispensable components of ICT for teaching-learning (Shamim & Raihan, 2016).

Literature showed that ICT like the internet, smartphones, computers, and laptops extensively grasped in organizations (Pitt, Berthon, & Robson, 2011; Wasko, Teigland, Leidner & Jarvenpaa, 2011). Further, this contention was upheld by the aforementioned studies that because of ICT employees had accessibility to colleagues, just as to data sources (Cecez-kecmanovic, Boell & Campbell, 2014; Dery, Kolb & MacCormick, 2014). As indicated by Das (2019) ICT progresses computerize resources in education. Therefore, students, teachers, administrators can approach course and research material, articles wherever, at whatever point they need. Additionally, it is found that ICT offers online forums for university teachers (Zafar & Ullah, 2020). Along these lines, teachers can have online meetings because of the utilization of ICT (Akram et al., 2020; Shahzad et al., 2020). Mishra and Bajpai (2010) explained that ICT changed the education system's working method as digital information. In addition, it has presumed a considerable role in teaching, research.

Correspondingly, Victor and Bolanle (2017) depicted the advantages of ICT. Students, teachers, and administrators could access, recover, and distribute their information, for example, e-books and journals within a short period with ICT usage to foster their teaching-learning process. ICT also assists in correspondence inside as well outside any organization. Besides, these days, ICT is an essential tool in this society. It is intended to make work extremely simple, fasten a process, and solve problems briefly. It influences the organizations straightforwardly and offers opportunities in the form of easy and quick dissemination of information and enhances access to information (Lawal & Olawale, 2020). In addition, as per

other previous investigations, ICT aids the broadcast of audio-visual handling, telecommunication, and so on (Akram et al., 2020; Shahzad et al., 2020).

Notwithstanding the above proclamation, Schmidt and Cohen (2015) similarly portrayed that ICT is an approach to acquire information promptly available to students wherever throughout the world. Other than the above finding, it is affirmed that ICT is the innovation without which we can't get by today and later the globe (Suliman, Khaidzir & Khaidzir, 2014). Researchers define ICT in various ways. Juma et al. (2016) expressed that ICT encompasses computers and electronic equipment, which are used to gather, store, and send data electronically. Other academic researchers depicted ICT as the equipment used to disseminate, store, and gather data by computers and interconnected networks (Cirera, Lage, & Sabetti, 2016; Ghavifekr & Rosdy, 2015).

The researchers defined ICT as those technologies which could be utilized to get to, process, create, store, recover, and distribute information with communication devices like computers, laptops, smartphones, hardware, software, internet, and videoconferencing for upgrading learning outcomes and teachers' professional competency (Adebayo, 2013; Onyije & Opara, 2014; Cirera et al., 2016; Gebremeskel, Kebede, & Chai, 2016). In the same way, some other previous studies highlighted that the term ICT intends to store, create, communicate, disseminate, and recover information (Appiahene et al., 2016; Gujjar, Naemullah & Tabassum, 2013; Oulmaati, Ezzahri & Samadi, 2017).

UTILIZATION OF ICT IN TEACHING-LEARNING PROCESS

ICT use has exerted a noteworthy and optimistic effect on the instruction and learning method (Appiahene et al., 2016). The aforementioned investigations uncovered that use of Information and Communication Technology in education straightforwardly influences the method of teaching and method of learning. It additionally offers innovative possibilities in the form of vital course material, as well as empowering their better teaching (Shamim & Raihan, 2016). As per Aminatum (2019), ICT facilitated the teachers in education and the learning process; it likewise augments their professionalism. So, universities use technology to support the teaching-learning process. Conferring to several preceding studies, ICT is important in changing and modernizing learning and teaching methods (Fernandez-Gutierrez, Gimenez & Calero, 2020; Comi, Argentin, Origo & Pagani, 2017; Falck, Mang & Woessmann, 2018). Moreover, the usage of ICT enriches the teaching materials and makes lessons more appealing, comprehensive, interacting (Corni et al., 2017).

