Evaluation of Research Productivity of The Islamia University of Bahawalpur, Pakistan

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Abstract

The aim of this paper is to evaluate the research output and publications trends of the Islamia University of Bahawalpur (IUB), Pakistan for the last 42 years as observed in the Scopus database. IUB is the premier degree-awarding institution of the Southern Punjab, Pakistan and considerably subsidized their valuable share in national research growth. A quantitative bibliometric research technique was employed to enumerate the documents and their parameters. The publications record of IUB from 1980 to 2021 was retrieved on 2nd January 2022. The Microsoft Excel and VOSviewer software were used to appraise the dataset and presented the findings in tabular/graphic formats. The authors affiliated to IUB contributed the share of 2.52% in the national research growth of Pakistan with 6,209 documents and 62% of the documents were published in the last five years (2017-2021). The review papers and subscription-based documents gained more citations as compared to articles and open-accessed documents. The highest numbers of the documents were published on the subject area of "*Agricultural and Biological Sciences*" and about 15% of the documents were published in top-10 journals. Bahauddin Zakariya University was found on the top among the research collaborative institutions and China emerged as the top preference in the international research collaboration. The findings confirmed that a promising research growth has been explicit in the

last decade. The outcomes of this study are significant for the IUB authorities and they can review their efforts to promote research culture. The findings of this paper would also serve as a benchmark for the future studies on IUB as well as the other universities of Pakistan.

Keywords; Bibliometric, Research output, The Islamia University of Bahawalpur, Pakistan

Introduction

The higher educational institutions (HEIs) contribute a pivotal role in the development of human capital by providing a quality environment for teaching and learning as well as for the creation and dissemination of scholarly knowledge (Tari & Dick, 2016; Alemu, 2018). The prime objective of the higher education system is to develop the ability of critical thinking that further subsidizes to create new spheres of knowledge (Iqbal, Mahmood & Iqbal, 2018; Ahmad, et al., 2020). Effective teaching of research methodology supports in conceiving innovative ideas, developing new disciplines and refining the existing theories of knowledge (Ullah & Rafiq, 2021; Haider & Mahmood, 2007). Quality education and research are considered as the backbone for sustainable development and economic strength in the competitive knowledge-based society (Meo, Almasri & Usmani, 2013; Laurie, et al., 2016).

The creation of knowledge has been increased in manifold in the 21st century, likewise, the periodic assessment of research has also received acceptance by the academicians, policy-makers and ranking agencies (Ameen & Warraich, 2014; Chaudhuri, et al., 2020; Haq & Faridi, 2021). The evaluation of scholarly publications is one of the vital indicators to measure the standards of quality education. The quantitative bibliometric approach has frequently been used to assess the scholarly and scientific progress of HEIs (Ahmad, et al., 2020; Shahzad et al., 2021; Haq & Al Fouzan, 2017). The expression of bibliometric was introduced by Alan Prichard in 1969, the application of statistics and mathematics on publications and other media

(Prichard, 1969). This is an advanced form of statistical bibliography. The findings of bibliometric studies highlight the periodic growth, research trends, publications patterns, citation impact and collaboration networks of publications. The bibliometric studies stretch from national to regional and regional to global levels (Shehata & Mahmood, 2016; Barkim et al., 2017). The bibliometric studies on journals help library committees in the process of journals' selection for the libraries (Kevin, Zainab & Anuar, 2009), bibliometric studies on one area of knowledge support to understanding the strong and weak areas of research along with productive authors and most contributing institutions (Haq et al., 2020; Siddique et al., 2021). These studies also help the young scholars in the selection of research topics. The research units of the institution formulate and review their research policies and allocate research funds based on the bibliometric findings (Alfadley et al., 2021).

Pakistan is a developing country and having the fifth largest population in the world. Promising growth in higher education and research was started after the transformation of the University Grant Commission into Higher Education Commission (HEC) in 2002 (Mubeen, Soroya & Mahmood, 2021; Haq & Faridi, 2021). A 2018 study appreciated the role of HEC in establishing new degree-awarding institutions as well as improving the quality of higher education in Pakistan. One of the prime objectives of HEC is to increase research productivity in Pakistan (Iqbal, Mahmood & Iqbal, 2018). The latest scenario of education in Pakistan denotes that there are 224 HEIs along with 102 sub-campuses and approximately having 1.9 million enrolments. These HEIs offer 1,800 programs accredited by the HEC. The expenditure on education has been reduced due to the Coronavirus Pandemic in the recent financial year from Rs. 868 billion (2.3% of G.D.P.) in 2018-2019 to Rs. 611 billion (1.5% of G.D.P.) in 2019-2020 (Pakistan, 2021).

