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Collaborate, Collaborate, Collaborate: A Case Study of Lahore's Private Universities Presents High Correlation between its Research Output and Intra-University Collaboration

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Abstract: Teaching and research are two essential components of every university. While some institutions are dedicated to teaching (referred to as 'teaching university'), others favor research ('research university'), even fewer can strike a balance between the two. This work evaluates the correlation between research output of Lahore's private universities and their intra-university collaboration. The authors specifically chose private universities of Lahore (Pakistan's second largest city) because their faculty have higher teaching load, attract less funding, and draw fewer excellent students. The authors employed a data-intensive approach by collecting research profiles of faculty members of all 21 private institutions and summarized them. Results show a high degree of correlation (0.846) between the university's research output and its intra-university collaboration. At the same time, the study also presents a grim picture showing for instance, that most of the faculty in private institutions in Lahore do not present any scientific contribution.

Keywords: Co-authorships, Collaboration, Social Network Analysis

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Introduction

Universities stand on two fundamental elements, teaching and research. Some institutions are dedicated to teaching, others favour research, while a few are able to balance both. For several universities in Pakistan, teaching was considered a means to an end, i.e., research. However, this paper seems to indicate otherwise. As a sample, the authors have chosen to evaluate private universities in Lahore (Pakistan's second largest city). The authors specifically chose private universities over public universities because (i) they are less favored in government funding, (ii) faculty have higher teaching load, (iii) are more expensive, making them less attractive to bright students who tend to prefer public universities as they are significantly cheaper. All the above renders collaboration a necessary characteristic needed for overcoming these challenges in achieving timely promotions and research goals. Hence, as a case study, the authors have taken all the private universities in Lahore, Pakistan (twenty-one in total) as their target study. This study is significant under current circumstances where "teaching institutions" are pushing more and more towards research all the while lacking necessary facilities of a "research institution."

Within the domain of research, several projects are interdisciplinary in nature. Authors understand that they need to share their respective expertise to meet necessary milestones and deliverables. As promotion of a faculty considers (i) the number of publications, and (ii) the total value of funding obtained, it is only logical that fellow colleagues collaborate with one another to fulfill promotion requirements. In this respect, collaboration within the same institution is only natural due to the proximity of fellow co- workers. In fact, in natural sciences, the cost of scientific facilities and instruments promotes collaborative and interdisciplinary research (Smoot et al. 2011; Morel et al., 2009). Common interest areas might be another driver of collaborations. Since it is difficult for researchers to be experts in

specialty areas, researchers try to find others who complement their area of expertise (Boh et al., 2007), enhance their problem-solving capacity and scholarly productivity along with their respective unique knowledge and expertise (Freeman 1978; Freeman et al., 2014). With the growth in the intensity of research in universities, a parallel growth in research collaborations is both visible and vital (Cole & Zuckerman, 2017, Landry et al., 1996).

Note, that collaboration cannot always be "consummated into co-authorship." If it is to be reflected as a true collaboration, it should end up in the form of a jointly authored research paper. Conversely, working together requires a minimum threshold of contributions to be considered as co-authors (Subramanyam, 1983). Within an institution, co-authorship can be termed as an intra-institution collaboration as shown in Table 1.

Table 1

Levels and Types of Collaboration (Katz and Ben 1997).

S. No.	Type	Intra	Inter
1	Individual	-	Between individuals
2	Group	Individuals in the same research group	Groups within the same department.
3	Department	Groups in the same department	Departments of the same institution.
4	Institution	Departments in the same institution	Between institutions.
5	Sector	Between institutions in the same sector	Between institutions in different sectors,
6	Nations	Institutions in the same country	Institutions from different countries.

Table 2

Important Principles within Academic Collaboration

S#	Principal	Impact on Academic Collaboration
1	High impact publications	International research partnerships lead to higher-impact publications (Johnston et al., 2020).
2	Social networks	Strong social networks improve trust and resource sharing, enhancing research quality and interdisciplinary collaboration (Deeken et al., 2020).
3	Digital Platforms	Digital collaboration tools have eased global research partnerships, improving knowledge dissemination and productivity (Vaz, 2024; Zai et al., 2023).
4	Authorship	Authorship and intellectual property concerns continue to block collaboration in projects that span multiple institutions.
5	Increased Citations	Collaborative efforts involving international partners dramatically increase citation counts and boost overall research visibility (Khor & Yu, 2016; Vieira, 2023).
6	Teaching	Collaboration among faculty enhances teaching quality and innovation, benefiting student engagement and academic development (Moon, 2019; McMillan et al., 2020).
7	Social proximity	Social proximity is more likely to help develop fruitful collaborations than cognitive proximity (Koopmann et al., 2021).

