

Factors Affecting Researcher Productivity of Public and Private Universities in the Global South: the Case of Indian Academia

Miss. Japji Kaur¹, Professor Seema Singh²

¹Research Scholar, Department of Humanities, Delhi Technological University, Delhi, India.

²Professor of Economics, Delhi Technological University, Delhi, India.

Email: japesnnats@gmail.com, prof.seemasinghdtu@gmail.com

Abstract: Research productivity not only plays a vital role in the development of higher education institutes but it is also equally important for academic evolution of faculty. The STEM researchers from global south look for higher educational opportunities in the global north than in their own nations due to several constraints. They prefer to move to nations like USA, UK to pursue their careers because of issues like lack of funding or research infrastructure etc in their nations. This article explores factors influencing research engagement, with a primary focus on academia from underrepresented Global South communities. It compares the factors affecting researcher productivity in STEM branches of public and private engineering colleges in Delhi, India by conducting a census of the heads of departments of engineering colleges in Delhi using principal component analysis and gives recommendations further.

Keywords: STEM Research, Researcher Productivity, STEM Academia.

1. Introduction

In the globalized landscape of higher education, universities worldwide, including those in developing nations, increasingly mandate their academic faculty to engage in research and disseminate their findings through publication in internationally recognized peer-reviewed journals. This aligns with the prevailing global trend of establishing world-class universities. Academicians in resource-scarce Global South regions may face barriers, hindering their research engagement due to limited resources and expertise. Resource disparities and challenges in the Global South can lead to unequal opportunities and reduced research activity among academics, further exacerbating the North-South divide in academia. In this era, technical disciplines are high in demand and efforts are being made in developing nations to increase the participation of workforce in mainly STEM disciplines. In this background, it is important to have more research oriented STEM leaders in academia because research is crucial for economies to grow in the developing nations of the global south. Further, the STEM leaders in academia can inspire the faculty under them in turn students to conduct more research and innovation. The study also brings out the possible reasons responsible for the factors affecting the researcher productivity in public and private engineering colleges in Delhi, India which might be helpful for future stakeholders in framing policies accordingly.

A View from Studies Conducted in Global North

In a study of the U.S institutions out of an interview of twenty faculty, seven participants characterized themselves as intentionally blending their personal and professional lives, aligning their research agenda pursuits with their family, community, and core personal values 8., the tenured faculty were primarily motivated by intrinsic rewards, such as peer recognition and personal fulfillment through contributions to their field whereas the untenured were motivated by extrinsic rewards, including the attainment of tenure, promotions, and salary increases 2. Academics in the global north are predominantly driven by intrinsic factors like personal passion and interest in their research 21. The study of 1370 academicians in UK suggests that individuals often turn to their immediate peers as a source of inspiration, considering them a vital reference group and benchmark for their own aspirations and actions 24. In UK universities, faculty members contend with intense pressure to "publish or perish," creating a challenging environment where competition, heightened teaching responsibilities, and administrative duties collectively contribute to decreased research productivity. The results of a study conducted in Australia revealed that more time spent on research doesn't necessarily correlate with better teaching and a limited or negative relationship exists between research time and teaching quality 5. In the study of the US, 8 out of 20 participants explicitly mentioned that their teaching responsibilities played a supportive role in advancing their research agenda 8. In a study of norwegian academics, participation in research groups and international research networks was associated with increased research productivity 11 and similar results were obtained for South korean academics 3.

In a US study, participants expressed that, despite the increasing focus on community engagement by research institutions, promotion and tenure criteria predominantly favor traditional research. This is because participants believe community engagement, while personally valued, is not adequately rewarded by the university and falls outside the normal reward structure. Additionally, concerns were raised about insufficient university sponsorship for the necessary resources. While research institutions are increasingly committed to engagement with the community, the structure of promotion and tenure is still skewed in favour of traditional research at many institutions. In the developed nations, faculty members need to actively engage with the community to benefit from it, while also fulfilling the requirements of publishing and securing funding to maintain a balanced and productive academic career. ³. Researchers from a public university in Italy who had applied frequently for grants turned out to be more actively engaged in teaching and administration and showed persistent funding application behaviour but funding did not lead to higher research productivity 12. In a study in the US, faculty members face the challenge of meeting university expectations to secure external grants and contracts when internal funding is scarce. Nonetheless, for those who successfully obtain external research support, substantial funding serves as a remedy for their academic marginalization? Participants experienced pressure to meet conventional expectations of publishing and obtaining external funding, and they tailored their work accordingly to align with these expectations. Fifty percent of the participants (10 in total of 20 interviewees) utilized externally funded research grants as a means to incorporate engagement activities into their ongoing scholarly endeavors 8. The availability of grants and funding support in academic institutions in the global north significantly boosted research engagement and productivity by providing essential resources for projects 21. The indirect influence of funding bodies emphasized the necessity for academics in Australia to tailor their research to meet the criteria set by these organizations to successfully secure research grants. They had to align their research with contemporary trends and topics that were considered "in fashion" to increase their chances of securing