The Islamia University of Bahawalpur (IUB) is a public sector university located in one of the major cities of Southern Punjab, Bahawalpur. This university has a significant historical background, it was founded by His Highness Nawab Sir Sadiq Muhammad Khan Abbasi-V as the Jamia Abbasia in 1925 and it was upgraded as Jamia Islamia in 1963. The Jamia Islamia was transformed into a Chartered University as The Islamia University of Bahawalpur in 1975. IUB has 129 departments, offering more than 300 disciplines with 1000+ faculty members (approximately 500 Ph.Ds.) are providing the latest and quality education to approximately 50,000+ students. (https://www.iub.edu.pk/). The main purpose of the current study is to investigate the research productivity of authors affiliated with IUB from 1980 to 2021. The dataset was extracted from the Scopus, a reputed database of Elsevier's publishers.

Literature Review

A number of bibliometric studies was performed by Library and Information Science (LIS) professionals in Pakistan. These studies covered diverse aspects of publications. Mahmood (1996) examined the LIS research on Pakistan published in international journals from 1947 to 1997. Anwar and Saeed (1999) analyzed 251 LIS papers contributed by Pakistan indexed in LISA-PLUS database. Khurshid (2013) reviewed the quality of 516 papers produced by Pakistani LIS authors published in international journals. Similarly, Ahmad, K., JianMing, Z., & Rafi, M. (2019) evaluated the knowledge management literature in the LIS field to know the growth of the respective research area.

Four studies were conducted on the publication's patterns of the Pakistan Library and Information Science Journal at different times. (Khan & Samdani, 1997; Naseer & Mahmood 2009; Haq & Alfouzan 2018; Haq 2021). Two studies were carried out in the Pakistan Journal of Information Management and Libraries (Warraich & Ahmad, 2011; Haq, Faridi & Tanveer

2021). Siddique et al., explored the LIS research output of Pakistan from 1957 to 2018. About half of the papers were published between 2010 to 2018. Notable Pakistnai LIS scholars, e.g., Midrar Ullah, Saeed Ullah Jan, Ikram Ul Haq and Zameer Hussain Baladi conducted various bibliometrics studies on the medical journals published from Pakistan.

Nowadays, scholarly databases like PubMed, Scopus and Web of Science have extensively been used to retrieve the dataset for bibliometric studies. Meo, Almasri and Usmani (2013) investigated the research growth of Pakistan from 1996 to 2012 as indexed in Web of Science database. Quaid-e-Azam University contributed the highest number of papers and IUB secured the 10th position with 621 papers.

Iqbal, Mahmood and Iqbal (2018) examined the 74,755 documents produced by Pakistan from 1981 to 2015 as indexed in the Web of Science database. Steady research progress (n=3,274; 4.37%) was observed from 1981 to 1990, but outstanding progress was recorded as 79% (n=59,090) of the total publications were published in the last ten years (2006-2015). The highest number of documents were written on subject area of *Chemistry,* followed by *Plant and Animal Sciences* and *Clinical Medicine*. The study also highlighted the most productive universities in Pakistan and research trends. Haq and Faridi (2021) reviewed the research growth of Pakistan in the 21st century from 2000 to 2019. A total of 148,678 documents were found in the Web of Science database. COMSATS University Islamabad contributed the highest number of papers but the highest citation impact was gained by the National Centre of Physics. *Medical General Internal* was found the preferred area of research but the papers on *Environmental Sciences* received the maximum citation impact. China was on the top in the international research collaboration followed by the United States and Saudi Arabia. The study also figured out the frequently used sources of publications and suggested

incorporating the research activities with the industrial sector for the socio-economic development of the nation.

Javed, Ahmad and Khahro (2020) examined the research record of 17 universities located in Islamabad, Pakistan from 2008 to 2017 and reported that eleven percent of the country's HEIs were geographically located in the Federal capital city, Islamabad and one percent of the country's total population inhabitants of this city, contributed about one-third of the total national research. Ahmad et al., (2020) measured the research contribution of four leading universities of Pakistan along with one university from India. The University of Punjab and University of Karachi contributed about 59% of the total research while the University of the Balochistan contributed the lowest research output.

Shahzad et al., (2021) explored the research portfolio of Government College University Lahore Pakistan from 1908 to 2020. A total of 6,008 documents were identified and more than one-fourth (n=1,596; 26.56%) were published during the last three years of study. The highest amount of papers was written on the subject of *Physics and Astronomy* (18%) and *Chemistry* (16%). Maximum research collaboration at the institutional level was performed with the researchers of the University of the Punjab and Saudi Arabia was found on the top in the analysis of international research collaboration. The study suggested that authorities should provide adequate financial supports to conduct and publish more research.

Haq (2020) examined the research performance of the University of Peshawar, Pakistan from 1957 to 2019. Eighty percent of the research generated during the last ten years of study and *Chemistry* was the favorite area of research. Abdul Wali Khan University Mardan was the top choice at the institutional research collaboration while China and United Kingdom were the top two countries in international research collaboration.