In contrast to our study, a previous work on the German research community showed that researchers who completed their PhD from the same institution (coined as 'social proximity,') as well as researchers who study the same subject (termed as 'cognitive proximity') are more likely to collaborate than scientists who are physically present close to one another (referred to as 'geographic proximity') (Koopmann et al., 2021).

Another work analyzed how formal research collaboration changed Mexico, in the fields of social sciences from 2005 – 2020. Contrary to their expectations, their results indicate that evolution remained almost flat in almost all fields of knowledge. On average, 42% of the publications were by single authors, while 58% of papers were completed in collaboration (with 26% within Mexico, 24% with another country, and only 8% with authors belonging to multiple countries). Their results indicate that researchers in Mexico prefer to work alone (42%) (González & José, 2021).

Another paper analyzed 115 years of scientific contribution of Nigeria (from 1901 to 2016). Their results indicate two important milestones, i.e., (i) a steady increase in publications after independence, and (ii) an exponential growth rate from 2001 to 2016 showing more awareness for producing scientific contributions (Salisu & Malik, 2020).

Another publication analyzes the entire Italian academic system over two successive five-year periods. Their findings indicate that top scientists exhibit international collaboration, whereas their lesser- performing colleagues prefer domestic collaboration, revealing that international collaborations do translate into a higher impact on publications (Abramo et al., 2019).

Another interesting work shows the impact of cognitive proximity on research collaboration. The authors investigate 5,982 domain-specific papers, over seventeen years (2001 – 2017), derived from the International Conference on Computational Science (ICCS). They found that authors of ICCS papers continue to collaborate after the conference, on average collaborating with three other ICCS authors, suggesting that in general, attending conferences provides a valuable platform for collaboration (Abuhay et al., 2018).

Table 3

Review of countries in South Asia, all facing similar challenges. In case of Afghanistan, political instability at decades of war became a major impediment. While all three countries Bhutan, Maldives and Afghanistan, show almost no scientific collaboration Dua et al. (2023)

#	Country	Subject	Proportionate share of each country in research output	Collaborations			Challenges								References
				International	Domestic	NGOs	Limited domestic Funding	Limited infrastructure	Political instability	Brain drains	Research Capacity	Dependence on International Partners	Administrative and Bureaucratic Hurdles	Language and Cultural Barriers	
1	Bangladesh	Health, Environmental Science	2.51%	✓	✓	✓	✓	✓	×	×	×	✓	✓	✓	Roy and Habib (2024).
2	Pakistan	Engineering, Agriculture, Public Health	11%	✓	✓	✓	✓	✓	×	×	×	✓	✓	✓	Malik et al. (2021); Sain et al. (2025).
3	India	Engineering, Health	84.41%	✓	✓	✓	✓	✓	×	×	×	✓	✓	✓	Deshmukh et al. (2024)
4	Sri Lanka	Engineering and Agriculture	1.10%	✓	✓	✓	✓	✓	×	✓	×	✓	✓	✓	Ariyawansa (2022)
5	Nepal	Agriculture and Health	0.02%	✓	✓	✓	✓	✓	×	✓	✓	✓	✓	✓	Subedi (2025)
6	Bhutan	N/A	0.06%	×	×	×	✓	✓	×	✓	✓	✓	✓	✓	Dua et al. (2023)
7	Afghanistan	N/A	0.08%	×	×	×	✓	✓	✓	✓	✓	✓	✓	✓	Danish and Omar (2025), and Kayyali (2024)
8	Maldives	N/A	0.02%	×	×	×	✓	✓	×	✓	✓	✓	✓	✓	Dua et al. (2023)

In general, collaboration at intramural and domestic levels has positive effects on research productivity specifically (Abramo et al. 2017), and other elements in general. Moreover, recent theories are summarized in Table 2, whereas types of collaborations and the challenges faced by developing countries are highlighted in Table 3.

This humble effort attempts to extend existing literature by quantifying the correlation between the research output of universities and their intra-university collaboration, using Lahore's private universities as a pilot study. The choice of Lahore, and private universities is explained herein below:

- **Choice of Lahore:** The total population of Pakistan stands at 230 million, distributed over six states (provinces) and one center (Islamabad). Table 3 highlights the number of universities chartered by the governments of the center and six provinces. Among provinces, Punjab is the most populous, boasting a strength of 115 million. The capital of Punjab is Lahore, its most populous city, and the 2nd most populous city in Pakistan, catering to almost 12 million. As can be seen from Tables 2 and 3, 21 out of 26 private universities in Punjab are present in Lahore. This makes Lahore a good choice for studying the relationship between the research output of private universities and their intra-university collaboration. It is, however, appropriate to mention that even though the choice of 'Lahore' as a case study is academically sound since all authors are physically located in Lahore, the choice of using Lahore also comes naturally.

