IMPACT OF UNIVERSITY RESEARCH ENVIRONMENT ON THE RESEARCH PRODUCTIVITY OF FACULTY MEMBERS OF SOCIAL SCIENCES

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CERTIFICATE

This is to certify that this thesis entitled: **"Impact of University Research Environment on The Research Productivity of Faculty Members of Social Sciences."** submitted by Nasrullah Jan Bangash is accepted in its present form by the PIDE School of Social Sciences, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Public Policy.

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Author's Declaration

I Mr. Nasrullah Jan Bangash hereby state that my MPhil thesis titled **"Impact of University Research Environment on The Research Productivity of Faculty Members of Social Sciences"** is my own work and has not been submitted previously by me for taking any degree from Pakistan Institute of Development Economics or anywhere else in the country/world. At any time if my statement is found to be incorrect even after my Graduation the university has the right to withdraw my MPhil degree.

Date: <u>September 27, 2024</u>   Signature of Student

                                                                                        Nasrullah Jan Bangash

Dedication

Dedicated to my Father, Mother, Brother and Sister who were source of constant support during my research.

ACKNOWLEDGEMENTS

ABSTRACT

Research productivity has become one of the important measures of university performance. All around the world universities are ranked on the basis of their research output. Universities are now prioritizing research engagement of their faculty and are incentivizing their research activities to maximize their productivity. There are various factors that impacts research productivity. This study analyzes how research environment of the university impacts the research productivity of faculty members along with their personal characteristics. The objective of the study is to analyze what is current research environment of public sector universities in Pakistan and how is that research environment impacting the research productivity of the faculty members of social sciences. In this study primary data was used which was collected through questionnaires. The data was analyzed through situational and OLS regression analysis. Study concludes that research environment of universities has positive relation with research productivity of faculty members. Faculty in high level research environment have higher research productivity and publish in high ranked journals as compare to faculty in low and medium level research environment. Also, according to findings of this study the research environment of universities is below average and is not conducive for research productivity. Personal characteristics also have significant impact on research productivity therefore impact of personal characteristics are also analyzed in the study according to which male faculty members have higher research productivity, faculty with foreign qualification are more productive than faculty that are locally qualified. Therefore, to maximize research productivity and increase the quality and visibility of research produced better conducive research environment in universities is very crucial.

Keywords: Research Environment, Research Productivity, Public Sector Universities, Social Sciences.

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CHAPTER 1

1 INTRODUCTION

1.1 Background

Higher education institutions play vital role to transform developing economies into knowledge-based economies. They produce skilled work force and new knowledge which helps a country in development. Higher education institutions play an important role in enabling the knowledge-based economy of country for which universities around the world are encouraged to engage more into research. In past universities were only focused on the teaching and course work activities but with changing trends and innovation they are equally focused on research activities. The universities now prioritize their research outputs as compared to academic assignments. (Faize et al., 2018).

Since research is prioritized around the world, universities are now ranked through their research productivity. Most of the higher education institutions now have ambitions to achieve higher institutional rankings and reputation by increasing their research productivity. Research productivity has become one of the key measures of educational quality (Jalal, 2020). With the changing trends, a paradigm shift has occurred within the higher education where universities are now shifting from teaching institutions to research institutions and becoming research centers. Therefore, universities focus on providing a better research environment through various strategies and better infrastructure to encourage their researchers to engage in research along with their other academic activities.

There are various factors that affects the productivity of researcher, Aboagye et al. (2021) in his work also highlights the impacts of work environment on the performance of the researcher. It studies how organizational and psychosocial characteristics of the institution affects the productivity of researcher. Research environment has significant impact on the research output of researcher. It is important for universities to have an encouraging and conducive environment for research but universities of Pakistan have struggled with creating a healthy environment which produces better quality research. There are multiple factors which affects the research productivity of universities in Pakistan but this research will be focused on what research environment of Pakistan's public universities and how are they impacting the research productivity of the faculty members of the universities?

1.2   Statement of Problem

The formation of Higher Education Commission (HEC) in 2002 lead to the expeditious expansion of Higher Education Institutions in Pakistan. From 59 universities in 2002 to 247 universities in 2022-23 (HEC, 2023). Despite having been successful in establishing large number of institutions, the problem of budget allocation still remains. The existing economic crises have further aggravated this issue. Due to this financial instability, universities are struggling with significant deficits due to which they are unable to maintain the existing infrastructure, pay salaries to their employees on time and provide pensions (Bari, 2022). Pakistan is spending only 0.25% of its GDP on research and development which is very low (British Council, 2019). The research environment provided by the universities is not conducive for research activities and universities are more focused on teaching activities rather than research which have negative impact on research productivity. Along with it lack of attention on research activities has hindered the establishment of rich and efficient research culture in Pakistan. This study is focused on how research environment impacts the research productivity of faculty members of social sciences as it is one of the least performing disciplines in terms of research. In order to compete internationally, Pakistan must enhance the research environment of the universities which would in-turn increase the research productivity of faculty members.

1.3   Research Objectives

The objectives operationalized for the study are following:

- To analyze the current research environment of public sector universities.
- To explore how the current research environment of public sector universities is impacting the research productivity of the faculty members.

1.4   Research Questions

The research questions for this study are following:

- What is the current research environment of public sector universities?
- What are the impacts of research environment of universities on the research productivity of faculty members?

- How personal characteristics like gender, designation, qualification, experience of faculty members affects their research productivity?

1.5 Significance

There are several studies that explored and analyzed factors that affects the research productivity of the researchers. Internationally research environment and its effects on research productivity of faculty members have been studied by various scholars. In Pakistan, studies in this subject area are very scanty. Some of the prominent studies that discusses research cultures are, report of British Council, (2020) that has in detailed covered how budget, policies, agendas and lack of university market connections affects the university research culture in Pakistan. Another study is of Mustafa & Khan (2022) where they analyzed the impact of incentives on the research productivity of faculty members in public sector university. Iqbal, Mahmood & Iqbal, (2018) also studied various factors that contributes to research productivity but this study is specifically focused on what are the current conditions of research environment in public sector universities and how are they affecting the research productivity of faculty members. This study will contribute further to literature which can lead to other detailed analysis of factors affecting research productivity so that knowledge production and visibility of Pakistani scholarship could be enhanced.

When HEC was established one of its goals was to transform Pakistan's higher education into knowledge economy by encouraging research and increasing the research productivity of universities. HEC in its vision 2025 prioritized research and innovation through improving university infrastructures, incentives and support (HEC Vision 2025). There has been increase in the research outputs but universities still lack research culture and quality infrastructure which affects their research performance. Especially, discipline of social science has one of the lowest research productiveness. This study with focus on the departments social sciences will identify and analyze the institutional or environmental factors that is affecting the research productivity of faculty members. This will further help the policy makers, university administration and HEC to make focused and targeted information-based policies to enhance the research environment of the universities to maximize research productivity in terms of quantity and quality.

1.6   Scheme of Study

This study is organized in various chapters, chapter 2 comprise of literature review in which we have discussed the importance of higher education research, research productivity has been defined and its importance has been highlighted. Furthermore, we have defined research environment and discussed how the research environment impacts the research productivity. Lastly this chapter discusses the research in Pakistan's universities and points out the research gaps. Chapter 3 explains the PEO framework used to analyze the association of research environment with research productivity. Also, flowchart is shown in this chapter to show relation between variables. Chapter 4 converse about data, variables and methodology of the research. It includes all the details that what was the data source, units of data analysis, sampling design and sample size. Moreover, it discusses about the data collection method and questionnaire design. All the variables taken in the research are mentioned in this chapter. In the end methodology is explained that in this research empirical estimation and logistic estimation will be done to find the impact of research environment on research productivity. Chapter 5 discusses about the situational analysis that has been done to find the impact of research environment on research productivity. We have done OLS estimation and Logistic estimation and have interpreted the tables in great detail. In the end chapter 6 presents the conclusion, the limitations of the research and policy recommendations that can guide the future policies.

CHAPTER 2

2 LITRETURE REVIEW

This chapter is of literature review in which we have discussed the importance of higher education research, research productivity has been defined and its importance has been highlighted. Furthermore, we have defined research environment and discussed how the research environment impacts the research productivity. Lastly this chapter discusses the research in Pakistan's universities and points out the research gaps.