Latif and Haq (2020) analyzed the 231 documents produced by the Shifa Tameer-e-Millat University Pakistan from 2012 to 2018. More than half of the documents were published in the last two years and *pharmacology* was found the preferred area of research followed by *medical education*. The United States was on the top in overseas collaboration. Number of bibliometric studies assessed the publication growth of medical institutions in Pakistan as Ahmad (2020) assessed the publication output of the oldest medical institution of Pakistan, King Edward Medical University. Haq, Ullah and Tanveer (2020) and Ali, Gatiti and Haq (2021) investigated the research metrics of Army Medical College and the Aga Khan University. All the bibliometric studies show the upward trends of research publications.

Research Objectives

The present research study was carried out to fulfill the following objectives: -

1. To review the share of IUB in the national research output of Pakistan and examine the chronological growth of publications and citations from 1980 to 2021.
2. To point out the types and accessibility modes of documents.
3. To analyze the authorship patterns of documents.
4. To segregate the documents by subjects.
5. To assess the most preferred sources/journals of publications.
6. To examine the research collaborative trends at national and international levels.

Research Methodology

A quantitative bibliometric research approach was employed to examine the publications records of IUB indexed in the Scopus database. The dataset of 42 years from 1980 to 2021 was downloaded.

The country affiliation search probe opted, and "Pakistan" was typed in the main query box. The years from 1980 to 2021 were selected from the time filter. The summary of the research output of Pakistani authors was scrutinized to assess the share of IUB. Further, from the index of affiliation, the limit command was used and selected the "The Islamia University of Bahawalpur". No other filter has been applied. A total of 6,209 documents were found and no duplicate record was traced.

All the targeted documents were exported into Microsoft Excel (Version 2016) and further, VOSviewer (Version 1.6.15) software was applied to visualize the co-occurrence of top-20 collaborative countries. The results are presented in tabular and graphic formats. The bibliometric indicators such as publications and citation counts by years, authorship patterns, distribution of documents by subject, frequently used journals, national and international research collaborative have been used.

The inclusion criteria of indexation in the Scopus database follows that, if the document is published in Scopus indexed journal/source and secondly there should be at least one author affiliated with a specific institution in the list of author(s), Scopus indexed such document under the affiliation ID of this institution. The Scopus database provides a subscription-based extensive coverage of multidisciplinary research data with abstracts, bibliographic records and citations counts, published in more than 40,000 sources/journals (Alhibshi, et al. 2020).

Data Analysis and Interpretation

Share of IUB research at the national level

Pakistani authors produced a total of 249,352 documents from 1980 to 2021. The Quaid-e-Azam University contributed the highest number of documents (n=20,128; 8.07%), followed by National University of Sciences and Technology (n=14,841; 5.95%), and

University of the Punjab (n=14,699; 5.98%). The authors affiliated with the Islamia University of Bahawalpur produced 6,209 documents, 2.52% of the total national research output and secured the 12th position among the research organizations of Pakistan.

Periodic growth of publications by IUB

A total of 6,209 documents were published in 42 years (1980 to 2021) by the researchers affiliated with IUB with an average of 147.83 documents per year. The first document was indexed in the Scopus database under the affiliated address of IUB in 1980 and during the first ten years (1980-1989) only 22 documents were identified. Steady progress was recorded in the next two decades (1990-1999; 2000-2009). Only 7% of the total documents were published in the first thirty years of the study. A remarkable growth has been found (62% of the total document) in the last five years from 2017 to 2021.