- **Choice of Private Universities:** The authors specifically chose private universities for this study because faculty in private universities in Pakistan have significant teaching loads, scarce research funding, and fewer excellent students. Whereas, promotion criteria as governed by HEC, are based on (i) the number of post-Ph.D. years of experience, and (ii) research output applies to both public and private institutions alike. With high teaching loads, scarce funding, and few excellent students, faculty in private universities in Pakistan are faced with an uphill task in promotions because HEC-governed promotion criteria depend heavily on research output.

Therefore, by studying private universities in Lahore, this humble effort builds upon existing literature by looking into a subset of universities (private universities) in a developing economy where researchers face an uphill task of researching while facing ten challenges, eight of which are highlighted in Table 3, along with two additional obstacles, i.e., high teaching loads, and few good Ph.D. and M.Sc. students.

Table 3

List of Public/Private Universities in Pakistan, as Chartered by Different Provinces and Autonomous Government Bodies

S. No.	Chartered by the Government	Private sector	Public sector	Total
1	Azad Jammu & Kashmir	2	5	7
2	Gilgit Baltistan	-	2	2
3	Baluchistan	1	8	9
4	Khyber Pakhtunkhwa	11	27	38
5	Punjab	26	35	61
6	Sindh	33	23	56
7	Central Government	10	27	37
	Pakistan	83	125	208

Here, Punjab has been mentioned as it is the most populated province of Pakistan. Moreover, Lahore, which is employed by the authors as the city of choice for this study, is its capital and boasts the highest population in Punjab.

Table 4

List of 21 Private Universities in Lahore (Recognized by HEC)

S. No.	University	Acronym
1	Ali Institute of Education	AIE
2	Beaconhouse National University	BNU
3	Forman Christian College University	FCC
4	Global Institute Lahore	GI

S. No.	University	Acronym
5	Hajvery University	HU
6	Imperial College of Business Studies	ICBS
7	Institute for Art and Culture	IAC
8	Institute of Management Sciences	IMS
9	Lahore Garrison University	LGU
10	Lahore Leads University	LLU
11	Lahore School of Economics	LSE
12	Lahore University of Management Sciences	LUMS
13	Minhaj University	MU
14	National College of Business Administration & Economics	NCBAE
15	Nur International University	NIU
16	Qarshi University	QU
17	Superior University	SU
18	University of Central Punjab	UCP
19	University of Lahore	UOL
20	University of Management and Technology	UMT
21	University of South Asia	UoSA

Methodology

The authors employed 'Google Scholar' for retrieving data for private universities of Lahore (enumerated in Table 4) as recognized by the Higher Education Commission (HEC) of Pakistan. For preparing the dataset we ensured that (i) all faculty members of an institution are incorporated and (ii) fictitious Google profiles are filtered out. Interestingly, as many authors share similar names, Google Scholar incorrectly adds papers to wrong profiles. It was found that some authors deliberately do not remove such publications from their profile page as it helps improve their citation metrics. Hence, the authors chose to filter out such google profiles which contained publications not authored by the scholar. The authors employed the following working scheme for gathering and analysing data:

a. **Collect:** scrolled all faculty members presented on an individual institution's website.
b. **Verify:** employed Google's verified email @edu.pk to collect essential data of the scholar, including their co-authors list.
c. **Filter:** filtered profiles that were misleading (as described above), leaving us with 535 reliable authors.
d. Present represented each author, within an institution, as a 'node' N of the 'collaborative graph.'
e. **Compile:** collected the list of research articles published by each author.
f. **Order:** ordered all 21 private universities, from most prolific in research to the least, in terms of the number of research papers published.
g. **Assemble:** crawled each research article published by these 535 authors in order to develop an extensive list of co-authors with whom these primary 535 authors have collaborated.
h. **Refine:** retained collaborators who work within the same institution.
i. **Demonstrate:** displayed partnership between two co-authors of the same university as an 'edge' E of the collaborative graph.
j. **Rank:** ranked 21 private universities of Lahore with respect to their collaborative networks. Here, a university is ranked higher if its collaborative network is denser characterizing more in- house collaboration.

The results of the 21 graphs, one for each private institution of Lahore, are discussed in the next section.