2.1 Importance of Higher Education Research

Higher education around the world has important role in societal advancement. It helps the country with technological, economic and socio-political development. Through higher education new knowledge is produced which has led to innovation in every sector of life (Bouhajeb et al. 2018). Knowledge production has not only contributed to the academic discipline but through that knowledge, countries have gained economically as well. This led to the new concept of knowledge-based economy through which countries earn in various ways through the knowledge that they produce. In knowledge-based economies the focus is on production of new knowledge and then utilize that knowledge to create new and innovative products. Higher education institutions globally now stress on increasing their research outputs and universities play vital role to enable knowledge-based economy of country (Donlagic & Kurtic, 2018). Higher education is now given much more importance so that universities could have economic impact. This is why increase in universities around the world can be observed.

2.2 Research Productivity

Research is crucial for knowledge production which helps in achieving the goal of knowledge-based economy. Higher education institutions also focus on research activities along with their other academic activities. Universities now prioritize research outputs and are incentivizing research activities to increase their research productivity.

Research productivity could be defined as the total scholarly output of a researcher but it is often associated to the total number of publications, journal articles, books, book chapters and conference papers (Nguyen & Klopper, 2014). According to Jalal (2020) the best way to measure

research productivity is by looking at the quantity and quality of the published books, journal articles, research proposals, book chapters and conference papers.

There is no specific and commonly agreed method to define and measure research productivity. In past the research productivity was measured only through number of publications of a researcher, publications include journal articles, books, book chapters etc. (Dundar and Lewis, 1998). Later with the increased emphasis on research productivity, measuring methods of research output also changed. Now along with the number of publications other bibliometric indicators like looking into the number of citations of a publication got importance to see the impact of research.

Bibliometric indicators are now widely used by developed and developing countries to measure their scientific output and their linkages to the world. Bibliometric indicators seek to measure the quantity and the impact of scientific publication, it is based on the total count of publication and total citation they receive (Muhammad Bashir 2013). Some of the commonly used indicators are total number of publications (P), Citations per publication (CPP) and Hirsch or h index.

Research productivity has become the dominant measure of analyzing university performance. Through higher research productivity they achieve better academic reputation as well as higher rankings. Also, with higher research productivity they attract funds and grants to the university. Higher education institutions now consider research productivity as one of the most important factors which could help them in reaching highest ranking and improve their academic quality (Jalal, 2020). According to Creswell, (1985) that research and teaching are equally important for university faculty because through participating in research, quality of teaching is also improved. Universities aim for higher research productivity and expect their faculty to not only engage in teaching activities but also to actively participate in research activities. Studies suggest that research helps faculty members with expanding their knowledge in their subjects which is then transferred to their students through teaching (Nguyen & Klopper, 2014). It enhances the knowledge of faculty which encourage them to share it with their students which enriches students learning experience.

Therefore, all over the world research activities in universities are now incentivized through various strategies like university rankings, funding, promotion of faculty etc. Consequently,

research productivity in higher education system today is important for individuals, higher education institutions and for country because of which knowledge economy is enabled.

2.3   Research Environment and its Impact on Research Productivity

One of the earliest studies which examined the characteristics of productive research environment was by Bland and Ruffin (1992), according to which organizational characteristics like goal clarity, communication research orientation, group climate, culture and resources are associated with research performance. According to Bashira & Siddiqueb, (2022) a research friendly environment is where there are publication awards, less teaching workload better physical facilities or infrastructure and provision of guidance through trainings. Definition of better research environment may vary person to person and institution to institution but some of the common elements which studies suggests are that there must be physical infrastructure or facilities, institutional support through policies, research activities, trainings, financial incentives and grants to researchers and most importantly less workload so that proper time could be given to the research. Jalal, (2020) elucidates that the factors that hinders the research productivity are, not having a set of required research skills, high teaching and administrative workload and absence of institutional support.

There are multiple factors that affects research productivity. Jung, (2012) while studying the research productivity of Honk Kong universities considered various factors that influenced the productivity, that included demographic characteristics of researcher, workload, institutional characteristics and their research style (motivation, collaborations etc.). Dhillon et al. (2015) also studied factors that were associated with the research productivity in public sector universities of Malaysia. Their research also found that the personal, environmental and behavioral factors are positively associated to research productivity.

There are personal factors that impacts the productivity of a researcher are somehow in control of a researcher but more importantly there are environmental or institutional factors that significantly affects the research output and are out of control of a researcher. Personal characteristics of researcher are important but if the work environment is not conducive to research then personal skills are insufficient.

According to the literature to have higher research productivity a better research environment is required. Research environment is explained as working space and culture in which a researcher conducts his/her research. Universities have responsibility to provide research friendly environment which encourages their faculty and research students to produce research more efficiently. Aboagye et al. (2021) also explained the impact of work environment on the performance of the researcher. PEO (population, exposure and outcome) framework was used in that study to analyze the impact of work environment on the productivity of a researcher. Their results were that the work environment or research environment which includes clear research agenda of institution, less teaching, cooperative environment, mentorship, satisfactory departmental resources etc. are positively associated with the research productivity of the group.

Another element of research environment that has a significant impact on research productivity is collaborations. Research collaborations could be within the department, among other universities, international collaborations, collaborations with governments, NGOs and beyond. Kyvik, (1995) argued in favor of larger department size, he called it 'intellectual synergy'. According to him that in larger departments there are more chances for cooperation and collaboration among the faculty. It is more likely that there are more people with similar research interests which results in more performing and productive research group. Lee & Bozeman, (2005) analyzed American university researchers to find out the correlation of collaboration and research productivity. Their findings suggest that the number of collaborating researchers is one of the strongest predictors of productivity and there is positive correlation between collaborations and research productivity.

More time given to research also results in increasing research productivity and in better research environment faculty members that are interested in research are given more time to do their research instead of burdening them with teaching and administrative workloads. Quimbo & Sulabo, (2014) argues that the lack of research time available to the faculty during academic year leaves them with only summer breaks to engage in research activities which results in lower productivity. Such barriers discourage faculty members to engage in research activities resulting in lower productivity. Baloch et al. (2021) study also highlights that highly productive academic scientist spend more time doing research than teaching activities as compare to their counterparts.

Hence, various studies point out that to have higher research productivity and to enhance the quality and visibility of knowledge produced better and motivating research environment has become a need of universities.

2.4 Research in Pakistan's Universities

Pakistan also has experienced rapid expansion of higher education. Especially after the establishment of Higher Education Commission (HEC) in 2002 the universities increased from 59 in 2002 to 240 in 2022. This resulted in increased enrollment as well but Iqbal, Mahmood & Iqbal, (2018) argues that the graduates that are produced are less than satisfactory. Pakistan's universities are not ranked even in top 500 universities around the world (Haque).

There are multiple reasons for the underperformance of universities in Pakistan. One of them is that higher education in Pakistan faces budget constraints, education budget has remained stagnant between 2-2.5% of GDP because of which HEC is not given funds according to their requirements. Also, Pakistan struggles with its research culture. Pakistan has one of the lowest budgets for research and development which is only 0.25% of the GDP (British Council, 2020). Because of such factors Pakistan struggles with its university research culture.

Another reason is that universities of Pakistan are mainly considered as teaching institutions instead of research institutions and as mentioned earlier today universities are ranked on the basis of their research productivity. Haque (2020) also highlights the same problem that universities in Pakistan are teaching oriented. One of the studies by Wajid et al. (2023) also concludes that 20 out of 21 private universities in Lahore are essentially teaching universities keeping in view their research outputs.

HEC through various strategies has tried to promote research culture and increase the research productivity. Strategies like research grants, promotions based on number of publications etc. are used which resulted in increase in the productivity but still universities and individuals are not performing up to their potential. After establishment of HEC in 2002 Pakistan has seen rapid growth in their research productivity. Nasir & Ahmed, (2013) did an in-depth analysis of HEC's Research Productivity Award (RPA) scheme, they found out that this scheme played vital role in increasing the research output and internationalization of science in Pakistan.