Another study recommended incorporating ICT as its application in education has an affirmative and noteworthy influence on teaching, learning, research. Additionally, ICT stimulates the teaching-learning process and presents innovative opportunities for teachers (Noor-Ul-Amin, 2013). Likewise, its usage in education has increased inventive opportunities for teaching and learning (Talebian, Mohammadi, & Rezvanfar, 2014). Additionally, as Pavel et al. (2015) indicated that ICT aims to change instruction and the learning process, predominantly in tertiary education. It is additionally explained that ICT is an innovation that assists teachers in teaching students. Agreeing to these lines, Al-Qahtani and Higgins (2013) exposed that the technology in educational institutions came up to advance the process of teaching and the process of learning. Moreover, according to Voogt and Tondeur (2015), the applied use of ICT in education directs collaborative activities and upgrades the teacher's knowledge and the teaching and learning process. In addition, one more investigation highlighted that ICT usage influences the teaching and learning process (Houcine, n.d).

Besides, Ratheeswari (2018) illustrated that usage of ICT upgraded the teaching-learning process. It is vital for teachers to carry out their job. It upholds the teachers in presenting their lectures more appealingly and empowers learners to learn at each phase of the educational program. In like manner, technology offers various approaches for improving the teaching-learning process (Ghavifekr et al., 2014). Moreover, the consequences of another study exposed that ICT significantly affected teaching, learning, and research (Obiri-Yeboah et al., 2013). Likewise, the previous researchers Ali, Haolader and Khushi (2013) investigated that application of Information and Communication Technology makes teaching, just as learning operative in progressive education organizations. Besides, other studies similarly revealed that ICT upheld process of teaching-learning (Sangra & Gonzalez-Sanmamed, 2010).

UTILIZATION OF ICT FOR GENERAL ACADEMIC ACTIVITIES

As per past exploration, teachers used ICT for general academic and research activities. They utilized ICT to examine, update information, as well as improve competencies (Shehu, Urhefe & Promise, 2015). Furthermore, an additional study highlighted that they utilized it to plan just as present lessons, and further develop their research competences via looking through the literature, assembling as well as analysing data, compiling reports, and publication (Odigwe, Basse & Owan, 2020).

Likewise, Ali et al. (2013) exposed that teachers used ICT (computers) to teach, learn, and prepare lesson plans. The previous investigations represented how ICT assumed a crucial role for teachers in their research. For example, Mondal and Mete (2012) described that ICT assisted teachers in different manners, for instance, in preparing lectures and presentations,

conveying and sharing content, creating course material, correspondence with other scholars, students and academic researchers for academic research, administration, and enrolment of students.

In addition, another study emphasized that ICT empowered teachers to set up their lesson plans in an innovative approach that would achieve dynamic learning of students (Jamieson-Proctor et al., 2013). Similarly, Arnseth and Hatlevik (2010) illustrated that ICT likewise facilitated the teachers in the classroom for setting up their students according to the advance digital period. ICT also gave a dynamic and involved teaching-learning environment.

USE OF ICT FOR PERFORMANCE OF RESEARCH SUPERVISORS

As per prior studies, teachers' performance is distinguished as: their ability to combine related inputs for further developing process of teaching just as learning (Amin, Ullah, Ayaz & Atta, 2013); teaching, management, discipline, consistency, in addition personal relations (Mugizi & Amwine, 2020); planning lessons, providing guidance, designing just as carrying out managing tactics to amplify the viability of teaching lessons (Steinberg & Garrett, 2016).

Various aforementioned studies explored the impact of ICT on the research supervisors' performance. In this aspect, previous investigation reported that ICT is indispensable for teachers' performance (Shamim & Raihan, 2016). Furthermore, Oko and Uwatt (2015) found that teachers used ICT to plan and convey lessons. According to Loureiro, Huet, Baptista and Casanova (2010) teachers utilized ICT to accompany research supervision processes like sharing and providing content and correspondence with postgraduate students. In addition, Eze and Olusola (2013) pointed out that teachers could get the best information with the assistance of ICT (internet), which may develop their insight, quality of university education, and research articles/papers because of their capability to search.

Furthermore, in this viewpoint one more exploration pointed out that access to e-resources is crucial for teachers' performance. Teachers because of accessibility to e-resources can get online information significant for their teaching, can without a very remarkable stretch make research in anticipation of lessons, just as can gain commendable teaching aids (Mugizi & Amwine, 2020). As per, Nwigbo and Madhu (2016) Information and Communication Technology supported teachers in the organization of enormous information, for example, organizing assessments and events, the readiness of reports. In this way, teachers easily kept up with grade books, aggregate data bank of test items, done online evaluation and amendment of work of students, keeping records, accounts, just as documents of all the previously referenced occasions and strategies with fast recovery.