Results and Discussion

The authors have employed both tables (Tables 4 and 5) and figures (Figures 1 – 4) to present their findings. For instance, hereinbelow, Table 5 summarizes the research output of the 21 private universities in Lahore. Here, no

research paper is affiliated with the 7 of the 21 private institutions. These are (1) Hajvery University (HU), (2) Institute for Art and Culture (IAC), (3) Institute of Management Sciences (IMS), (4) Qarshi University (QU), (5) Imperial College of Business Studies (ICBS), (6) Global Institute, Lahore (GI), and (7) Ali Institute of Education (AIE). Whereas, the remaining 14 institutions collectively published 10,430 scientific publications.

In addition, Table 5 also shows the number of faculty that 'do,' and 'do not' present a research profile. The same is also presented in Figure 1 in the form of negative results. Evidently most faculty in these private institutions do not have a research profile. As shown in Figure 1, 7 out of 21 institutions, do not have a research profile, while in 18 out of 21 universities, more than 80% of the faculty do not have a research profile.

Table 5 also resonates similar results indicating that 2785 out of 3561 faculty, making up 78% of the faculty engaged in these 21 private universities, do not have a research profile. The only exception is LUMS where 47% of the faculty have actively contributed towards scientific literature.

Such high negative results suggest that either all private institutions in Lahore are 'teaching universities,' or the hiring process of these universities favors 'teaching faculty' with little or no publication experience, perhaps, favoring new faculty that are similar to existing faculty, i.e., having little or no research profile.

Drawing the collaborate networks of each of the 21 universities indicates that institutions that perform poorly in research have very sparse networks, as shown in Figures 2 and 3. While the top four institutions exhibit dense networks, as shown in Figure 4. Lastly, Table 5 illustrates strong correlation (Spearman correlation = 0.846) between intra- university collaborations and research ranking.

Table 5

The Table Reflects a Summary of Papers Published by 21 Private Institutions in Lahore (up until March 2020).

S. No.	University	Total Faculty	Faculty with Scholar Profile	Faculty without a Scholar Profile	%age of Faculty with Scholar Profile	Published Papers
1	LUMS	255	120	135	47	2,898
2	UOL	900	148	752	16.4	2,043
3	UMT	538	126	412	23.4	1,891
4	FCC	216	23	193	10.6	1,156
5	UCP	367	48	319	13.1	696
6	LSE	114	20	94	17.5	632
7	BNU	97	8	89	8.2	285
8	SU	178	16	162	8.9	192
9	MU	207	3	204	1.4	161
10	NCBAE	15	6	9	40	131
11	LLU	110	3	107	2.7	128
12	UoSA	97	5	92	5.1	100
13	LGU	204	11	193	5.4	68
14	NIU	27	3	24	11.1	49
15	HU	166	-	-	-	-
16	IAC	42	-	-	-	-
17	IMS	18	-	-	-	-
18	QU	10	-	-	-	-
19	ICBS	-	-	-	-	-
20	GI	-	-	-	-	-
21	AIE	-	-	-	-	-
	Total	3,561	540	2,785		10,430/-

Note. Universities have been sorted in decreasing order with (1) representing the top institution. Moreover, seven institutions (S. No. 15 to 21) did not present any research papers to their name.

Figure 1

Negative results: Ordered in increasing order, the figure indicates that almost all private