Another policy that HEC introduced was Tenure Track System (TTS), an incentive mechanism where promotion was associated with certain number of publications in Impact Factor (IF) journals. This also led to increase in number of publication but academic experts have critical opinion on such policy. It is argued that promoting teachers based on number of publications instead of their experience and quality of work has negative impact on the quality of research. One of the main goals of research is to produce knowledge about existing issues and problems. Through research alternate solutions are explored to various problems. Problem solving and contribution to existing knowledge are the most important aspects of research. But due to publication pressure these motives have been left behind for doing research. According to the data collected 62% of researchers are motivated to do research to advance their careers instead of problem solving and knowledge production. (British Council 2019).

Faize et al. (2018) conducted a study according to which that setting a criteria of publishing in IF journals covered by Thomson Reuter is creating a culture of 'Publish or Perish' among the researchers. To cope up with the HEC criteria researchers are now getting involved in 'ghost co-authorships' and to meet publication numbers they are just publishing low quality research in local journals. The impact of such policies is different on different disciplines. Waheed, (2020) in his book explains that publishing in international journals is time consuming but most importantly there must be a strong theoretical framework in your research and most of the time it does not connects with the local context because of which there is higher chances of rejection. So, in this way it becomes very hard for social science researchers to publish local oriented research in international IF journals.

According to data shared in the study of Iqbal, Mahmood & Iqbal, (2018) social science is the least performing area in terms of research with lowest research productivity. One of the reasons are that social sciences is not give much importance. There is lack of information or researched based public policy making. This is why this study will focus on the performance of social sciences and exploring what are the institutional or environmental factors that impacts the research productivity of social sciences in Pakistan.

2.5 Pakistan's Standing on Global Innovation Index

The existing literature establishes that innovation leads to sustainable economic growth and prosperity which brings about uplift in the living-standards of the people. Due to its association

with economic growth, innovation performance has long been a topic of interest in contemporary business fields (e.g.; Dekoulou and Trivellas, 2017; Jian et al., 2021; Wang and Tan, 2021). In order to measure the innovation performance, the World Intellectual Property Organization (WIPO) computes the Global Innovation Index (GII) for global economies depends on 81 different indicators clubbed under the seven pillars which determine the innovation performance. The index contains two major dimensions: i) innovation inputs, and ii) innovation outputs. These two dimensions further encompass seven pillars. Likewise, *Innovation Inputs* contains political environment, human capital and research, infrastructure, market sophistication, and business sophistication, while *Innovation Output* includes knowledge creation of each economy. GII ranks the innovation ecosystem of the countries each year while highlighting the innovation strengths and weakness, and particular gaps in innovation metrics. In short, GII enables the global economies to learn where they are placing, and reviewing their policies to enhance innovation performance. According to Global Innovation Index for 2021 (GII-2023), Switzerland, Sweden, USA, and UK come out as the leading economies on innovation ranking.

GII-2023 for South Asia: A Comparison among Pakistan, India, and Bangladesh

Three big economies of the South Asia are Pakistan, India, and Bangladesh. A comparison among these will help comprehend which economy is performing better on GII-2023 as the innovation capability also measures the ability of the countries to exploit new technologies which enable the economies to grow inclusively and sustainably as well. Specifically, comparison between India and Pakistan is supposed to be the vital as both countries are deemed as rival of each other in all spheres.

According to the GII-2023, the economy of Pakistan places 88th position out of 134 countries which is higher than 2021-22. Despite improvement in GII as compare to previous years, the global ranking is very poor. By comparing the country, the GII ranking with India, Pakistan seems far behind while a bit encouraging position as compared to the Bangladesh (table 1).

Table 1: Ranking on Global Innovation Index (GII)

Years	Pakistan	India	Bangladesh
2023	88th	40th	105th
2022	87th	40th	102nd
2021	99th	46th	116th
2020	107th	48th	116th
2019	105th	52nd	116th

Source: WIPO GII Report (2023)

The decomposition of the GII into seven sub-indices demonstrates that Pakistan's performance in the most of the pillars of the innovation relatively low— market sophistication (97th), human capital and research (117th), infrastructure (120th), business sophistication (72th), while knowledge and technology inputs (69th). It is showcasing that Pakistan is not performing well specifically in market sophistication and human capital and research (table 2). Unlike to aforesaid, the India's performance in all major seven pillars of innovation index evidently high specifically market sophistication (20th), knowledge and technology inputs (22th), business sophistication (57th), while India holds 48th position in human capital and research indices. Nonetheless, Bangladesh is lying in lower ranking than Pakistan. The India's high ranking on GII demonstrates the outcome of sound policies regarding achieving higher ranking on innovation index while Pakistan is missing sound and effective policies regarding improvement in global innovation index.

Table 2: Ranking on Seven Pillars of Global Innovation Index in 2023

	Pakistan	India	Bangladesh
Knowledge and Technology Inputs	69	22	89
Creative Outputs	70	49	82
Business Sophistication	72	57	126
Institutions	113	56	108
Infrastructure	120	84	93
Human Capital and Research	117	48	125
Market Sophistication	97	20	100

Source: WIPO GII Report (2023)

Aforementioned seven dimensions are further based on sub-indices, which demonstrate the wider aspects of the innovation index. Likewise *Human Capital and Research* has three indicators such as education, tertiary education, and research & development. India encompasses much better

ranking on education (88th) while Pakistan holds 121th position on education which evidently highlights that India's performance is relatively better than both Pakistan and Bangladesh. The education includes expenditure on education % GDP, school life expectancy, PISA scales in reading, mathematics, and science, and teacher pupil ratio are the sub-indicators for education. These unleash that Pakistan is not better performing in these indicators as compared to India.

Table 3: Innovation Performance by Sub-Indicators in 2023

Seven Pillars of Global Innovation Index	Pakistan	India	Bangladesh
Human Capital and Research			
Education	121	88	128
Tertiary Education	119	65	111
Research and Development	62	32	76
Business Sophistication			
Knowledge workers	101	81	119
Innovation Linkages	54	59	100
Knowledge Absorption	57	41	120
Knowledge and Technology Outputs			
Knowledge Creation	57	44	95
Knowledge Impact	63	9	62
Knowledge Diffusion	79	29	106
Infrastructure			
Information and Communication technology (ICT)	107	82	90
General Infrastructure	132	46	93
Ecological Sustainability	113	128	96
Institutions			
Political Environment	105	69	109
Regulatory Environment	116	68	122
Business Environment	98	47	76
Market Sophistication			
Credit	103	56	86
Investment	81	17	92
Trade, Diversification, and Market Scale	75	9	96
Creative Outputs			
Intangible assets	52	38	73
Creative Goods and services	117	56	108
Online Creativity	65	66	87

Source: WIPO GII Report (2023)

Again, in tertiary education India is surpassing Pakistan, wherein India's ranking is 65th while Pakistan ranks 119th and Bangladesh stands at 111th position at the ranking of tertiary education. It means that Pakistan not only behind than India but Bangladesh also. The tertiary sub-index contains tertiary enrollment, graduates in science and engineering, and tertiary inbound mobility. Moreover, research and development include researchers, expenditures on R & D, global corporate R & D investors, and QS university ranking are the important sub-indicators of the dimension of the research and development.

As it is discussed earlier, Pakistan' ranking on dimension of *Business Sophistication* is very low, and its sub-indicators are: knowledge workers, innovation linkages, and knowledge absorption. In knowledge workers, Pakistan ranks 101th position while India contains 81th which is visibly suggesting that India is performing better than Pakistan and Bangladesh. The further decomposition of the knowledge workers suggest that India is performing well in knowledge intensive employment, firms offering formal trainings, GERD performed by business, and female employment with advanced degrees.

Moreover, the ranking on *Innovation Linkages* shows that India is extremely performing well (50th) while again Pakistan is standing at 78th position and Bangladesh contains 96th position. The sub-indicators are university-industry R & D collaboration, state of cluster development and depths, GERD financed by abroad % GDP, and patents. Similarly, India exceled in *Knowledge Absorption* dimension of the innovation index. The performance of Pakistan in dimension of *Knowledge and Technology Outputs* also very low wherein she stands at 57th position on knowledge creation, knowledge impact (63th), while 79th position on knowledge diffusion. Nonetheless, India is excelling in these mentioned indicators where she stands at 44th, 9th, and 29th position on knowledge creation, knowledge impact, and knowledge diffusion respectively.