competitive grants 19

The results of a study conducted in U.S.A in a private university indicate that consultancy done to four hours per week and upto eight hour per week of teaching can facilitate research productivity¹³.

A View from Studies Conducted in Global South

The academics' engagement in research and their research productivity are influenced by personal as well as environmental factors 10. A conducive environment provides access to necessary tools, equipment, and resources, facilitating productivity 15.

Motivation, especially the intrinsic one, is identified as a significant factor that empowers academics to thrive in their research endeavours 19. In a study of 20 public universities in Malaysia, the results revealed that a higher level of trust and commitment in self lead to higher research engagement 4. In a study of a public university in Saudi Arabia both intrinsic motivation such as professional development and external motivation like promotions were significant in improving research productivity 1. Working alongside supportive colleagues fosters collaboration and idea-sharing, boosting productivity 15. To facilitate increased international research collaboration in public institutions like IIT Delhi in India, there is a pressing demand to create a conducive research environment and upgrade existing infrastructure 23. In a survey of vietnam university academics, the lack of access to research resources lead to less engagement in research 16. Monetary rewards served as a strong motivator for Chinese academics, encouraging them to publish in international journals. Financial incentives were a key factor in their publication decisions 22. Results of a study on faculties of six public sector universities in Pakistan showed how highly productive researchers were often motivated by various factors, including financial benefits, research grants, rewards, promotions, job security (tenure), and other incentives. These incentives served as powerful drivers for their research efforts and productivity 26. Establishing suitable research facilities and an encouraging atmosphere can foster greater global connectivity and collaborative efforts within the institution. Public sector institutions like IIT Delhi have collaborations within India but very less abroad 23. Although it is possible that people work collaboratively on research with individuals in other departments or even in other universities, much research collaboration occurs within departments because of proximity 15. In a research conducted in twenty Malaysian public universities, the results revealed that knowledge sharing via international research collaborations has lead to an increase in research productivity but the same has been criticized by many researchers as the focus on international collaborations is being done because of the pursuit of higher rankings and this ranking-driven approach has some negative consequences 4. The high ranking of one private university (second) in Malaysia among all Malaysian universities in the Times Higher Education Ranking for 2021 is intriguing. It presents an opportunity to evaluate how academicians in private universities relate to Knowledge Sharing (KS) behaviour and, subsequently, their research engagement. 39% of the total faculty in a Saudi Arabian public university agreed that they were engaged in research collaborations within the institute although collaboration with colleagues over there was'nt a strong motivating factor in doing research and so mostly the faculty engaged in individual research. The reason could be their cultural identity of preservative Islamic values which discourages the academic staff from engaging in collaborative research 1.

In a survey of 56 vietnam university academics, the results revealed difficulty in obtaining research funds and the cumbersome process of preparing paperwork for research funding applications were notable barriers, highlighting the importance of streamlined funding

procedures and support for researchers 16. Funding bodies and academic institutions should acknowledge unintentional biases in their reward systems that favour sole authorship and neglect collaborative contributions. They should advocate for the recognition of knowledge sharing as a valuable academic achievement, fostering a more inclusive and equitable research environment and encourage a re-evaluation of assessment criteria to give due importance to participatory and collaborative research methods 17. Interviews of cambodian university academics revealed that many were engaged in consultancy because of a lack of promotion based system and lower salaries. Holding multiple administrative positions in universities demonstrates a strong commitment to the institution in which the faculty is tenured, which may translate into higher overall commitment to the university thereby increasing productivity. Teaching at multiple institutions provides a broader perspective and understanding of the academic landscape, potentially enhancing one's commitment by recognizing the university's role in a larger context. Administrative roles and experience at various institutions can contribute to professional growth, increasing job satisfaction and attachment to the university 15. Researchers in cambodian private universities who are untenured engage in part time teaching which reduces their research productivity 10.