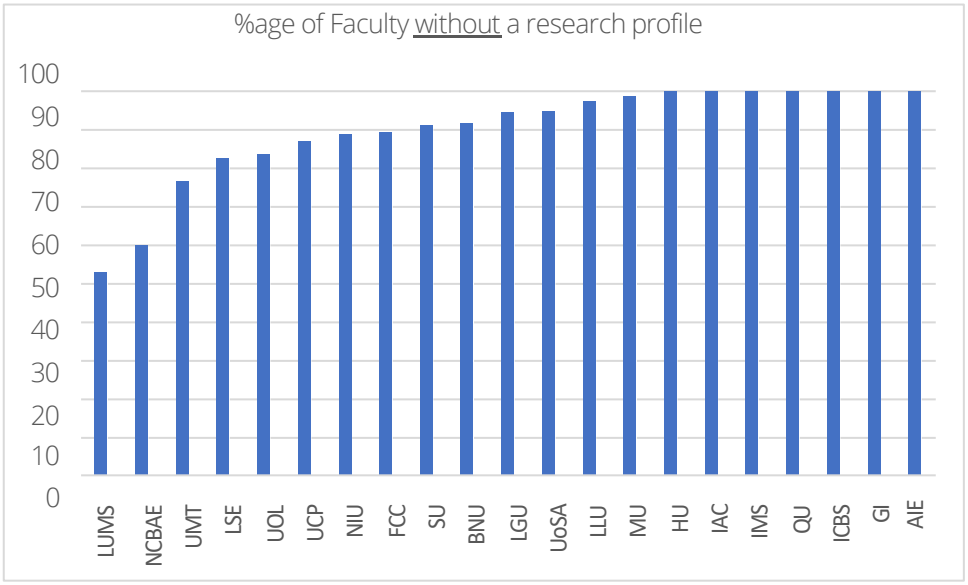
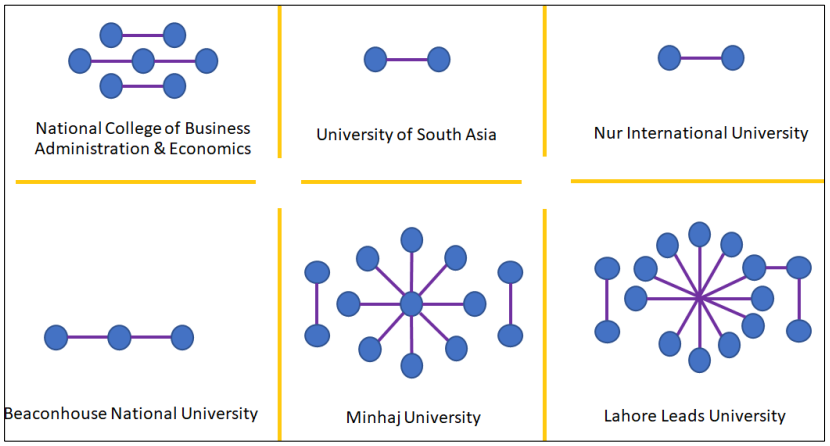


Figure 2

The Figure Shows the Intra-University Collaborative Networks of Low-Performing Institutions (as per Table 6).



Note. For instance, the figure shows that both UoSA and NIU have only two faculty that collaborate with one another.

Figure 3

The figure shows the intra-university collaborative networks of middle order universities (see Table 6), (vii) LGU, (viii) SU, (ix) LSE, and (x) FCCU.

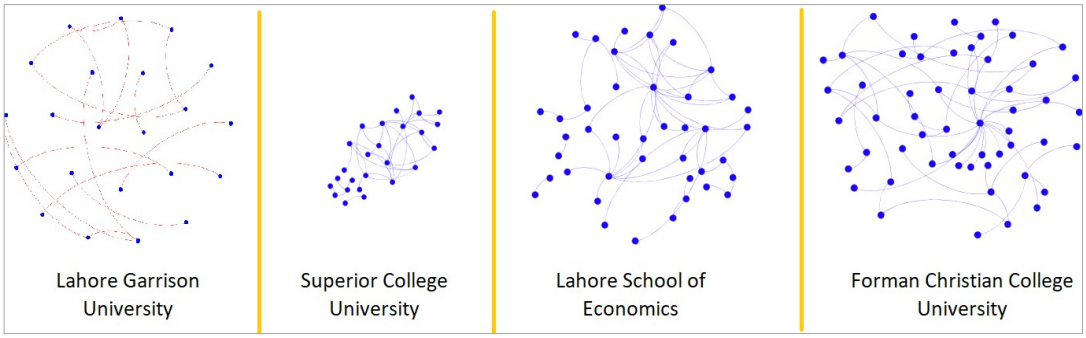
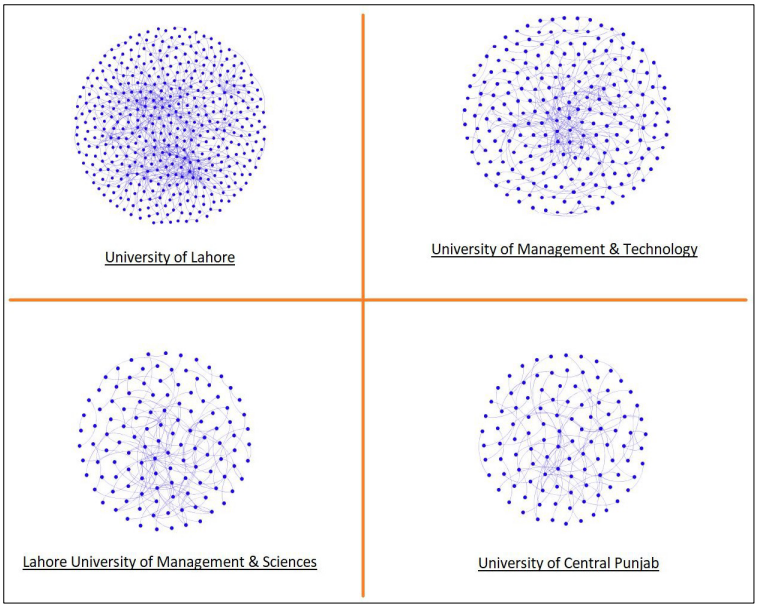


Figure 4

The figure showcases the top four leading intra-university collaborative networks of Lahore (see Table 6), i.e., (xi) UoL, (xii) UMT, (xiii) LUMS, and (xiv) UCP



Note. The authors employed Cytoscape to present these graphs (Smoot et al. 2011).