The above-mentioned three major dimensions play significant role in placing the country on innovation-based performance index. The fourth important pillar of the GII is the *Institutions*, which contains further political environment, regulatory environment, and business environment. India is showing its strengths in political and regulatory environments as compared to Pakistan and Bangladesh, while Pakistan has relatively improved ranking in business environment (55th) as compared to India (62th) and Bangladesh (117th). So far, we have found the only indicator, business environment wherein Pakistan is performing better than India. The three pillars can be

viewed from the table 3, where it will be evident that Pakistan is performing very low in all remaining dimensions of the global innovation index as compared to India, nonetheless relatively better than Bangladesh.

The above discussion concludes that although Pakistan has improved its ranking on global innovation index in 2023 as compared to the previous years, however still it is far behind from other global economies. It needs a lot of to place among high-performing economies. Nonetheless, the comparison between India demonstrates that India is surpassing in all seven pillars of the GII-2023 as compared to the Pakistan and Bangladesh, but Pakistan's performance is relatively better than Bangladesh.

World Intellectual Property Organization (WIPO) states that graduates in science and engineering, global corporate research and development investors, availability of immense knowledge capital, and promising start-up ecosystem are leading factors cause persistent improvement of the Indian economy on GII. They further suggest that India's scientific departments related to atomic energy, science and technology, biotechnology, department of space have contributed significantly in improving in innovation performance globally. Moreover, other factors like political stability, government effectiveness, and macroeconomic factors are the significant reasons to place at higher ranks on global innovation index as compared to other South Asian economies such as Pakistan, and Bangladesh.

On contrary to India, Pakistan is facing multiple problems to place among the highly innovative economies such as: i) low quality of human capital, ii) low budgetary allocation on research and development specifically on science and technology related departments, iii) absence of linkages of universities with industry macroeconomic instability, and iv) poor quality of political and economic institutions. Pakistan needs to extremely work on the seven pillars of GII specifically on human capital and research, business sophistication, knowledge and technology outputs, institutions, and infrastructure related.

2.6   Research Gap

There are several studies which highlights the research culture of Pakistan and hurdles it faces in establishing more efficient and productive research culture. The report of British Council, (2020) is one of the most comprehensive studies which highlights problems with our policies of research

system in universities. Also, Mustafa & Khan (2022) highlights the impacts of incentive mechanism on the research productivity. But there has been little work done on the impacts of research environment on the research productivity of the faculty members of the university.in the context of Pakistan little work has been done on how various elements that are related to research environment of higher education institution like physical infrastructure, workloads, collaborations, research activities and incentives affect the research productivity of the faculty members. Most importantly has Iqbal, Mahmood & Iqbal, (2018) highlights that social sciences is one the lowest performing discipline in terms of research productivity it becomes important to analyze the cause of lacking productivity. Therefore, this study will specifically explore the impact of existing research environment of social science department of public sector universities on the research productivity of their faculty members.

CHAPTER 3

3   CONCEPTUAL FRAMEWORK

There are various factors that impacts research productivity. According to Heng, Hamid & Khan, (2020) there are national factors, individual factors and institutional factors that impacts the research productivity. There is no specific theory or framework that explains the relation of research productivity with its predictors (Jung, 2012). According to literature that has been studied for this research the framework that best fits this study is PEO (Population, Exposure, Outcome) framework. Abogaye et al. (2021) also used PEO framework to analyze and investigate the association between publication performance and work environment of the university.

PEO framework explains the relationship of how outcome of population is influenced or impacted by the exposure population gets. For this study population is faculty members and their personal characteristics whereas, exposure is the research environment they are working in and outcome is their research productivity. This study is mainly focused on the impact of research environment of universities on research productivity of the faculty members. The PEO framework for this study is explained in the following table:

Table 3.1 : PEO Framework

Population	Faculty members of social science department.
Exposure	Research environment which consists of variables like physical infrastructure of the university, research activities, collaborations, incentives/ support and workload. These variables represent the research environment of university.
Outcome	Research productivity of the faculty members. Research productivity for this study is measured by looking into total number of publications, W, X, Y category publications, citations, h index, research projects and book publications.

Population for this study is defined as the faculty members of the university of social science department. Their personal characteristics that also have a significant effect on research productivity are also taken for this study. The variables of personal characteristics that are made

part of the study are gender, years of experience, designation, their qualification and contract status.

Exposure in this study represents the research environment of the university in which faculty members do their research. The most important objective of the study is to investigate the relationship of research environment with the research productivity of the faculty. To measure the exposure or conditions of research environment variables taken for this study are physical infrastructure, research activities, collaborations, incentives and workload. These variables are then divided into further sub variables which gives detail about the variable that are shown in table 4.1 of chapter 4.

Outcome for this study is research productivity of the faculty members of university. To measure the research productivity of faculty members variables taken were their total number of publications, publications in W, X, Y category journals, citations, h index, book publication and research projects earned. Therefore, this study will analyze how the outcome is impacted by the exposure given to the population.