2. Methodology

A census had been conducted for engineering colleges providing full time Btech degree in STEM disciplines in twenty colleges. The heads of departments had been asked to fill the surveys which had statements being measured on a likert scale from one to five with '1' being strongly disagree to '5' as strongly agree. The jist of the statements asked are indicated in the table below under the properties coloumn of table 3. Principal component analysis had been conducted to compare the means in the public and the private universities.

3. Results

The initial stage of reliability and validity test was done. The results yielded a Cronbach vaue of 0.755 and KMO value of 0.714 for the public university and 0.700 for the private university with a highly significant Bartlett's test result ($p < 0.001$). Table 4 shows that the mean of work family enrichment is higher in public universities than the private universities and extracts the maximum variance (86.6%) in the first component because there is more job stability in the former which leads to more satisfaction from the work domain whereas in the private sector there is more job switching which leads to less job satisfaction and lower work family enrichment. The mean of accommodating/positive work environment is more in the case of public sector universities as each employee is satisfied in life after getting a job in the govt. sector and so they don't face any competition from other employees regarding their position which is the reason that they cooperate with them and build trust amongst themselves unlike private institutions where job is considered to be unstable. The govt. college teachers are more satisfied with the working conditions as compared to the non govt. ones. The mean of private college faculty is more in the case of intrinsic motivation and has the highest variance extracted (84.8%) in the third component than the public sector ones. There are lower pay emoluments in the private colleges, unsecured state of job and harassment by other peers who don't show support for their work are the reasons why the private sector faculty is more instrinsically motivated to work. The mean of peer expectations is more in the case of public universities. The professors in public colleges are considered to be competent enough (eg:IIT Delhi) and hence there are more expectations from them. They

have to keep up or upgrade themselves with knowledge in their areas as the students in these universities come through entrance exams and are best out of the lot. So, if students in these institutes are expected to involve in high quality research, there are definitely more expectations from the faculty. The mean of research infrastructure and external funding/grants is higher in the case of public institutes than the private ones. The former also extracts the highest variance (81.7%) in the second component. A reason for this could be that it is comparatively easier for public colleges to get govt. funding because of the tag of being a govt. university as compared to the private ones which is also the reason that they are able to provide a large array of research labs and facilities. The mean of departmental work which includes teaching is higher in the case of public universities. The student absentee ratio is higher in the case of private universities as the less proverbial cream of the lot takes admission into these universities and many students get admissions easily in the name of management quotas through higher donations which is the reason for lower teaching load for the faculties working here. Apart from this the student teacher ratio is also less in private institutions. Administrative work is more in the case of public institutions as they are under the banner of govt. checks by NAAC (National Assessment and Accreditation Council) /IQAC (Internal Quality Assessment Cell) or have to work according to UGC framework. They are bound to follow certain frameworks like UGC guidelines and affiliation to their main institutes for their courses and so their faculty is more burdened as compared to the private institutes. The mean of research award/ monetary benefits is higher in the case of public universities as they have the institutional requirements to publish in higher quality journals which are SSCI (Social Science Citation Index) or SCI (Science Citation Index) in order to improve their rankings and for this the faculty receives research awards or monetary benefits whereas in private universities there aren't much institutional requirements to publish in high quality journals. Private universities tend to focus more on teaching than research. The highest amount of variance extracted (75%) in the fourth component is by research awards/monetary benefits.

The mean of research networks was more in the case of private universities and had the highest variance (84.3%) extracted in the first component because of less job stability more informal contacts are being formed by the private sector universities which also help in improving their rankings whereas in public universities less informal and more formal contacts are being formed because bagging a job in the public sector is difficult and there is more fear of losing the current prestigious position. Public universities provide more funding facilities than the private ones. The mean of academia collaboration was higher in the case of public universities and it also extracted the highest variance (82.9%) in the third component. The collaboration with corporates is more especially in the case of USR (University social responsibility) activities as public sector colleges provide more funds and incentives to engage in societal activities and also corporate sector have to fulfil their requirements of CSR (Corporate social responsibility) for which they think public universities are a good choice. The mean of external funding/grants is more in the case of public universities as getting govt. funding is easier for public institutes as compared to the private ones which is also the reason that they are able to provide a large array of research labs and facilities. The mean of consultancy is more in the case of public universities and it also extracts the highest variance (68.7%) in the fourth component as the corporates might think that the prestigious tag of being a govt. institute means more knowledge with the professors as it is tough to get a job in a public university. Corporates want to exploit the knowledge with the universities in order to do innovation. The mean of engagement in part time work is more in the case of private

universities and it extracts the highest variance (63.8%) in the second component as the salaries in private universities are less and engagement in part time teaching is an extra source of income.