Likewise, various investigations have reported the impact of ICT and performance of teachers. For example, Sabanci, Ozyildirim and Imsir (2014) found that utilization of ICT assisted in management of classroom, save time, offered supplementary ways for further deeds, restricted non-disciplinary practices of the learners, supported leadership authority of the teachers. Hence, usage of ICT supported instructors instruct viably, just as inspire students to learn. Besides, Bhukuvhani, Chiparausha and Zuvalinyenga (2012) investigated that teachers can conduct their research and can prepare it for their students because of access to e-resources. In this way, the outcomes of their study presented that use of e-resources affected straightforwardly and significantly their work. Furthermore, Ibieta, Hinostroza, Labbe and Claro (2017) explained that teachers can upgrade their delivery of content, if they used ICT frequently in the classroom.

ICT is viewed as a standard in the sector of higher education. It is being used in various areas, like, faculty members used the ICT device (internet) to look through information (Mulla, 2011; Thanuskodi, 2011; Thanuskodi & Ravi, 2011; Egberongbe, 2011; Bhatti, 2010); diverse studies examined that teachers used Google, Google Scholar, Yahoo, and Alta Vista to find information (Salaam, Ajiboye & Bankole, 2013). An effective usage of ICT by the teachers can give more incredible perception to the teachers (Alharbi, 2014). As indicated by Tsvere, Swamy & Nyaruwata (2013), numerous teachers used the ICT to source information, however not utilized it for publishing/disseminating their research material. In addition, academics and scholars of universities find it appropriate for looking through information by search engines, subject gateways, and e-library. Furthermore, a researcher found that most of the teachers used electronic journals rather digital books (Egberongbe, 2011). According to Tyagi (2011), academics utilized the ICT to make research papers and revive their knowledge allied to their subject.

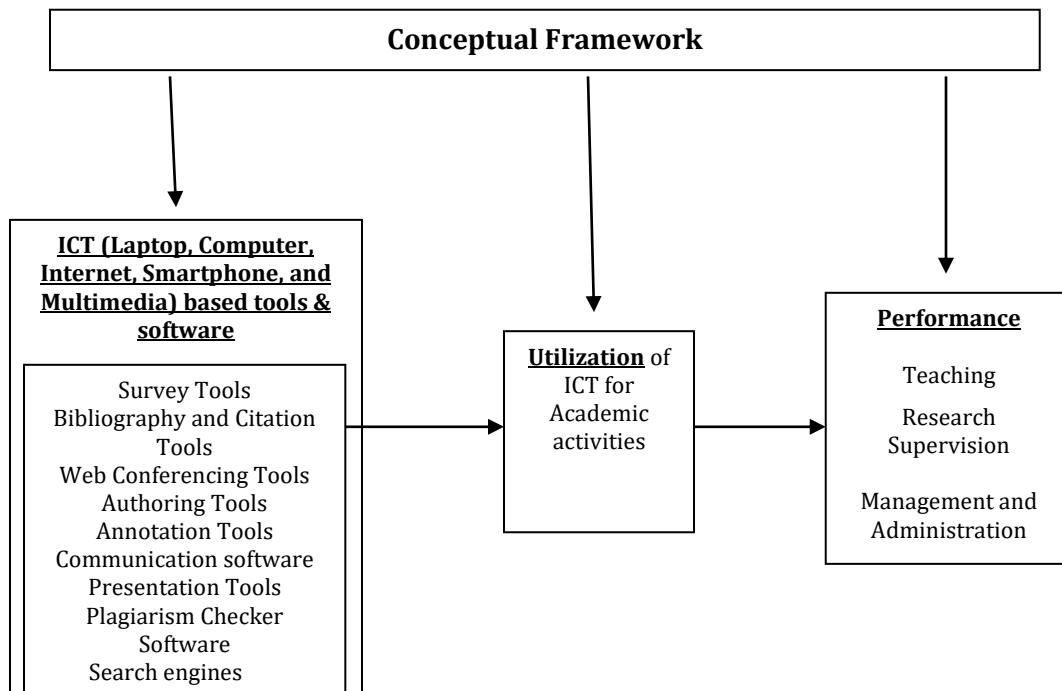
In addition, ICT tools used by teachers such as; "search engines, productivity software, social networks, university's portal, communication, e-learning instruction and assessment, online survey, e-curriculum, MIS" (Basak, 2015). Likewise, Ali et al. (2013) pointed out that teachers basically used ICT (computers) for instruction and learning purposes, planning lesson plans, and using software like Tally and Microsoft Office to instruct more efficiently to the students. In addition, Emeka and Nyche (2016) as well as Amaoge and Igwebuike (2016) highlighted that in all the academic organizations, ICT plays an extremely critical role in teaching, research just as in learning.