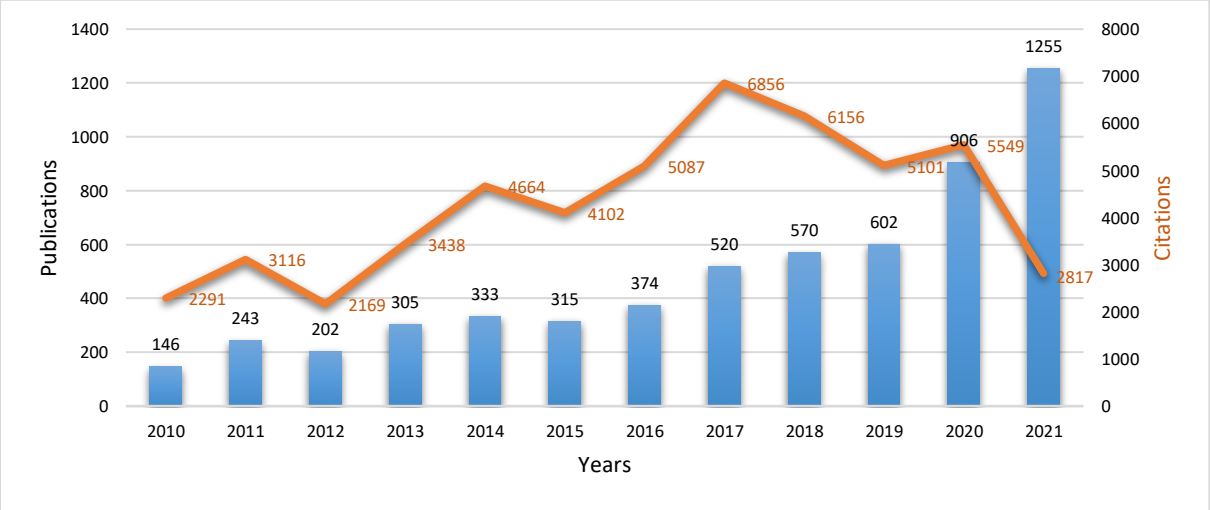
All the targeted documents gained 58,560 citations (9.43 cites/doc). More than one-third (n=4,834; 77.85%) of the total documents were cited. The documents published during the third decade (2000-2009) received the highest ratio of average citation (18.12 cites/doc), followed by the 146 (15.69 cites/doc) and 333 (14.01 cites/doc) documents published in the year 2010, and 2014, respectively. Table-1 and Figure-1 demonstrate the growth of documents and citations by year.

Table-1: ***Distribution of publications by years/intervals***

Year/Interval	Total Documents	Total Citations	Citation Impact
2021	1,255	2,817	2.24
2020	906	5,549	6.12
2019	602	5,101	8.47

2018	570	6,156	10.80
2017	520	6,856	13.18
2016	374	5,087	13.60
2015	315	4,102	13.02
2014	333	4,664	14.01
2013	305	3,438	11.27
2012	202	2,169	10.74
2011	243	3,116	12.82
2010	146	2,291	15.69
2000-2009	337	6,105	18.12
1990-1999	79	977	12.37
1980-1989	22	132	6.00
	6,209	58,560	9.43

Figure-1: ***Distribution of publications and citations by years (2010-2021)***



Types and accessibility modes of Documents

The analysis of document's type exposed that the majority of documents were written as articles (n=5,443; 87.66%), followed by conference papers (n=295; 4.75%) and reviews (n=267; 4.30%), while 204 documents consisted of books (n=2), book chapters (n=39), data papers (n=2), editorials (n=13), erratum (n=37), letters (n=28), note (n=5), short survey (n=5) and 66 documents were undefined by the Scopus database. Two hundred and sixty-seven reviews gained the higher ratio of citation impact (n=6,278; 23.51 cites/doc) as compared to articles (n=47,662; 8.75 cites/doc) followed by conference paper (n=1202; 4.07 cites/doc).

The analysis of accessibility modes shows that slightly less than one-third of the documents (n=1980; 32%) were open-accessed and these documents gained 15,401 citations (7.77 cites/doc), while 68% of the documents (n=4229) were subscription-based and these documents received 43,159 citations (10.20% cites/doc).

Authorship Pattern and Citation Impact

A total of 38,258 authors including multiple counts contributed in 6,209 with an average of 6.16 authors per document. The number of distinct authors was 8,752. The analysis of the authorship pattern has been shown in Table-2. Merely 94 documents (1.51%) were written by a single-author patron and a majority of the documents (98.49%) were the result of collaborative research. The six-author pattern (n=824; 13.27%) was found the most preferred followed by five-author pattern (n=817; 13.16%). More than one-fourth (26.43%) of the total documents were either in five or six-author patterns. The documents contributed by the eight-author pattern gained the maximum citation impact (10.68 cites/doc). The single-author documents gained the lowest citation impact followed by two-author patterns.

Table-2: ***Authorship Pattern and Citation Impact***

Authorship Pattern	Documents (%)	Total Citations	Citation	Citable (%)
Single Author	94 (1.51%)	466	4.96	69 (73.40%)
Two-Author	502 (8.09%)	3,988	7.94	378 (75.30%)
Three-Author	721 (11.61%)	6,418	8.90	563 (78.09%)
Four-Author	766 (12.34%)	7,840	10.23	595 (77.68%)
Five-Author	817 (13.16%)	7,168	8.77	649 (79.44%)
Six-Author	824 (13.27%)	8,181	9.93	646 (78.40%)
Seven-Author	661 (10.65%)	6,412	9.70	557 (84.27%)
Eight-Author	529 (8.52%)	5,650	10.68	416 (78.64%)
Nine-Author	444 (7.15%)	4,198	9.45	335 (75.45%)
Ten-Author	320 (5.15%)	2,752	8.60	231 (72.19%)
More than 10-Authors	531 (8.55%)	5,487	10.33	395 (74.39%)
Total	6,209	58,560	9.43*	4,834 (77.85%)