Table 6

Ranking and Correlation: The Table shows the ranking of the 14 private institution in Lahore with reference to their (a) collaborative networks, and (b) research publications. Spearman rank correlation coefficient between collaborative and research ranking comes out to be 0.846.

S. No.	University	Collaborative Ranking	Research Ranking
1	UOL	1	2
2	UMT	2	3
3	LUMS	3	1
4	UCP	4	5
5	FCC	5	4
6	LSE	6	6
7	SU	7	8
8	LGU	8	13
9	LLU	9	11
10	MU	10	9
11	NCBAE	11	10
12	BNU	12	7
13	NIU	13	14
14	UoSA	14	12

The authors specifically chose private universities for this study, because faculty in private universities in Pakistan have significant teaching loads and scarce research funding. Whereas, promotion criteria, as governed by Higher Education Commission (HEC) of Pakistan for all public and private universities, counts research output as one-third of the necessary requirements, as shown in Table 7 below:

Table 7

Eligibility Criteria: The table highlights the eligibility criteria for different ranks at the University level, as governed by HEC, Pakistan.

#	Designation	Min. Qualification	Min. Experience	Min. Number of Publications
1	Lecturer	First Class MS/MPhil/equivalent degree awarded after 18 Years of education in the relevant field, with no 3rd division in academic career.	Zero (0)	Zero (0)
2	Assistant Prof.	Ph.D. in relevant field.	Zero (0)	Zero (0)
3	Associate Prof.	Ph.D. in relevant field.	5-years post-PhD teaching/research experience at the University level.	10 journal publications with at least 4 in the last five years in HEC recognized Journals.
4	Professor	Ph.D. in relevant field.	10-years post-Ph.D. teaching/research experience at the University level.	15 journal publications with at least 5 in the last five years in HEC recognized journals.

Limitations to the Work

Even though considerable work was done to (a) compare private universities in Lahore, (b) showcase collaborative networks for qualitative purposes, and (c) quantify correlation (0.846) between research output and intra-university collaboration, the work presented here has limitations that could not be circumvented due to unavailability of data.

For instance, at a university level, faculty are responsible for (i) teaching, (ii) research, and (iii) service. Based on one's agreement with the university, faculty in many countries adopt either a 'teaching track,' a 'research track,' or a 'tenure track.' However, as per the author's 17 years of experience teaching in Pakistan, there is hardly any difference between different tracks as faculty are normally exposed to the same set and the same level of responsibilities.

At the same time, the authors admit that without specific statistics on teaching loads, research and service requirements from different universities, this work is limited, as it compares institutions based on their research output, and their collaborative tendency. A broader comparison must incorporate all three components i.e., teaching, research, and service, while establishing relationships between collaborative tendencies and the universities' research output.

In addition, this work is limited as it only refers to private universities in Lahore. Compared to earlier works, where authors either looked at different determinants to research productivity, or analyzed productivity at a national level, this work corresponds to institutions designed specifically for teaching, where faculty are overloaded with teaching, have limited access to excellent students, and funding, yet their promotion criteria depend heavily on research output. As our results indicate a significant correlation (0.846) between research output and intra-university collaboration, faculty of teaching universities should be encouraged to collaborate in-house to circumvent the challenges they face to produce scientific contributions.

Conclusion

The paper employed a data-intensive approach to quantify the relationship between the research output of private universities and their intra-university collaboration. The authors specifically chose private universities for this study, because faculty in private universities in Pakistan have significant teaching loads and scarce research funding. Whereas, promotion criteria, as governed by HEC, counts research as one-third of the essential requirements.

The paper conducted a thorough comparison of private universities (of Lahore) in terms of their research output and intra-university collaboration and concludes that there is significant correlation (0.846) between the two. With 84% of the 3,561 faculty members not showing any scientific contribution, the authors conclude that 20 out of 21

private universities in Lahore are essentially 'teaching universities.' Hence, faculty in teaching universities are recommended to collaborate with their colleagues to improve their scientific contributions.