A descriptive study was researched in Uganda on investigating the "use of Information and Communication Technology on performance of school teachers". The consequences of the

study presented that access to ICT is essential for the performance of school teachers (Mugizi & Amwine, 2020). Additionally, a study was done in the Division of city schools, Valenzuela City, Philippines, on the "impact of technology integration in teaching performance of social studies teachers." Performance of teachers was taken as, "content knowledge and pedagogy, learning environment, diversity of learners, curriculum and planning, assessment and reporting, community linkages and professional engagement, personal growth, and professional development." Outcomes of the investigation showed the significant impact of technology incorporation on teaching performance (Hero, 2019).

An empirical study was conducted in Pakistan on the "role of information and communication technology in teachers' motivation, professional skills, and performance at public sector universities." The results of the study presented that ICT played a significant role in fostering the performance, skills of the profession, and motivation of teachers (Zafar & Ullah, 2020). Besides, another descriptive study investigated the "effects of ICT on the professional development of teachers at the university level in Sahiwal, Pakistan. It was inferred that ICT directly affects the professional development of teachers (Ahmed, Arshad & Tayyab, 2019). The conceptual framework of the study is presented in figure 1.

Figure 1. Conceptual Framework



RESEARCH METHODOLOGY

The present investigation used a quantitative method.

POPULATION AND TARGET POPULATION

The population includes all the public sector universities of Rawalpindi and Islamabad. There are **eighteen** public sector universities in Rawalpindi and Islamabad (Higher Education Commission). The population comprised teachers of the public sector universities of Rawalpindi and Islamabad. The target population encompassed those eight public sector universities having faculties of sciences and social sciences. Accordingly, in total the target population of the present study was 5,870 teachers (lecturers, assistant professors, associate professors, professors) of 08 public sector universities of Rawalpindi and Islamabad (COMSATS University Islamabad, Bahria University Islamabad, Air University Islamabad, International Islamic University Islamabad, Quaid-i-Azam University Islamabad, National University of Science and Technology Islamabad, Fatima Jinnah Women University Rawalpindi, Pir Mehr Ali Shah-Arid Agricultural University Rawalpindi). But, among these 08 universities in the faculties of basic and social sciences were 914 teachers; 365 in faculty of sciences, and 506 in faculty of social sciences.

SAMPLING TECHNIQUE AND SAMPLE SIZE

In this study, a multistage purposive sampling method was utilized to choose the sample size of quantitative data. At the first stage, the researcher identified from the Higher Education Commission (HEC) website directory about the public sector universities of Rawalpindi and Islamabad. Then in second stage identified which university has both faculties of basic and social sciences. At third stage, identified those departments in which was running programme of M.Phil./MS/PhD. At fourth stage those research supervisors, who were supervising the M.Phil./MS/PhD research students at least from 03 years were selected purposively from targeted universities. Along these lines, the sample chosen by purposive sampling technique was 300 research supervisors (lecturers, assistant professors, associate professors, professors). As Krejcie and Morgan (1970) demonstrated in table 1, if the population size is 900, then 269 sample size is sufficient, so in this study researcher has taken the 300 research supervisors (lecturers, assistant professors, associate professors, professors).