* Average citation per documents

Segregation of documents by subjects

The Scopus database distributed all 6,209 documents in 26 broad subject categories. The maximum number of documents were written on the subject of "*Agricultural and Biological Sciences*" (n=1,163; 18.73%), followed by "*Chemistry*" (n=965%), "*Pharmacology, Toxicology and Pharmaceutics*" (n=953; 15.54%), "*Materials Science*" (n=916), "*Engineering*" (n=815), "*Physics and Astronomy*" (n=778), and "*Medicine*" (n=731). The detail of the top-15 categories has been shown in Figure-2. The lowest number of documents were written on the subjects of *psychology* (n=41), *nursing* (n=33) and *neuroscience* (n=16).

Table-3 presents the detail of documents by subjects and their citation impact. The documents written on the subject of "*Chemical Engineering*" got the highest citation impact (15.80 cites/doc), followed by "*Immunology and Microbiology*" (14.79 cites/doc), and "*Biochemistry, Genetics and Molecular Biology*" (13.31 cites/doc). The lowest citation impact was recorded on the subject of "*Social Sciences*" and "*Computer Sciences*". This analysis is limited to only top-15 subjects.

Figure-2: ***Distribution of documents by top-15 subjects***

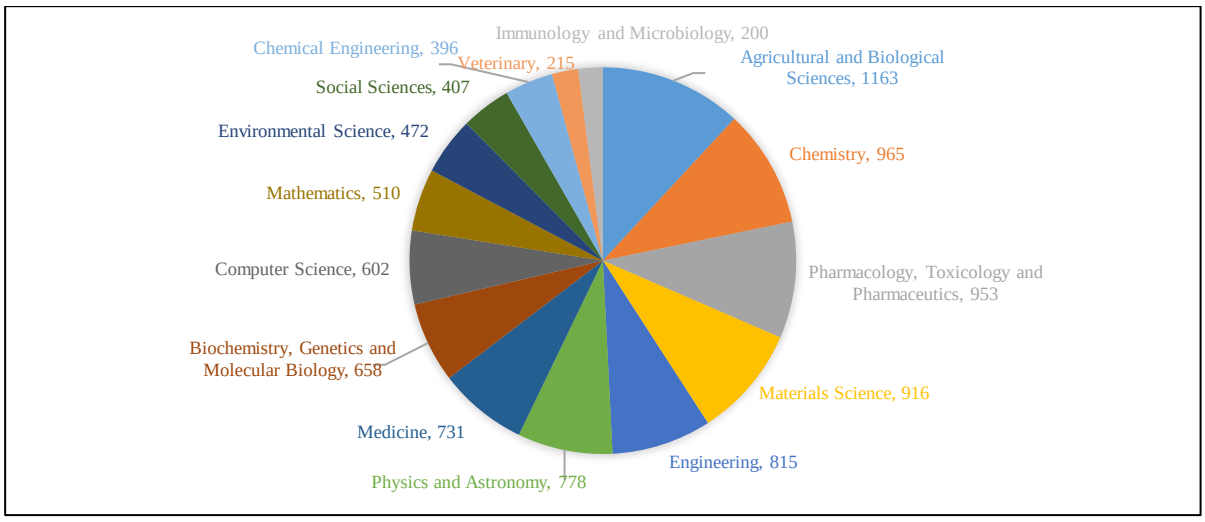


Table-3: ***Distribution of documents by subject and its citation Impact***

Serial No.	Subjects	Total Documents	Total Citations	Citation Impact	*h*-Index
1.	Agricultural and Biological Sciences	1,163	9,518	8.18	38
2.	Chemistry	965	11,817	12.25	45
3.	Pharmacology, Toxicology and Pharmaceutics	953	10,896	11.43	42

4.	Materials Science	916	10,822	11.81	46
5.	Engineering	815	7,633	9.37	38
6.	Physics and Astronomy	778	7,451	9.58	37
7.	Medicine	731	7,123	9.74	36
8.	Biochemistry, Genetics and Molecular Biology	658	8,760	13.31	39
9.	Computer Science	602	3,496	5.81	26
10.	Mathematics	510	3,365	6.60	27
11.	Environmental Science	472	6,121	12.97	35
12.	Social Sciences	407	2,230	5.48	21
13.	Chemical Engineering	396	6,255	15.80	35
14.	Veterinary	215	1,584	7.37	20
15.	Immunology and Microbiology	200	2,958	14.79	25

Preferred Sources of Publications

A total of 916 (14.75%) documents were published in the top-10 sources of publication (Table-4). The highest number of documents were published in the *Pakistan Journal of Pharmaceutical Sciences*, (n=130) followed by *Ceramics International* (n=124), and *Journal of the Chemical Society of Pakistan* (n=115). The top-three journals have more than 100 documents each. Four national journals have been included in the top-10 journals. Among the top-10 journals, the highest citation impact and highest *h*-index score were gained by the documents published in *Ceramics International*, followed by *Pakistan Veterinary Journal*.