Figure 3.1: Flow Chart

Gender

Experience

Designation

Qualification

Contract Status

Personal Characteristics

Research Environment

Infrastructure

Research Activities

Collaboration

Incentives

Workload

Research Productivity

Total No. Publication

W, X, Y Publication

Citations

h-index

Research Projects
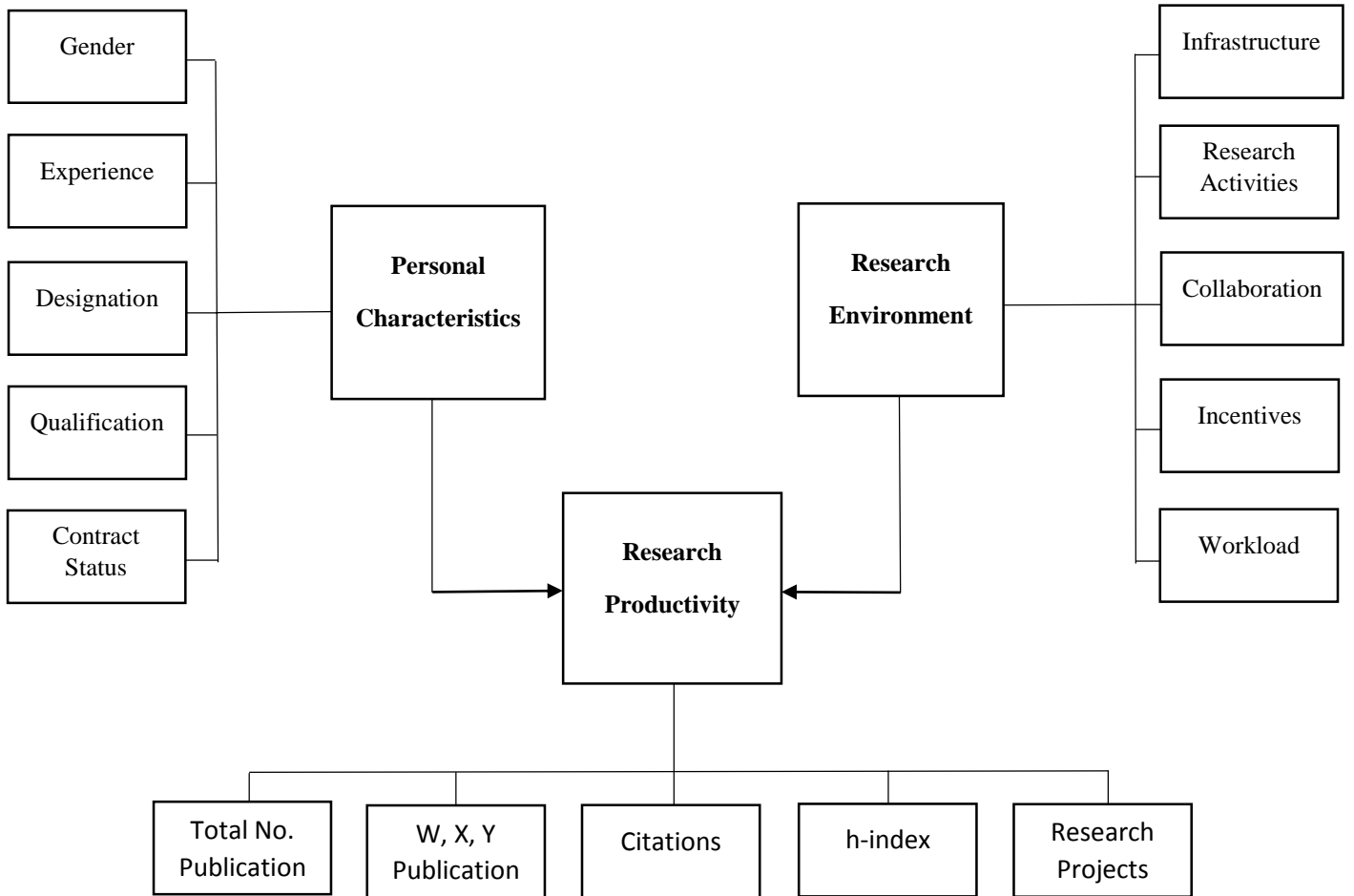
CHAPTER 4

4   DATA, VARIABLES & METHODOLOGY

This chapter converse about data, variables and methodology of the research. It includes all the details that what was the data source, units of data analysis, sampling design and sample size. Moreover, it discusses about the data collection method and questionnaire design. All the variables taken in the research are mentioned in this chapter. In the end methodology is explained that in this research empirical estimation and logistic estimation will be done to find the impact of research environment on research productivity.

4.1   DATA

4.1.1   Data Source

The data used for this study is primary data. The data is collected from public sector universities across Pakistan through questionnaires.

4.1.2   Units of Data Analysis (UDCs)

The UDCs for the study are faculty members of the social science department of public sector universities of Pakistan. Faculty members that have PhD qualification and are engaged in teaching and research both are approached for data collection. Only faculty with academic rank of assistant professors, associate professors and professors are used as UDCs for this study.

4.1.3   Locale

The locale for the study is only public sector university of Pakistan. Faculty from universities were approached all around Pakistan. Out of 188 responses that were collected 90 are from Islamabad, 56 are from Khyber Pakhtunkhwa, 38 from Punjab, 2 from Sindh and 2 from Azad Jammu Kashmir, we got no responses from Balochistan. Data from other provinces is collected via emails and from Islamabad data is collected by going to universities and approaching faculty in person.

4.1.4   Sampling Design

Clustered random sampling is used to collect data. This study was focused on faculty members of only social sciences but within social sciences clusters of different disciplines were created through purposive sampling. Due to lack of time, resources, cooperation and availability of faculty members within those clusters random sampling is used to collect data.

Disciplines within social sciences are divided into different groups based on purposive sampling. Group 1 consists of faculty of economics and public policy, group 2 consist of faculty of international relations, political science etc., group 3 comprise of faculty of sociology, anthropology, development studies and group 4 is from other disciplines that are considered in social sciences by the universities like psychology, media studies, behavioral science etc.

4.1.5   Sample Size

Total of around 950 faculty members were approached around Pakistan. At the end of the data collection, we were only able to collect 188 responses out of which 90 were from Islamabad and 98 were from other provinces.

The faculty were initially approached through emails with google form attached and were reminded several times for around 3 to 4 weeks but the responses were very low in numbers. Then faculty in universities of Islamabad were approached in person by visiting campuses using hard form of questionnaire.

The limitations for this study were that faculty was not responding to emails even after several reminders and those visited in person were not very cooperative. Along with that the results heavily depends on the responses of faculty members. The data that is collected have uneven responses in terms of region and designation because of which findings are analyzed in general.

4.1.6   Questionnaire Design

The main objective of the questionnaire is to collect personal information from faculty, information related to their productivity or research output and research environment of their university. To measure the conditions of research environment of universities Likert scale was used in the questionnaire where value 1 represents poor conditions of research environment and 5 represents ideal conditions of research environment. Some of the questions are asked with

simple yes and no responses and in the last part of questionnaire they are asked about their research outputs. Questionnaire is attached at the end of the document in appendix.

4.2 Variable Construction

The variables that are used to measure the research environment of universities and research productivity of faculty members are discussed below along with the variables of individual characteristics of the faculty members.

4.2.1 Research Environment

Variables of research environment taken in this study are physical infrastructure, research activities, collaborations, incentives and workload. Each of the variable is divided into sub indicators which gives detailed condition of research environment of the university. Infrastructure has sub variables like quality of books and resources available at the library of campus, the condition of internet facility at university and overall physical infrastructure whether it is supportive or not. The variable of research activities is divided into frequency of seminars, workshops, conferences and training sessions held at the campus. Collaboration is sub divided into how frequently faculty member engage in research collaborations within department, with other universities, and internationally along with-it faculty are asked about how supportive the university or department is to their research collaborations. Another important variable is Incentives and support, the sub indicators of this variable are that how administration of the university supportive to the research of the faculty member, also how frequently are faculty members given leaves for their research activities and finally faculty members are asked about how satisfied are they with incentives provided by the university. In the end faculty are asked about their workload. Workload is then further divided into administrative workload, teaching workload and time they get to do their research work. All these variables and sub indicators gives a detailed account of what is the condition of research environment at university.

Jung, (2012) also took workload, research collaborations among researchers as variables of research environment. Nguyen & Klopper, (2014) in their study also emphasized on the collaboration between colleagues as key indicator of research environment. Whereas, Quimbo & Sulabo, (2014) along with other variables used research benefits and incentives as variable of

work environment in which researchers work and impacts their outcomes. Variable and sub indicators are shown in the following table:

Table 4.1: Variables of Research Environment

Infrastructure
• Books and Resources at Library
• Internet Facility
• Physical Infrastructure
Research Activities
• Seminars, Workshops and Conferences
• Research Training Sessions
• Other Research Activities
Collaborations
• Within Department
• With other Universities
• International Collaborations
• University Support
Incentives and Support
• Administrative Support
• Research Leaves
• Satisfaction with Incentives
Workload
• Teaching Workload
• Administrative Workload
• Time available for Research

Since Likert scale is used for measuring research environment, indexes of each variable are generated using mean score of each sub indicator of variable using equal weights of each indicator. Once indexes of variables were generated, a composite index table is generated from sub-indices shown in table through using relative weights of sub-indices by the application of Principal Component Analysis (PCA). On the basis of scores the data was divided into terciles. The research environment was divided into three levels low level, medium level and high level research environment. Through this approach we are able to analyze the impact of different level of research environment on the research productivity of faculty members. The composite table is shown in chapter 5 table 5.2. Weights for the composite table are shown in the following table:

Table 4.2: Weights of Indices for Composite Index

Research Environment Indices	Absolute	Relative
Infrastructure	0.4890	0.23
Research Activities	0.4929	0.23
Collaboration	0.4475	0.21
Incentive and Support	0.5390	0.25
Work Load	0.1647	0.08
Composite Index		1

4.2.2 Research Productivity

The variables to measure research productivity for this study are total number of publications, publications in W, X, Y category journals, total number of citations, h index, authorship of book and book chapters and research projects earned. Citations and h index of faculty members were also counter checked from their google scholar account. Through citations and h index we could measure the quality factor of research publications along with the quantity. Aydin, (2017) explained various measures of research productivity in their study some of them that are aligned with this study are number of publications, citations, success in getting research funding or project, book publications and impact factor of journals. Similarly, Mustafa & Khan (2022) in their study measured productivity of faculty members by looking into their number of journal publications, book publications and h index. Variables taken for research productivity are shown in the following:

Table 4.3: Variables of Research Productivity

Total No. of Publications
W Category Publications
X Category Publications
Y Category Publications
Total No. of Citations
H-Index
Book/Book Chapters
Research Projects

4.2.3 Personal Characteristics

There are personal characteristics that also significantly influence research productivity along with the research environment. Variables of personal characteristics taken for this study are, gender of the faculty members, years of experience as faculty, their qualification (local or foreign) qualified, designation, their contract status (BPS/TTS or contractual) and the department they belong to within social sciences. Quimbo & Sulabo, (2014), Jung, (2012) also analyzed individual or personal characteristics along with the environmental factors which affects the research productivity. Personal characteristics that were taken in their studies are similar to that have been taken for this study. The variables are shown in the following table:

Table 4.4: Variables of Personal Characteristics

Gender (Male/ Female)
Years of Experience
Qualification (Foreign/ Local)
Contract Status (BPS/TTS/Contractual)
Designation
Department

4.3 Empirical Model

One of the main objectives of the study is to analyze how research environment impacts the research productivity of the faculty members of universities. Empirical model for OLS and logit estimation is used for that purpose. To estimate the impact following model was used:

RP= f (RE, Gender, Experience, Designation, Qualification, Contract status, Department)

Where RP is research productivity which is dependent variable and RE is research environment which along with personal characteristics are independent variables.