RESEARCH INSTRUMENT

The tool of the present investigation was questionnaire for gathering quantitative data from research supervisors. Through questionnaire, the researcher examined ICT usage by supervisors and measured its impact on their performance. To measure the impact of ICT,

the researcher collected the data by using questionnaire consisting of Five-point Likert scale rating questions i.e., "Strongly Disagree (1) disagree (2) Undecided (3) Agree (4) Strongly Agree (5)", beside the 1st section of questionnaire, i.e., respondents' demographic information. Questionnaires comprised of the accompanying sections: demographic information (name, gender, university, faculty, department, age, designation, teaching experience, supervising experience, number of students had been supervised, participated in ICT related training and email), utilization of ICT devices (laptop, computer, internet, smartphone, and multimedia) for (online-based tools and software involved: survey tools (i.e., Survey Monkey, online Web surveys, Google forms, Forms of the Fly), online bibliography and citation tools (i.e., Mendeley, EndNote, Citefast, Bibme), web conferencing tools (i.e., AnyMeeting, Meetin Gs), authoring tools (i.e., Easy generator, author point), annotation tools (Diigo, A.nnotate), communication software(s) (Skype, Gmail, Yahoo, Hotmail, Facebook, WhatsApp), presentation tools (PowerPoint, Keynote, Prezi, Canva), plagiarism checker software (Turnitin, dupli checker, Copy leaks, Plagiarisma) and search engine tools (Google, Internet Explorer, Firefox, Bing), for general academic & research activities), performance (was measured that how they used ICT to enhance effectiveness and efficiency in the following areas such as; teaching, research supervision, management and administration) . The researcher personally requested research supervisors to participate and rate the range of questions. The questionnaire was validated by 07 professional experts. SPSS software version 25 was employed to find out the reliability of questionnaire. The researchers randomly selected one of the universities, i.e., Bahria University Islamabad, from the targeted population. Above 50% of respondents, i.e. 20 research supervisors among 29, were selected for pilot testing from the targeted population of Bahria University Islamabad. The internal consistency estimate of te questionnaire was 0.908.

DATA COLLECTION

The researcher collected primary data, which is quantitative data from the research supervisors. So, the researcher gathered the primary data through self-directed questionnaires. The researcher personally visited the sampled universities to take formal permission to the heads of departments of faculty of sciences and social sciences of each university to collect data through questionnaires from their research supervisors.

DATA ANALYSIS

For analysing the data, statistical tests were executed with the help of SPSS software package 25. The collected data were analyse by utilizing descriptive and inferential

statistics. For achieving objective number 1 of the study, frequency, percentages, mode, and SD were calculated. The data of indicator utilizing ICT for general academic and research activities were collected by using the following 05 point scale, i.e., "Strongly Disagree (1) disagree (2) Undecided (3) Agree (4) Strongly Agree (5)". However, in the analysis was categorized as in four groups, i.e., low, average, high, and very high, based on the quartiles value of composite (sum) score of this indicator. The values of the quartile are presented in table 1.

Table 1: Values of Quartile of Utilization of ICT for General Academic and Research Activities by Research Supervisors

Indicators	Quartile value	Verbal description	Coding	Mode Score interpretation
Utilization of ICT for general academic activities	0-29.25	Low	1	Low
	29.25-32	Average	2	Average
	32-34	High	3	High
	34 & above	Very High	4	Very High

For achieving objective 2 of the study, frequency, percentages, mode, and chi-square were computed. Data of performance of research supervisors was collected by questionnaire. It was the composite (sum) score of indicators, teaching, research supervision, and management and administration. The data were collected by using the following 05 point scale like, "Strongly Disagree (1) disagree (2) Undecided (3) Agree (4) Strongly Agree (5)". In the analysis, their composite (sum) score was categorised as in four categories, i.e., low, average, high, and very high on quartiles value of composite (sum) score of these variables.

Table 2: Values of Quartile for Performance of Research Supervisors

Indicators	Quartile value	Verbal description	Coding	Mode Score interpretation
Performance of research supervisors	0-59	Low	1	Low
	59-75	Average	2	Average
	75-87	High	3	High
	87 & above	Very High	4	Very High

For achieving objective 3, simple linear regression was applied. In the analysis, their composite (average) scores were computed. The quartile values with a verbal description of a composite of ICT devices are displayed in Table 3.