Table-4: ***Top-10 Preferred Sources of Publications***

Serial No.	Name of Journal/Source	Total Documents	Total Citations	Citations Impact	*h*-Index
1.	Pakistan Journal of Pharmaceutical Sciences	130	505	3.88	12
2.	Ceramics International	124	1,951	15.73	26
3.	Journal of the Chemical Society of Pakistan	115	422	3.67	9
4.	Pakistan Journal of Zoology	95	372	3.92	10
5.	Latin American Journal of Pharmacy	84	210	2.50	8
6.	Pakistan Veterinary Journal	79	730	9.24	16
7.	Asian Journal of Chemistry	73	236	3.23	8
8.	IEEE Access	73	567	7.77	12
9.	Acta Poloniae Pharmaceutica Drug Research	72	475	6.60	13
10.	Library Philosophy and Practice	71	291	4.10	10

Research Collaboration

The analysis of the purely institutional research, without any documents having authorship affiliated with any of the national or international institutions, means that the documents produced by authors merely affiliated with the different departments/faculties of IUB were found 777 (12.51%). These documents gained 4,923 citations (6.33 cites/doc). This examination of national and international collaboration exposed that a total of 3,176 documents (51%) were found without international collaboration and these documents gained 24,992

citations (7.86 cites/doc) while other 49% (n=3033) of the documents were the result of international research collaboration and these documents were cited 33,568 times (11.06 cites/doc).

Table-5 presents the detail of research collaboration with the top-10 research institutions. A minute difference of one document has been found in the top two institutions, Bahauddin Zakariya University scored the top position in research collaboration with 717 documents while University of Agriculture Faisalabad reached the second rank with 716 documents. But the citation impact of documents collaborated with University of Agriculture Faisalabad has been higher than Bahauddin Zakariya University. Two international institutions one each from Saudi Arabia and China have also been included among the top-10 institutions. The highest citation impact was gained by the documents collaborated with the authors of Huazhong Agricultural University, China (18.16 cites/doc), followed by the University of Karachi (14.45 cites/doc) and King Saud University, Saudi Arabia (12 cites/doc).

Table-5: ***Research collaboration by institutions***

Serial No.	Name of Journal/Source	Total Documents	Total Citations	Citations Impact	*h*-Index
1.	Bahauddin Zakariya University	717	7,292	10.17	39
2.	University of Agriculture, Faisalabad	716	8,460	11.82	38
3.	University of Veterinary and Animal Sciences, Lahore	636	5,287	8.31	31
4.	University of the Punjab	432	5,050	11.69	32
5.	Government College University Faisalabad	396	4,480	11.31	36

6.	University of Sargodha	348	3,102	8.91	26
7.	King Saud University	293	3,516	12.00	30
8.	Government College University Lahore	267	2,216	8.30	28
9.	Huazhong Agricultural University	224	4,067	18.16	30
10.	University of Karachi	222	3,208	14.45	26

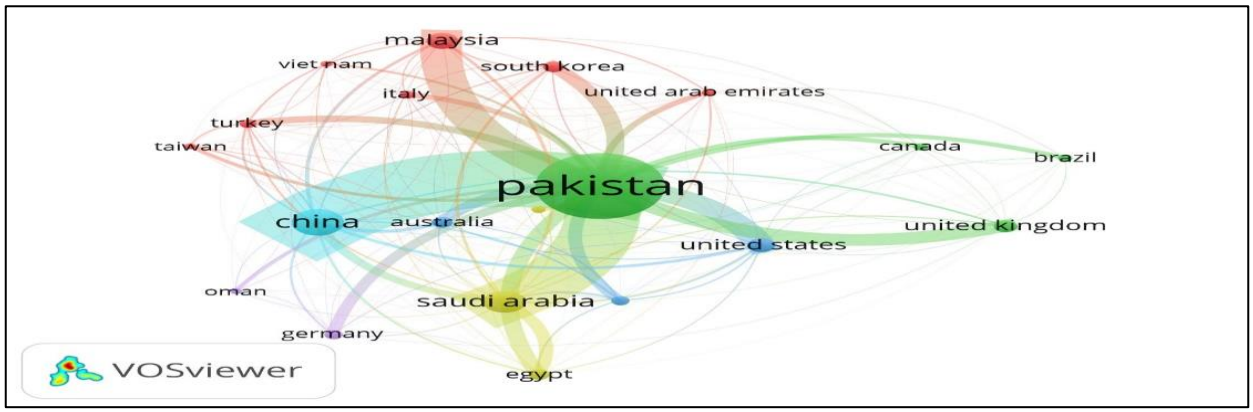
The authors of IUB contributed to the authors affiliated with 116 countries of the world. The detail of top-20 countries with a number of documents, citations and citation impact has been shown in Table-6 and co-occurrence network of these countries generated by the VOSviewer software has been shown in Figure-3. The examination of research collaboration by countries shows that the highest number of documents (n=986; 15.88%) have been produced in research collaborated with Chinese authors, followed by Saudi Arabian affiliated authors (n=674; 10.85%). Although, only 46 documents were written in collaboration with New Zealand but these documents gained the highest citation impact (27.67 cites/doc), followed by Italy (22.55 cites/doc), Canada (20.69 cites/doc) and Australia (17.15 cites/doc). The lowest citation impact was found with United Arab Emirates (5.96 cites/doc). Only two countries have more than 500 documents while the top-11 countries have more than 100 documents each in research collaboration with the authors affiliated with IUB.