4.3.1 OLS Estimation Model

The empirical equation used for regression estimation is following:

$$Y_i = \alpha_o + \beta_1 RE + \beta_2 Gender + \beta_3 Experience + \beta_4 Designation + \beta_5 Qualification$$
$$+ \beta_6 Contract\ Status + \beta_7 Department + \mu_i$$

In the above equation Y_i is the dependent variable which is research productivity and $\beta_1 RE$ is the independent variable which is research environment along with other variables that are personal characteristics of the researcher whereas, μ_i is error term. OLS estimation was used to see the impact of RE on RP of faculty members. Impact of research environment on each variable of research productivity was estimated separately which is shown in regression table 5.5 in chapter 5.

4.3.2 Logistic Estimation Model

One of the variables of research productivity is binary variable where 0 represents that faculty member had not earned any research project and 1 represent that faculty member had earned research project. So logistic estimation model is used to estimate the probability of earning or getting a research project by a faculty member. The coefficients in the table 5.6 of chapter 5 shows the positive or negative relation of dependent variable with independent variable. Odd ratios were used to estimate the probability of earning research project by a faculty member. The empirical equation used for logit estimation is following:

$$Z_i = \alpha_o + \beta_1 RE + \beta_2 Gender + \beta_3 Experience + \beta_4 Designation + \beta_5 Qualification$$
$$+ \beta_6 Contract\ Status + \beta_7 Department + \mu_i$$

Where, Z_i is the dependent variable which is binary variable where 0 means that faculty has not earned any research project and 1 means that faculty has earned research project and $\beta_1 RE$ is independent variable which is research environment. Other personal characteristics shown in above equation are also independent variables that can affect the chances of getting a research project and μ_i is error term.

CHAPTER 5

5 ANALYSIS AND FINDINGS

This chapter is divided into two parts. In first part situational analysis of research environment and research productivity have been done. The results of responses is shown in percentage frequency distribution table which shows what were the responses of faculty members about the research environment of the university. Based on those responses of faculty table of mean score of each variable of research environment is generated which is followed by situational analysis of research productivity which shows mean of productivity of faculty members with different characteristics and variables. In second part of the chapter OLS regression and logistic estimation analysis is done to find out the impact of research environment on the research productivity of faculty members.

5.1 Situational Analysis

5.1.1 Research Environment (RE)

The variables that were taken to analyze the research environment of university were physical infrastructure, research activities, collaborations, incentives and support and workload. These are some of the common elements which reflects research environment of the institution. Each variable was then divided into sub variables to have more detailed reflection of how faculty view the research environment of their university. The following table 5.1 shows the percentage of responses for each sub variable. Since we have used Likert scale for our survey where 1 shows highly negative review from the respondent about particular variable and 5 shows highly positive review about the research environment whereas 3 is neutral response from the respondent.

Infrastructure:

Physical infrastructure is one of the most important elements in shaping a conducive research environment. Since this study was limited to the department of social sciences only, so only relevant variables were analyzed. To analyze physical infrastructure of the university, respondents were asked about library, books and resources, access to digital database internet facility, computer labs for research, special rooms or spaces and overall satisfaction of respondent about the infrastructure of university.

Some of the key takeaways from data collected are shown in table 5.1. According to the table 2.66 % of the respondents were highly dissatisfied, 41.49 % were dissatisfied with the books and resources available at the library. Only 36.70 % were satisfied and 2.66% were highly satisfied with books and resources available. When they were asked about how satisfied are they with internet facility 10.11% were highly dissatisfied, 35.11 were dissatisfied where as 36.17 % were satisfied and 4.79% were highly satisfied with the internet facility at the campus. The respondents were asked that how satisfied are they with the infrastructure of the university more than 45% were dissatisfied whereas only 20.74 % were satisfied and 2.13% were highly satisfied 30.85% respondent had neutral stance.

Figure 5.1: Physical Facilities Available
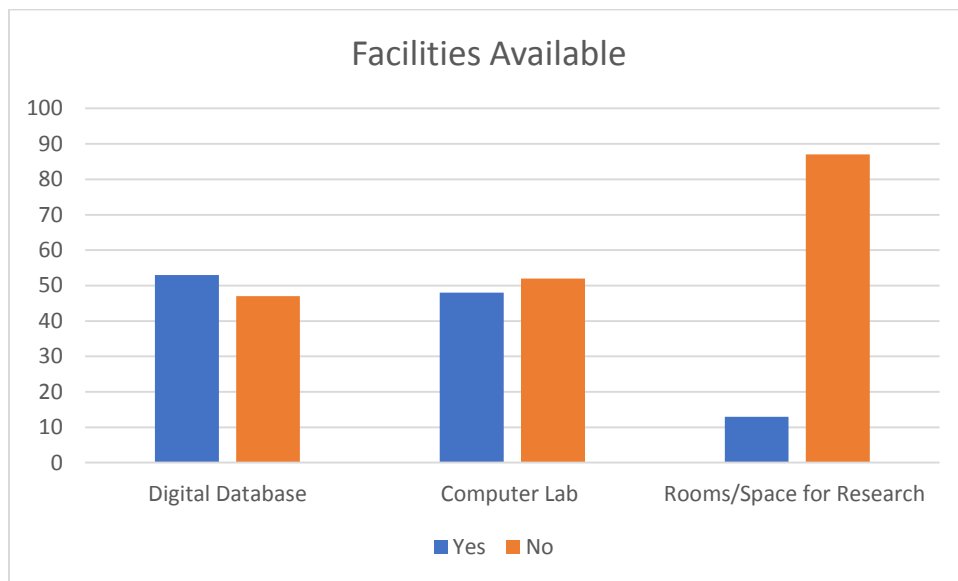
Some of the questions were asked with simple yes and no options which are presented through bar chart in figure 5.1. The respondents were asked whether they have access to any digital database or not, 47% of the respondents has no access to digital database whereas 53% respondent had an access. Similarly, 52% of respondent had no computer lab facility for research purpose contrary to that 48% had computer lab facility. Also, 87% faculty members had no rooms or spaces for research activities.

Research Activities:

Research related activities reflects the culture within the department or university. More activities like seminars, workshops and conferences enables debate which have good impact on research culture and reflects healthy research environment.

Table 5.1: Percentage Frequency Distribution

Variables of Research Environment	Highly Dissatisfied	Dissatisfied	Neutral	Satisfied	Highly Satisfied
Infrastructure					
Books and Resources at Library	2.66	41.49	16.49	36.70	2.66
Internet Facility	10.11	35.11	13.83	36.17	4.79
Physical Infrastructure	1.06	45.21	30.85	20.74	2.13
Research Activities					
Seminars, Workshops and Conferences	1.60	36.70	31.38	28.19	2.13
Research Training Sessions	7.98	46.28	31.38	13.83	0.53
Other Research Activities	2.66	42.55	38.83	15.43	0.53
Collaborations					
Within Department	7.45	46.28	33.51	12.23	0.53
With other Universities	4.26	34.57	36.70	23.40	1.06
International Collaborations	11.17	39.36	30.85	16.49	2.13
University Support	0.53	39.36	38.83	19.15	2.13
Incentives and Support					
Administrative Support	1.06	44.68	39.36	12.77	2.13
Research Leaves	13.83	52.66	26.60	5.85	1.06
Satisfaction with Incentives	20.21	56.38	18.62	4.79	0
Workload					
Teaching Workload	6.91	63.30	29.26	0.53	0
Administrative Workload	6.91	52.66	35.64	4.26	0.53
Time available for Research	4.81	50.27	33.69	10.16	1.07

The respondents were asked about how frequently seminars, workshops and conferences were organized at their department. According to 1.60% of the respondent's department never organizes these events, 36.70% were of the view that such activities are organized rarely, 31.38% were neutral whereas 28.19% and 2.13% were of positive view that department often or always organize such activities. Similarly, when they were asked about how frequently research training sessions are arranged, the breakdown of the responses was that 7.98% states that the department never arranges research training sessions, 46.28% states it rarely, in contrast to these negative responses only 13.83% says department often arranges research training sessions and 0.53% states that their departments always arrange research training sessions for their faculty members.