Table 3: Quartile Values with Verbal Description of Sum of ICT Devices

Indicators	Quartile value	Verbal description	Coding	Mode Score interpretation
ICT devices	0-81	Low	1	Low
	81-87	Average	2	Average
	87-92	High	3	High
	92 & above	Very High	4	Very High

RESULTS OF THE STUDY

NORMALITY TEST

Das and Imon (2016) pointed out that before performing any statistical analysis, the normality of data should be checked to draw the correct conclusions. Following the view of Das and Imon, researcher in the study checked the normality of data. According to Kwak and Park (2019) normality test is satisfied if dots of the Q-Q plot do not diverge too much from the line, if the skewness and Kurtosis values are adjacent to zero, and if the values of mean and median are not much different (p#9). After entering the data in SPSS, the normality of data on dependent variables of the study was checked for applying the parametric test. Normality of indicators i.e. utilization of ICT, and performance was checked using mean, median, skewness, Kurtosis and Q-Q plot. The summary of the normality test of data is displayed below in Table 4.

Table 4: Normality Test

Indicators	Mean	Median	Skewness (SE)	Kurtosis
Utilization of ICT	31.51	32	- 0.064(SE=0.141)	- 0.367(SE=0.199)
Performance	73.99	73.97	- 0.168(SE=0.141)	- 0.999(SE=0.281)

Table 4 shows that data of indicators i.e., utilization of ICT, and performance was normally distributed as; values of mean and median were almost the same, values of skewness and Kurtosis were close to '0'. Moreover, in the Q-Q plot, the dots on the distribution plot were not much deviated from the standard distribution line, so it satisfied the normality requirement (Figure 2, 3). All the data set collected were normally distributed.

Figure 2: Q-Q Plot on Indicator Utilization of ICT for General Academic Activities

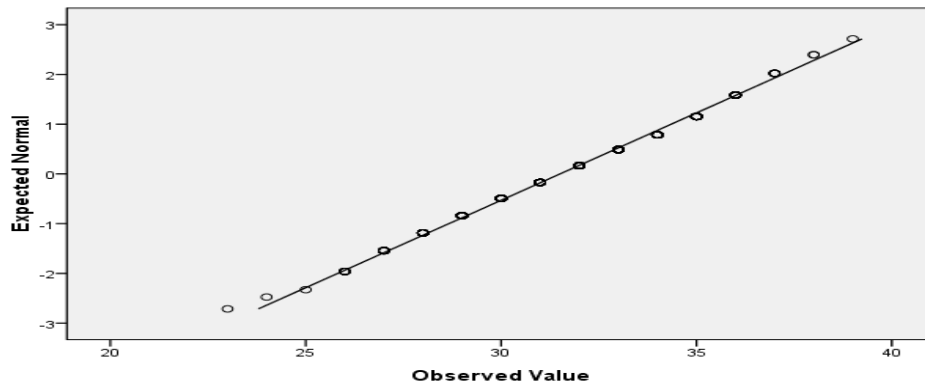


Figure 3: Q-Q Plot on Indicator Performance

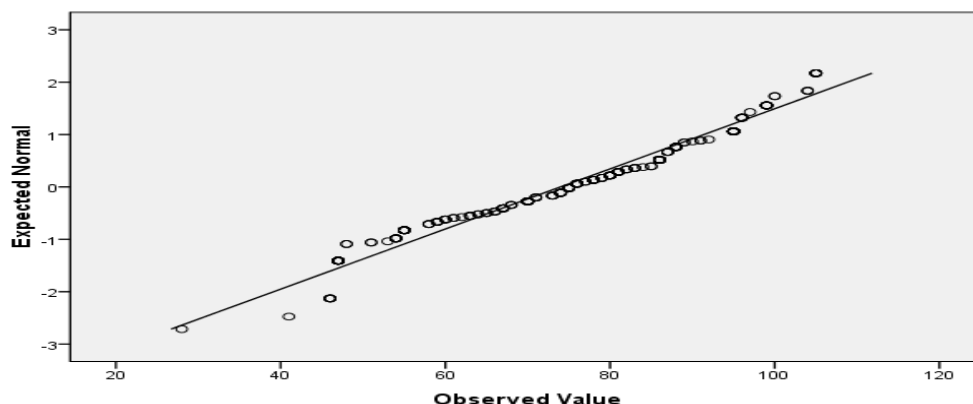


Table 5: Extent of use of ICT for general academic activities

Use of ICT		Low	Average	High	Very High	Mode	Remark	SD
Use of ICT	f	75	117	58	50	2	High	1.02
	%	25%	39%	19.30%	16.70%			
Total	f	300	300	300	300			
	%	100%	100%	100%	100%			

Table 5 shows that out of 300 research supervisors, majority of the supervisors used ICT on average extent for general academic activities. The value of mode (2) falls in the average category (2). The value of SD (1.02) also described departure in using ICT of research supervisors for their general academic activities. So, it is concluded from these results that majority of the supervisors used ICT to an average extent for their general academic activities.