4. Conclusion

It is important for STEM leaders to engage in research especially in the global south because R&D is important for the development of these nations. The STEM leaders can increase faculty motivation which positively impacts teaching, research, and service tasks, leading to improved overall university performance. Encouraging partnerships with developed countries can facilitate the exchange of knowledge, drive technological advancements, and contribute to the global advancement of Engineering and Technology. The NEP's (National education policy) main goal should be to dissolve the affiliation framework in order to create institutions which focus on research and teaching. The regulatory frameworks and bureaucracy have been the major obstacles in the path to teaching, research and excellence. More autonomy needs to be given to the public institutes to bring the best out of them.. The research findings should be generalized cautiously since the study exclusively focused on a single city, Delhi. Stakeholders such as faculty members, university administrators, and funding agencies may use these findings. The university administration in both the public and private sector can take measures like fostering stronger linkages between the university and industry to facilitate mutual benefits and collaborative research opportunities, provide rewards and incentives to faculty members for successful publications, encouraging a culture of research excellence.

5. References

1. Finnegan DE. The Decline of the Guru: The Academic Profession in Developing and Middle-Income Countries (review). *Rev High Ed.* 2005;28(3):429-430. doi:10.1353/rhe.2005.0008
2. Fox T, Canagarajah AS. A Geopolitics of Academic Writing. *College Composition and Communication.* 2004;55(3):582. doi:10.2307/414070
3. Kelly Ward, Tami L Moore. Institutionalizing Faculty Engagement through Research, Teaching, and Service at Research Universities. *Mich J Community Serv Learn.* 2010;17(1):44-58.
4. Chen Y, Gupta A, Hoshower L. Factors That Motivate Business Faculty to Conduct Research: An Expectancy Theory Analysis. *Journal of Education for Business.* 2006;81(4):179-189. doi:10.3200/JOEB.81.4.179-189
5. Teodorescu D. Correlates of faculty publication productivity: A cross-national analysis. *High Educ (Dordr).* 2000;39(2):201-222. doi:10.1023/A:1003901018634
6. Tartari V, Perkmann M, Salter A. In good company: The influence of peers on industry engagement by academic scientists. *Res Policy.* 2014;43(7):1189-1203. doi:10.1016/j.respol.2014.02.003
7. Feldman, A Kenneth. Research productivity and scholarly accomplishment of college teachers as related to their instructional effectiveness: A review and exploration. *Research in Higher Education .* 1987;26.
8. Kyvik S, Reymert I. Research collaboration in groups and networks: differences across academic fields. *Scientometrics.* 2017;113(2):951-967. doi:10.1007/s11192-017-2497-5
9. Shin JC, Cummings WK. Multilevel analysis of academic publishing across disciplines:

research preference, collaboration, and time on research. *Scientometrics*. 2010;85(2):581-594. doi:10.1007/s11192-010-0236-2