This work can be extended to study the following open-ended questions, at least for Pakistan:

- [Q1] What is the relationship between research output of universities and their intra-university collaboration for the whole of Pakistan incorporating both public and private institutions?
- [Q2] What is the relationship between social, cognitive, institutional, organizational, and geographical proximity to research output, in relationship to Pakistani universities?
- [Q3] Are there higher chances of earlier promotion in public or in private universities in Pakistan?
- [Q4] How do public and private universities compare with each other in terms of
  - Teaching loads,
  - Research, and
  - Service requirements?

References

Abramo, G., D'Angelo, A. C., & Murgia, G. (2017). The relationship among research productivity, research collaboration, and their determinants. *Journal of Informetrics, 11*(4), 1016–1030. https://doi.org/10.1016/j.joi.2017.09.007

Abramo, G., D'Angelo, C. A., & Di Costa, F. (2019). A gender analysis of top scientists' collaboration behavior: evidence from Italy. *Scientometrics*, *120*(2), 405–418. https://doi.org/10.1007/s11192-019-03136-6

Abuhay, T. M., Kovalchuk, S. V., Bochenina, K., Mbogo, G.-K., Visheratin, A. A., Kampis, G., Krzhizhanovskaya, V. V., & Lees, M. H. (2018). Analysis of publication activity of computational science society in 2001–2017 using topic modelling and graph theory. *Journal of Computational Science*, *26*, 193–204. https://doi.org/10.1016/j.jocs.2018.04.004

Ariyawansa, R. G. (2022). University Industry Collaborations: Trends and Practical Difficulties Faced by Sri Lankan Public Universities. In *Humanities and Social Sciences Education in Sri Lankan Universities: Past, Present and Future* (pp. 240–254). University Grant Commission, Sri Lanka.

Boh, W. F., Ren, Y., Kiesler, S., & Bussjaeger, R. (2007). Expertise and collaboration in the geographically dispersed organization. *Organization Science*, *18*(4), 595–612. https://doi.org/10.1287/orsc.1070.0263

Cole, J. R., & Harriet, Z. (2017). The emergence of a scientific specialty: The self- exemplifying case of the sociology of science. In *The idea of social structure. Routledge* (pp. 139–174).

Danish, F., & Omar, H. (2025). Female Lecturers' challenges in Afghanistan's higher education under the Taliban rule. *International Journal of Language and Literary Studies*, *7*(3), 158-168. https://doi.org/10.36892/ijlls.v7i3.2152

Deeken, A. H., Mukhopadhyay, S., & Jiang, X. S. (2020). Social media in academics and research: 21st-century tools to turbocharge education, collaboration, and dissemination of research findings. *Histopathology*, *77*(5), 688-699. https://doi.org/10.1111/his.14196

Deshmukh, V., Agarwala, T., Mohapatra, A., Kumar, S., Acquilla, S., Das, M. K., Dasgupta, R., Chaturvedi, S., Sinha, S., Mukherjee, S., Angolkar, M., Wig, N., Dhamija, N. K., Arora, N. K., & INCLEN Leadership Study Group. (2024). Challenges of biomedical research collaboration in India: Perceptions of Indian and international researchers. *PloS One*, *19*(6), e0305159. https://doi.org/10.1371/journal.pone.0305159

Dua, J., Lathabai, H. H., & Singh, V. K. (2023). Measuring and characterizing research collaboration in SAARC countries. *Scientometrics*, *128*(2), 1265-1294. https://doi.org/10.1007/s11192-022-04606-0

Freeman, L. C. (1978). Segregation in social networks. *Sociological Methods & Research*, *6*(4), 411-429. https://doi.org/10.1177/004912417800600401

Freeman, R. B., Ganguli, I., & Murciano-Goroff, R. (2014). Why and wherefore of increased scientific collaboration. In *The changing frontier: Rethinking science and innovation policy* (pp. 17-48). University of Chicago Press.

González Brambila, C. N., & Olivares-Vázquez, J. L. (2021). Patterns and evolution of publication and co-authorship in Social Sciences in Mexico. *Scientometrics*, *126*, 2595-2626. https://doi.org/10.1007/s11192-020-03644-w

Johnston, E., Burleigh, C., & Wilson, A. (2020). Interdisciplinary Collaborative Research for Professional Academic Development in Higher Education. *Higher Learning Research Communications*, *10*(1), 62-77. http://dx.doi.org/10.18870/hlrc.v10i1.1175

Katz, J. S., & Martin, B. R. (1997). What is research collaboration? *Research Policy*, *26*(1), 1–18. https://doi.org/10.1016/s0048-7333(96)00917-1

Kayyali, M. (2024). The impact of war on higher education: the context of wars in Syria, Iraq, Ukraine, and Afghanistan. In *Rebuilding higher education systems impacted by crises: navigating traumatic events, disasters, and more* (pp. 275-284). IGI Global.