Table 6: Extent of Utilization of ICT (Desktop, Laptop, Internet, Smartphone, Multimedia) Based Tools & Software

Utilization of ICT Tools & Software		Low	Average	High	Very High	Total	Mode	SD
Survey Tools	f	76	76	83	65	300	3	1.092
	%	25.3	25.3	27.7	21.7	100.00		
Bibliography & Citation Tools	f	76	92	62	70	300	2	1.1049
	%	25.3	30.7	20.7	23.3	100.00		
Web	f	102	101	52	45	300	1	1.048

Conferencing Tools	%	34.1	34	17.3	15	100.00		
Authoring Tools	f	93	73	94	40	300	3	1.0427
	%	31	24.3	31.3	13.3	100.00		
Annotation Tools	f	114	61	86	39	300	1	1.078
	%	38	20.3	28.7	13	100.00		
Communication Software	f	93	67	75	65	300	1	1.136
	%	31	22.3	25	21.7	100.00		
Presentation Tools	f	80	105	46	69	300	1	1.106
	%	26.7	35	15.3	23	100.00		
Plagiarism Checker Software	f	89	97	43	71	300	2	1.135
	%	29.7	32.3	14.3	23.7	100.00		
Search engines	f	83	104	45	68	300	2	1.109
	%	27.7	34.7	15	22.7	100.00		
ICT tools & software	f	77	85	70	68	300	2	1.102
	%	25.7	28.3	23.3	22.7	100.00		

Table 6 presents that most of the research supervisors utilized ICT (desktop, laptop, internet, smartphone, multimedia) based tools and software at average extent as mode value (2) falls in the average category (2). Wherever, most of the research supervisors used survey tools and authoring tools to a high extent as mode value (3) falls in the high category (3). Besides, standard deviation (1) described the deviation of research supervisors in the utilization of ICT (desktop, laptop, internet, smartphone, multimedia) based tools and software. Hence, it is determined from the results that most of the research supervisors among ICT (desktop, laptop, internet, smartphone, multimedia) based tools and software mostly used the survey and authoring tools to a great extent.

Table 7: Performance of Research Supervisors

University Name	Performance of research supervisors				Total	χ^2	df	Sig.	Mode	SD
	Low	Average	High	Very High						

PMAS-Arid	f	0	07	06	12	25					
university	%	0	28	24	48	100					
Fatima	f	04	09	03	09	25					
Jinnah	%										
Women		16	36	12	36	100					
university											
International Islamic	f	13	07	08	06	34					
university	%	38	20.60	23.5	17.6	100					
Quaid-i-	f	27	16	29	20	92	48.78				
Azam	%	29.3	17.40	31.5	21.7	100	3	1	0.0		1.
university		0		0	0		**	8	0	1	1
Air	f	01	07	03	02	13					
university	%	7.70	53.80	23.1	15.4	100					
				0	0						
COMSATS	f	12	23	18	17	70					
university	%	17.1	32.90	25.7	24.3	100					
		0		0	0						
NUST	f	21	07	06	07	41					
university	%	51.2	17.10	14.6	17.1	100					
		0		0	0						
Total	f	78	76	73	73	300					
	%	26	25.30	24.3	24.3	100					
				0	0						

P<0.01**

According to results of table 7, the value of chi-square is ($\chi^2 (18) = 48.783, p (0.000) < 0.01$) which is noteworthy. This means that there exists substantial evidence on the association among universities and the performance of research supervisors. According to table 4.20, research supervisors rated low their performance as mode value (1) falls in the low category (1). Furthermore, SD (1.12) described deviance in the performance of research supervisors.

REGRESSION ANALYSIS ON IMPACT OF USE OF ICT ON PERFORMANCE

It includes the model summary, ANOVA, and values of Coefficient.

Table 8: Model Summary of Use of ICT and Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.150	0.022	0.019	17.253	0.022	6.856	1	298	0.009

Table 8 shows the consequences of the analysis of the impact of ICT on the performance of supervisors. In model summary, the value of R² is 0.022, presented a 2.2% variance in the performance of supervisors because of utilizing ICT.