Collaborations:

One of the key indicators of positive research environment is how much they collaborate with other institutions or within the department. Universities now have special focus on research collaboration especially international collaborations to increase their productivity but as well as their visibility to get better academic reputation. In this study collaboration is taken as one of the key variables of research environment. Through survey, respondents were asked how often they collaborate within department, with other universities, with international universities and how supportive their department is in facilitating their collaborations.

As shown in table 5.1, 7.45% never, 46.28% rarely engage in research collaborations within their department. In comparison to that only 12.23% often and 0.53% always collaborate within department. According to the data collected the frequency of faculty members collaborating with other universities is slightly better than faculty collaborating within department and internationally. Data shows that 4.26% never, 34.57% rarely and 23.40% often 1.06% always collaborate with other universities. When asked about international collaborations 11.17% never and 39.36% rarely collaborate internationally whereas 16.49% often and 2.13% always engage in research collaborations at international level.

Along with it, faculty was asked about how much they think university or department is supportive in facilitating research collaborations. The breakdown of responses is as follow, 0.53% very unsupportive, 39.36% unsupportive, 38.83% had neutral stance, 19.15% thinks supportive and 2.13% thinks that department is very supportive in facilitating research collaborations.

Incentives and Support:

While doing literature review and data collection, one of the most motivating factors to do research were better financial incentives. Universities and higher education system around the world introduced many strategies to improve and increase their research productivity but the most effective one was the one which was related to incentives especially financial incentives. According to literature, better reward system, non-financial incentives and administrative support are important elements of better research environment.

For this study administrative support from university, financial incentives, non-financial incentives, research leaves and overall satisfaction with incentives were taken as sub variables. The table above shows that 45.68% of the faculty members are of the view that administration of their university is unsupportive to their research activities. Whereas, 14.90% thinks that their administration is supportive and 39.36% were neutral in their stance. Research leaves are also very important especially in social sciences where research and data collection are very time consuming. Data in the above table shows that 13.83% never and 52.66% rarely gets research leaves, only 5.85% often and 1.06% always gets leaves for their research work.

When faculty was asked about their satisfaction with the incentives provided by university, 20.21% were highly dissatisfied, 56.38% were dissatisfied and 18.62% were neutral in their stance. In comparison to that only 4.79% respondents were satisfied with the incentives provided by university.

Workload:

Less time available for faculty to do research during academic year leaves them only with summer breaks for research which results in lower research productivity. In Pakistan as mentioned earlier universities are teaching oriented so the workloads are mainly teaching and administrative and less time is given to research.

According to data collected for this study 70.21% faculty members have high to very high teaching workload, 29.26 % have normal teaching workload and only 0.53% of faculty members have lower teaching workload. Similarly, 6.91% have very high 52.66% have high, 35.64% have normal administrative workload, 4.26% have low and 0.53% have very low administrative workloads.

In survey they were asked about how much of the time they get to do their research work. The results we got are, 55.08% of the faculty members don't get enough time to do their research, 33.69% of the respondents were neutral and only 11.23% of the faculty members get enough time to do their research.

5.1.2 Mean of Research Environment Indices

Table 5.2: Research Environment Indices & Composite Index

Research Environment Indices	Mean	Minimum	Maximum	Weights for Composite Index	
Sub-Indices				Absolute	Relative
Infrastructure	2.848883	1.54	3.96	0.4890	0.23
Research Activities	2.685638	1.65	3.63	0.4929	0.23
Collaboration	2.691489	1.75	3.75	0.4475	0.21
Incentive and Support	2.329309	1.65	3.3	0.5390	0.25
Work Load	1.698397	0.99	2.64	0.1647	0.08
Composite Index	**2.556352**	**1.9115**	**3.1977**		

The table above shows the mean value of each variable of research environment. According to the data collected which was based on Likert Scale (1-5) the mean response for infrastructure is 2.848883, for research activities the value is 2.685638, for collaboration the mean value is 2.691489, mean value for incentives and support is 2.329309 and for workload its 1.698397.

Since as mentioned earlier the value 3 shows average conditions of the research environment the mean value of all indices is below 3 which shows that the research environment of universities from which the data was collected is below average. Most importantly the variable incentive and workload has the lowest score, this indicates that most of the faculty members in our universities are dissatisfied with the incentives they get and the burden of workload they have as a result of which productivity could be hindered.

The mean value of overall research environment was generated through composite index which is 2.556353, this reflects that the overall research environment of our universities according to data collected is below average and not very conducive for research

5.1.3 Research Productivity (RP)

Research productivity could be simply defined as total number of journal articles, books, book chapters, articles and conference papers published by a researcher. But with time bibliometric measure like total number of citations, h index etc. were also taken into account to measure quantity along with the quality. For this study the variables taken are total number of publications, number of publications in W, X, Y category journals, book or book chap authorship, research projects earned, total number of citations and h index. Research productivity is affected by various factors, main aim of the study is to analyze how university research environment affects the productivity of faculty members but it is also important to look at how personal characteristics of researcher affects their research productivity. The table 5.3 shows personal characteristics like their gender, their qualification (local or foreign) and their contractual status of their employment. The table shows mean value of their research productivity of the total data collected.

Table 5.3: Mean of Research Productivity

	Total No. Publication	W Category Publication	X Category Publication	Y Category Publication	Total No. of Citations	H- index
Overall	25.57979	3.484043	4.590426	17.50532	158.1117	7.002128
Male	30.67227	3.991597	5.747899	20.93277	171.5126	8.117647
Female	16.7971	2.608696	2.594203	11.5942	135	5.078261
Local Qualified	19.72028	2.517483	3.671329	13.53147	133.028	5.576224
Foreign Qualified	44.2	6.555556	7.511111	30.13333	237.8222	11.53333
BPS	18.62222	3.755556	3.488889	11.37778	142.3111	4.688889
TTS	27.32203	4	5.152542	18.16949	152.8814	6.694915
Contractual	15.26316	2.052632	3.473684	9.736842	58.47368	3.126316

The results in the table above shows that the research productivity of male faculty members is higher than the female faculty members. They publish in better category journals and have better citations and h index score as compare to the female counterparts. There could be various

reasons to that one of the studies shows that female faculty has more domestic responsibilities than male because of which they are likely to publish less as compare to male faculty members.

Another key takeaway from the results shown in the table 5.3 is that TTS faculty members have higher number of publications than BPS or contractual faculty members. Also, they publish in higher category of journals as compare to BPS faculty. TTS faculty members have better incentives as compare to BPS and it is nature of their job where they are required to publish more to meet certain criteria to advance their careers. Therefore, TTS faculty members have slightly higher research productivity as compare to BPS and contract-based faculty members.

Another important finding from the results is that foreign qualified faculty members have higher number of publications than the local qualified faculty. They publish in higher category journals and have better number of citations and h index than local qualified faculty. So, foreign qualification has positive impacts on the research productivity of faculty members.

Table 5.4: Percentage of Faculty written books/book chap & earned research project

	Author of Book/ Book Chap	Research Project Earned
Overall	21.28	39.89
Male	30.25	50.42
Female	5.80	21.74
Local Qualified	17.48	33.57
Foreign Qualified	33.33	60.00
BPS	33.33	38.33
TTS	58.33	50.00
Contractual	8.33	11.67

The table 5.4 shows the percentage of faculty who have been author of any book or book chapters and who have earned research projects. From the data which was collected result shows that overall, only 21.28% of the total faculty members have written book or book chapters and only 39.89% of faculty members have earned research project. The data above also shows that male as compare to female are more productive in writing books or book chapters and earning research projects.