Table-6: ***Research collaboration by countries***

Serial No.	Countries	Total Documents	Total Citations	Citation Impact
1.	China	986	10,457	10.61
2.	Saudi Arabia	674	6,737	10.00
3.	Malaysia	368	4,113	11.18
4.	United States	273	3,883	14.22

5.	United Kingdom	208	1,565	7.52
6.	South Korea	161	2,342	14.55
7.	Egypt	160	1,376	8.60
8.	Australia	149	2,555	17.15
9.	France	126	1,042	8.27
10.	Germany	120	1,099	9.16
11.	Turkey	111	1,097	9.88
12.	Italy	86	1,939	22.55
13.	Canada	78	1,614	20.69
14.	United Arab Emirates	74	441	5.96
15.	India	73	558	7.64
16.	Brazil	72	632	8.78
17.	Taiwan	51	563	11.04
18.	Oman	50	390	7.80
19.	New Zealand	46	1273	27.67
20.	Veit Nam	35	209	5.97

Figure-3: ***Co-occurrence network of top-20 countries***



Discussion

Bibliometric is a quantitative research procedure carried out to detect the silent features of scholarly literature. These studies covered the contributed by a prominent researcher as bio-bibliometric study, assess the scientific communication on a specific discipline of knowledge, research produced by one institution, or one country and even the publication output at the global level (van Raan, 1988). Often the bibliographic records of literature have been extracted from reliable sources e.g. Web of Science and Scopus (Şenel, Demir & Alkan, 2017). The outcomes of these studies are pertinent for strategic decisions and policy-making process (Chuang, et al., 2011). The scholarly database also quantifies the citations, which has been known as a quality indicator of papers (Garfield, 1979). Although, it is a challenging task to measure the significance of a research article but the impact factor of the journal and the citation counts declares the integrity of scholarly communication (Moed, 2010). Universities and HEIs are considered the primer centers of producing quality research. It is appropriate to measure the growth and quality of publications periodically (Haq & Al Fouzan, 2017). In Pakistan, some studies covered the national portfolio of research but some studies were restricted to the publication output of one university as discussed in the review of the literature. The current bibliometric study is limited to one institution, IUB. This university has an incredible historical background and was awarded the chartered as degree-awarding institution in 1975. Now the university is offering a wide range of programs and the significant number of the faculty is holding the Ph.D. degree.

The authors affiliated with IUB contributed a share of 2.52% in the national research growth from 1980 to 2021. The analysis of the last five years (2017-2021) indicated that Pakistan produced 129,179 documents and the segment of documents contributed by IUB was about 3% (n=3,844). It is interesting to note that 62% of the IUB's research was published in

the last five years of study. The citation impact of all the targeted publications of IUB was recorded an average of 9.43 citations per document and more than three-fourth of the documents were cited. This parameter is much better as compared to the study conduction by Javed, Ahmad and Khahor (2020) on the 17 universities located in the Capital city of Pakistan, Islamabad. The study showed that Quaid-e-Azam University scored the highest citation impact (11.27 cites/doc), followed by COMSATS University Islamabad (8.51 cites/doc) and other 15 universities gained the citation impact of less than 8 cites/doc. The majority of documents were written as articles but review papers gained more citations, likewise, the toll-based documents have been cited more as compared to open-accessed documents. The analysis of the authorship pattern reveals a positive co-relation (0.978517) between the number of authors and citations, as the number of authors increased in the document, these papers attract more citations. It can be said that the quality of paper improved in collaborative research.