10. Lawson C, Geuna A, Finardi U. The funding-productivity-gender nexus in science, a multistage analysis. *Res Policy*. 2021;50(3):104182. doi:10.1016/j.respol.2020.104182
11. Mrva-Montoya A, Luca EJ. Book Publishing in the Humanities and Social Sciences in Australia, Part One: Understanding Institutional Pressures and the Funding Context. *Journal of Scholarly Publishing*. 2021;52(2):67-87. doi:10.3138/jsp.52.2.01
12. Mitchell JE, Rebne DS. Nonlinear effects of teaching and consulting on academic research productivity. *Socioecon Plann Sci*. 1995;29(1):47-57. doi:10.1016/0038-0121(95)98606-V
13. Kimkong Heng, M. Obaidul Hamid, Asaduzzaman Khan. Factors influencing academics' research engagement and productivity: A developing countries perspective. *Issues in Educational Research*. 2020;30(3).
14. Pfeffer J, Langton N. The Effect of Wage Dispersion on Satisfaction, Productivity, and Working Collaboratively: Evidence from College and University Faculty. *Adm Sci Q*. 1993;38(3):382. doi:10.2307/2393373
15. Snowball JD, Shackleton CM. Factors enabling and constraining research in a small, research-intensive South African University. *Res Eval*. 2018;27(2):119-131. doi:10.1093/reseval/rvy002
16. Fauzi MA. Research vs. non-research universities: knowledge sharing and research engagement among academicians. *Asia Pacific Education Review*. 2023;24(1):25-39. doi:10.1007/s12564-021-09719-4
17. Borg S, Alshumaimeri Y. University teacher educators' research engagement: Perspectives from Saudi Arabia. *Teach Teach Educ*. 2012;28(3):347-356. doi:10.1016/j.tate.2011.10.011
18. Zahid Ashraf Wani, Mohd Tahir Pandit, Nighat Majeed. Research productivity of Indian Institute of Technology. *International Journal of Library and Information Science*. 2013;5(7).
19. P.H. Y, V.P. Q, L.T.B. P, L.B. N. English lecturers' perceptions and practices of research engagement: The case of Can Tho University. *Can Tho University Journal of Science*. 2018;54(2):122. doi:10.22144/ctu.jen.2018.016
20. Xu X, Rose H, Oancea A. Incentivising international publications: institutional policymaking in Chinese higher education. *Studies in Higher Education*. 2021;46(6):1132-1145. doi:10.1080/03075079.2019.1672646
21. Tariq Mahmood, Khan S, Syed Manzoor Hussain. An Investigation of Attitudes towards the Research Activities of University Teachers. *Bulletin of Education and Research*. 2018;40(1):215-230.
22. Reynolds L, Sariola S. The ethics and politics of community engagement in global health research. *Crit Public Health*. 2018;28(3):257-268. doi:10.1080/09581596.2018.1449598.

Tables

Table 1: Demographic characteristics of participants

Population	Public	Private	Total
Heads of	Male - 40, Female - 28, Total- 68	Male - 25, Female - 14, Total- 39	Male -

depart ments			65, Fem ale – 42, Tota l- 107
All Engine ering discipli nes	Applied science (Physics,chemistry, maths)/IT/Electronics/mechanical/biologicalsciences/civil/design/envirnonme ntalengg/architecture&planning/material sciences/energy sciences/textile & fibre.		12

Table 2: Reliability statistics

Cronbach's Alpha	N of Items
.755	12

Table 3: KMO and Bartlett`s Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		Public	Private
		.714	0.700
Bartlett's Test of Sphericity	Approx. Chi-Square	252.928	244.653
	df	66	66
	Sig.	.000	0.000

Table 4: Comparison of means and standard deviations for public and private universities for factors affecting research productivity.

Public					Private				
Principal compon ent	Properties	Me an	S. D	Fact or Load ing	Principal compon ent	Properties	Me an	S. D	Fact or load ing
PC1, Environ mental factors	Work family enrichment	1.2 18	0.1 22	0.86 6	PC1, Collabor ation factors	Consultancy	1.0 15	0.2 67	0.65 0
	Accommodatin g/positive work environment	2.2 78	0.5 92	0.75 2		academia collaboration with community/co rporates etc	2.1 43	0.7 41	0.67 5
	Intrinsic motivation	1.2 17	0.4 97	0.75 1		Research groups/interna tional networks	1.5 82	0.5 00	0.84 3

	Peer pressure/ high expectations	1.2 69	0.4 47	0.63 6	PC2, Workpla ce duty factors	Engagement in part time teaching	1.1 67	0.4 33	0.63 8
PC2, Institutio nal factors	Research infrastructure	2.4 03	0.9 22	0.81 7		Departmental work including teaching	2.3 89	0.9 34	0.60 0
	Departmental work including teaching	2.8 15	0.2 08	0.80 5	Work family enrichment	1.0 28	0.1 67	0.78 3	
	Research award/money	2.2 99	0.4 61	0.74 6	Peer pressure/ high expectations	1.1 98	0.4 67	0.77 7	
PC3, National factors	Research groups/internati onal networks	1.5 07	0.5 04	0.75 8	PC3, Environ mental factors	Intrinsic motivation	1.2 78	0.4 22	0.84 8
	academia collaboration with community/cor porates etc	2.2 54	0.8 59	0.82 9		Accomodating /positive work environment	2.1 11	0.9 19	0.77 0
	External funding/grants	0.7 64	0.5 02	0.76 3		Research infrastructure	0.3 06	0.5 06	0.64 3
PC4, Engage ment in other activities	Consultancy	0.2 99	0.4 61	0.68 7	PC4, Monetar y factors	External funding/grants	0.1 24	0.4 39	0.70 3
	Engagement in part time teaching	1.1 34	0.5 61	0.41 6		Research award/money	2.2 38	0.9 57	0.75 0