Khor, K. A., & Yu, L. G. (2016). Influence of international co-authorship on the research citation impact of young universities. *Scientometrics*, *107*, 1095-1110. https://doi.org/10.1007/s11192-016-1905-6

Koopmann, T., Stubbemann, M., Kapa, M., Paris, M., Buenstorf, G., Hanika, T., Hotho, A., Jäschke, R., & Stumme, G. (2021). Proximity dimensions and the emergence of collaboration: a HypTrails study on German AI research. *Scientometrics*, *126*(12), 9847–9868. https://doi.org/10.1007/s11192-021-03922-1

Landry, R., Traore, N., & Godin, B. (1996). An econometric analysis of the effect of collaboration on academic research productivity. *Higher Education*, *32*(3), 283–301. https://doi.org/10.1007/bf00138868

Malik, K., Bashir, T., & Ali, T. M. (2021). University-industry collaborations in Pakistan: current challenges and future opportunities. *foresight*, *23*(4), 496-508. https://doi.org/10.1108/FS-12-2020-0133

McMillan, L., Johnson, T., Parker, F. M., Hunt, C. W., & Boyd, D. E. (2020). Improving Student Learning Outcomes through a Collaborative Higher Education Partnership. *International Journal of Teaching and Learning in Higher Education*, *32*(1), 117-124.

Moon, H., Mariadoss, B. J., & Johnson, J. L. (2019). Collaboration with higher education institutions for successful firm innovation. *Journal of Business Research*, *99*, 534-541. https://doi.org/10.1016/j.jbusres.2017.09.033

Morel, C. M., Serruya, S. J., Penna, G. O., & Guimarães, R. (2009). Co-authorship network analysis: a powerful tool for strategic planning of research, development and capacity building programs on neglected diseases. *PLoS neglected tropical diseases*, *3*(8), e501. https://doi.org/10.1371/journal.pntd.0000501

Roy, P., & Habib, M. A. (2024). Fostering effective collaboration between library and information science academics and practitioners in Bangladesh: Insights, challenges and recommendations. *IFLA Journal*, *50*(3), 574–590. https://doi.org/10.1177/03400352241236737

Sain, Z. H., Aziz, A. L., & Sain, S. H. (2025). Transforming Pakistan's Higher Education: Challenges, Opportunities, and Strategic Innovations. *EIKI Journal of Effective Teaching Methods*, *3*(2). https://doi.org/10.59652/jetm.v3i2.495

Salisu, S., & Akorede, M. O. (2020). A Bibliometric Analysis of Nigeria's Research Performance, 1901-2016. *Archives & Information Science*, *30*, 1901–2016.

Smoot, M. E., Ono, K., Ruscheinski, J., Wang, P.-L., & Ideker, T. (2011). Cytoscape 2.8: new features for data integration and network visualization. *Bioinformatics (Oxford, England)*, *27*(3), 431–432. https://doi.org/10.1093/bioinformatics/btq675

Subedi, P. (2025). Knowledge Management in higher education in Nepal: Current practices, challenges, and future prospects. *TULSSAA Journal*, *12*(1), 44–62. https://doi.org/10.3126/tulssaa.v12i1.77250

Subramanyam, K. (1983). Bibliometric studies of research collaboration: A review. *Journal of information Science*, *6*(1), 33-38. https://doi.org/10.1177/016555158300600105

Vaz, E. (2024). The Emergence of Global Knowledge Networks and Collaboration Platforms. In *Regional Knowledge Economies: Exploring the Intersection of Technology, Geography, and Innovation in the Digital Era* (pp. 57-72). Cham: Springer Nature Switzerland.

Vieira, E. S. (2023). The influence of research collaboration on citation impact: the countries in the European Innovation Scoreboard. *Scientometrics*, *128*(6), 3555-3579. https://doi.org/10.1007/s11192-023-04715-4

Zhai, Y., Yang, K., Chen, L., Lin, H., Yu, M., & Jin, R. (2023). Digital entrepreneurship: global maps and trends of research. *Journal of Business & Industrial Marketing*, *38*(3), 637-655. https://doi.org/10.1108/JBIM-05-2021-0244

Zhou, F., Yang, Z. & Chen, P. (2021) 'Impact of collaborative research on citation and innovation in academia', Research in Science and Technology, 39(2), pp. 78–88.