Table 9: ANOVA of Use of ICT and Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2040.627	1	2040.627	6.856	0.009
	Residual	88703.319	298	297.662		
	Total	90743.947	299			

Table 9 presents the values of ANOVA. The ANOVA value displayed that F (1,298) = 6.856, p (0.009) < 0.05 that is noteworthy. It demonstrated that ICT utilization had a substantial impact on the performance of supervisors.

Table 10: Coefficients of Use of ICT and Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	44.037	11.482		3.835	0.000
	ICT	0.346	0.132	0.150	2.618	0.009

The model attained was:

$$Y=44.037+ 0.346X$$

The model attained denoted a significant and optimistic impact of ICT on the performance of supervisors, which designated that keeping other aspects constant a unit enhancement in the variable attained in the model consequences into a conforming improvement in the performance of research supervisors. In the table the t-test value also denoted that $t(298) = 2.618$ is noteworthy as $p(0.009) < 0.05$. Based on Beta coefficients, the model presented that ICT causes 34.6% variation in the performance of research supervisors in the positive direction, and the value of 't' is significant. So, based on these results, we accept H_1 that there is a significant effect of ICT on the performance of supervisors.

FINDINGS AND DISCUSSION

The study found that research supervisors utilized ICT to an average extent. Besides, majority of the research supervisors highly utilized survey tools and authoring tools for academic activities. The findings of the study support the conclusions of Okolocha and Nwadiani (2015), NJI and Idika (2018), and Eze and Aja (2014). As the system of higher education is an upheaval revolution in the provision of its services. In this manner, there is a need for research supervisors to acquire ICT resources and use them meaningfully for their academic activities.

Moreover, the study also found from the self-reported data of research supervisors that overall performance of research supervisors is low. Furthermore, the present study found that the usage of ICT has a noteworthy impact on the performance of research supervisors. The findings of this study are in agreement with the aforementioned investigations that; ICT is essential for teachers' performance (Shamim & Raihan, 2016), teachers could get the best information with the help of the ICT, which might improve their knowledge (Eze & Olusola, 2013), access to e-resources is indispensable for teachers' performance (Mugizi & Amwine, 2020), ICT assisted teachers in the management of huge amount and kinds of information such as; organizing assessments and events, the readiness of reports (Nwigbo & Madhu, 2016), utilization of ICT assisted teachers instruct effectively (Sabanci et al., 2014), utilization of e-resources effected directly and significantly work of teachers (Bhukuvhani, Chiparausha & Zuvalinyenga, 2012), utilization of ICT enhanced the delivery of content of teachers (Ibieta et al., 2017), Teachers utilized technology for content knowledge, pedagogy, curriculum, planning, assessment, reporting, community linkages, professional engagement, personal growth, and professional development. So, Results of the study depicted significant impact of technology incorporation on teaching performance (Hero, 2019), information and communication technology had a substantial role in developing the performance, skills of the profession, and motivation of teachers (Zafar & Ullah, 2020), teachers utilized ICT devices for teaching and learning purposes, and preparing lesson plans (Ali et al., 2013); teachers utilized ICT devices for scheduling delivery of lesson plans (Oko & Uwatt, 2015) as well; sharing the

delivery of content as well, and for interaction among postgraduate students (Loureiro et al., 2010).

Conclusions

Following are the conclusions of the study:

- i.** Research supervisors at average extent utilized ICT devices for general academic activities. It implies that research supervisors did not use ICT effectively for academic purposes. Among ICT-based software and tools, most research supervisors at a high extent use survey and authoring tools.
- ii.** The level of performance of research supervisors is low.
- iii.** The utilization of ICT devices has a noteworthy impact on the performance of research supervisors. It implies that there is an increase in performance of research supervisors due to the rise in the use of ICT.

Recommendations

- i.** University administration should facilitate, regulate, and monitor ICT resources and equipment to enhance ICT use.
- ii.** University administration should provide sufficient resources of ICT and training (workshops, conferences, and seminars) to research supervisors that will expose them to best practices of proper utilization of ICT to utilize very high for their academic activities, so they can augment their performance.
- iii.** In future investigations, to address the hindrances research supervisors face in utilizing ICT in teaching, learning, and research processes.

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