The analysis of subject dispersion showed that *Agriculture and Biological Sciences* has been the most preferred area of research followed by Chemistry. Other studies revealed that *Chemistry* was the top researched area at the University of Peshawar (Haq, 2020), *Engineering* was at the University of the Punjab (Ahmad, et al., 2020) and *Physics and Astronomy* at Government College University, Lahore (Shahzad et al., 2021). The reason behind the top priority on *Agriculture and Biological Sciences* research in IUB is that, the university is located in the fertile plains of Southern Punjab and the majority of the population depends on agricultural products so the research on agriculture directly impacts their corps. The research published on *Chemical Engineering* gained the maximum citation impact (15.80 cites/doc) but the documents on *Agriculture and Biological Sciences* received 8.18 cites/doc.

About 15% of the documents were published in top-10 journals and only three journals have more than 100 documents each. The examination of research collaboration exposed that

the 777 documents (12.51%) were written by IUB authors without any collaboration and these documents gained the lowest citation impact (6.33%). Out of 3,176 (51%) documents without international collaboration, 2,399 (38.63%) documents were produced with the collaboration of researchers affiliated with different institutions of Pakistan. These documents gained 20,069 citations (8.36 cites/doc). The slightly less than half (49%) of the total research was the result of international collaboration and these documents gained the highest citation impact (11.06 cites/doc). The scholars of IUB collaborated more than 500 documents with three institutions, Bahauddin Zakariya University (n=717), University of Agriculture Faisalabad (n=716) and University of Veterinary and Animal Sciences Lahore (n=636). Among the top-10 institutions, two international institutions one each from Saudi Arabia (King Saud University) and China (Huazhong Agricultural University) included at 7th and 9th position with 293 and 224 documents, respectively.

China was found the uppermost preference in international research collaboration, followed by Saudi Arabia, Malaysia, United States and United Kingdom. The research papers collaborated with the United States gained a higher citation impact as compared to the other four countries. Similar findings were also endorsed by Haq and Faridi (2021) on the research productivity of Pakistan from 2000 to 2019 and stated that a majority of research was produced by Pakistan in collaboration with China, United States, Saudi Arabia, United Kingdom but the research papers collaborated with the United States got a higher citation impact. Iqbal, Mahmood and Iqbal (2018) assessed the research output of Pakistan from 1981 to 2015 and the majority of research was collaborated with the United States, followed by United Kingdom, China and Saudi Arabia. Evan in this study the impact of collaborated research with United States was higher than the other three countries. Promising growth in scholarly research has been shown by IUB over the years. The majority of the documents were published in the last

five years. This finding confirmed the impact of M.Phil. and Ph.D. programs commenced by the university and competent supervision of learned faculty. The fact has also been established that collaborative research has a significant impact and visibility.

This study focused on the documents indexed in one database, only. The important research that has not been indexed in the Scopus database, is beyond the scope of the current study. All the Pakistani universities published their research journals and a few of them are indexed in the globally recognized databases. It is suggested that the authorities of universities with the representative of HEC, should formulate the panels of editors, researchers and academicians to review the guidelines of inclusion criteria of these databases and get the recognition of local journals for wider visibility. Haq and Tanveer (2020) stated that a total of 31,917 journals and other source publications were indexed in the Scimago Journal and Country Rank (SJR) in 2018 and about 37% were published by the United States. About three and a half percent (n=1,087; 3.41%) of total sources were published by 57 OIC member countries and the share of Pakistan was just 97 (0.30%). Meo, Almasri and Usmani (2013) reported that out of 85 scientific journals published from Pakistan only 13 were indexed in Web of Science database. Twenty-six journals are being published from IUB and similarly, other universities also published their research journals but the young and seasoned researchers of Pakistan preferred to publish their articles in journals indexed in globally established databases to get the long-term benefits in their career and credibility. If more local journals would be indexed, more quality research would be published in these journals.

In order to increase the research productivity, research training workshops and seminars should be conducted regularly and faculty/post-graduate students should be encouraged to actively participate as resource persons in local and international conferences. Memorandum of Understanding (MoU) should be signed with local and international research institutions to

enhance the research collaboration. The research funding crisis can be solved by public-private partnership with the industrial sector. The researchers of IUB could provide research-based solutions to improve their products and increase their profit margins. The research unit of IUB should conduct research audit of the publications on annual basis and should initiate the best researcher of the year award for senior, junior and emerging researchers.

Conclusion

IUB is one of the largest and premier degree-awarding institutions in Pakistan. It is pertinent to evaluate research growth, publication trends and its share in national research productivity. The steady growth of publications was observed from 1980 to 2010 but significant progress and upward trend was evident in the last decade. IUB contributed a share of about 3% in the total research of Pakistan during the last five years of study. *Agriculture and Biological Sciences* was found the preferred area of research and approximately half of the research was the result of international research collaboration. This study explicitly illustrated the sincere effort of authorities to stimulate dynamic research culture in the university and the findings of current study would serve as a benchmark for future studies.

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