Similarly, foreign qualified faculty members write more books or book chapters than faculty that are locally qualified. Foreign qualified faculty earns more research projects as compare to local qualified faculty. Just like the productivity results of previous table this table also shows that the

faculty members employed under TTS are more productive in terms of book or book chapter authorship and earns more research projects than faculty employed under contracts and BPS.

5.2 Impact of Research Environment on Research Productivity

The primary objective of the study is to analyze how research environment of the university impacts the research productivity of the faculty members. To achieve the results, regression analysis model is used to analyze the impact of research environment and personal characteristics on publications, citations and h index of the faculty whereas, logit model is used to look into how faculty from high level research environment are likely to get research projects or grants as compare to faculty from low level research environment. Since research productivity is also affected by personal characteristics of a researcher therefore, variables of personal characteristics are also analyzed.

5.2.1 Research Environment and Publications, Citations and H-Index: OLS Estimation

To analyze the impact of research environment on the research productivity, the research environment is divided into three levels: low level, medium level and high level. Low level of research environment means where the conditions are least conducive for research, medium level means that the university research environment is moderate and high-level research environment shows very conducive conditions for research.

The results we get through regression analysis shows that universities with medium and high-level research environment are significantly more productive in terms of research than universities with low level of research environment. Universities with medium level of research environment are 45% more productive than low level. Similarly, faculty of universities with high level of research environment are 61% more productive than faculty in low level research environment.

According to the results, faculty in medium level RE publish more in W, X, Y category of journals as compare to faculty in low level RE. On the other hand, faculty in high level RE significantly publish more in W category journals but have lower publications in Y category journals. This shows that the faculty in better conducive environment for research have more publication in high ranked journals and have low publications in low ranked journals.

Table 5.5: OLS Regression Estimation

	(1)	(2)	(3)	(4)	(5)	(6)
	Journal Publications					
VARIABLES	Total	W-Category	X-Category	Y-Category	Citations	H-Index
Research Environment						
Medium Level	0.457***	0.115	0.426**	0.528***	0.660	0.148
	(0.151)	(0.165)	(0.173)	(0.183)	(0.461)	(0.193)
High Level	0.614***	0.395**	0.203	-0.226	1.158**	0.530**
	(0.168)	(0.176)	(0.169)	(0.204)	(0.490)	(0.219)
Gender (Male=1)	0.542***	0.177	0.431***	0.417***	0.148	0.324**
	(0.135)	(0.136)	(0.130)	(0.144)	(0.298)	(0.150)
Designation						
Associate Professor	0.631***	0.591***	0.576***	0.619***	0.900**	0.620***
	(0.139)	(0.167)	(0.151)	(0.167)	(0.359)	(0.200)
Professor	0.752***	1.329***	0.677***	0.141	1.443**	0.626*
	(0.197)	(0.297)	(0.219)	(0.328)	(0.637)	(0.338)
Foreign Qualification	0.145**	0.106**	0.166*	-0.363**	0.381	0.0558
	(0.136)	(0.049)	(0.101)	(0.170)	(0.317)	(0.179)
Experience						
Between 5 to 10 years	0.00663	0.0552	0.123	-0.125	0.958**	0.617***
	(0.210)	(0.214)	(0.183)	(0.223)	(0.432)	(0.216)
Between 11 to 15 years	0.512**	0.110	0.399*	0.474**	0.285	0.242
	(0.208)	(0.226)	(0.209)	(0.213)	(0.470)	(0.241)
Between 15 to 20 years	0.340	-0.287*	0.132*	0.526	0.424	-0.348*
	(0.265)	(0.162)	(0.073)	(0.328)	(0.407)	(0.206)
Above 20 years	1.014***	-0.291*	0.665**	1.590***	-0.329	-0.356
	(0.245)	(0.152)	(0.260)	(0.273)	(0.637)	(0.336)
Contract Status						
Contractual	-0.224	-0.319	-0.0123	-0.240	-0.166	-0.111
	(0.211)	(0.281)	(0.215)	(0.234)	(0.465)	(0.265)
TTS	0.560***	0.433***	0.568***	0.628***	0.472	0.0769
	(0.145)	(0.150)	(0.144)	(0.182)	(0.358)	(0.180)
Departments						
IR & POL	-0.116**	-0.623***	-0.0298	0.226	-1.533***	-0.853***
	(0.058)	(0.188)	(0.162)	(0.187)	(0.340)	(0.194)
Sociological	-0.196	0.387	0.214	-0.0213	-0.316	-0.234
	(0.211)	(0.263)	(0.258)	(0.239)	(0.551)	(0.330)
Others	-0.283**	-0.328**	-0.0323	0.517***	-0.616	-0.281
	(0.138)	(0.157)	(0.157)	(0.163)	(0.469)	(0.207)
Constant	1.490***	0.543*	0.183	1.117***	4.858***	1.647***
	(0.289)	(0.296)	(0.261)	(0.301)	(0.723)	(0.305)
R-squared	0.595	0.506	0.471	0.557	0.442	0.522

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Faculty in Medium level RE have a greater number of citations and h index than faculty in low level RE but in comparison to both of these level faculty in high level RE have much higher number of citations and h index as compare to low and medium level of RE. therefore, according to the results shown in table 5.5 above, the faculty who gets better and conducive research

environment have higher research productivity, they publish more, have better citation and h index score but most importantly they publish more in highly ranked quality journals instead of low ranked journals.

Along with environmental factors personal characteristics have also significant impact on the research productivity of faculty members in universities. As discussed earlier in situational analysis personal characteristics like gender, qualification, contract status has also impact on the productivity of faculty. According to the table above, male faculty members have higher research productivity. They have higher number of publications; greater citation score and higher h index as compare to female faculty members. Similarly, the findings also tell us that faculty members with foreign qualification have higher productivity than faculty that have local qualification. Foreign qualified faculty publish more in higher categories of journals and have higher number of citations and h index.

Years of experience has also positive impact on the research productivity of faculty. Faculty with more years of experience in teaching have greater number of publications, citations and h index. These results also reflect on in their designations where professors who have more years of experience are more productive in research than their other counterparts. Faculty with more experience and higher academic ranks are more productive.

Another important result is that faculty who are employed under Tenure Track System (TTS) are more productive than faculty that are employed under Basic Pay Scale (BPS). TTS faculty publish more and according to results they have higher number of publications in every category of journal as compare to BPS faculty. Also, faculty that are employed on contracts are least productive in terms of publications, citations and h index.

On comparing the results of faculty from different departments, data shows that the faculty that belong to the economics have higher research productivity as compare to other departments. After economics faculty that belong to IR and political science have higher research productivity followed by the faculty that belong to development studies, sociology etc.

5.2.2   Research Environment and Research Funding: Logit Model Estimation

To analyze that how research environment could impact the probability or likelihood of getting research project or funding, logit model was used. The following table shows the results:

Table 5.6: Logit Estimation

Impact of Research Environment on Earning Research Funding or Project		
	(1)	(2)
VARIABLES	Logit	Odd Ratio
Research Environment		
Medium Level	0.695	2.003
	(0.519)	(1.040)
High Level	1.016**	2.763**
	(0.511)	(1.413)
Gender (Male=1)	1.541***	4.671***
	(0.413)	(1.930)
Designation		
Associate Professor	0.598	1.819
	(0.443)	(0.806)
Professor	1.852***	2.716***
	(0.796)	(1.84)
Foreign Qualification	0.745	2.106
	(0.455)	(0.958)
Experience		
Between 5 to 10 years	-0.0771	0.926
	(0.647)	(0.599)
Between 10 to 15 years	0.417	1.517
	(0.589)	(0.893)
Between 15 to 20 years	-0.648	0.523
	(0.695)	(0.364)
Above 20 years	-0.411	0.663
	(0.934)	(0.619)
Contract Status		
Contractual	-0.352	0.703
	(0.633)	(0.445)
TTS	0.518	1.678
	(0.424)	(0.711)
Department		
IR & POL	-1.392***	0.249***
	(0.512)	(0.127)
Sociological	-1.251*	0.286*
	(0.711)	(0.203)
Others	-0.590	0.555
	(0.564)	(0.313)
Constant	-2.002**	0.135**
	(0.829)	(0.112)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

According to the results in the table 5.6, faculty in medium and high level RE are more likely to earn research funding or projects. Though faculty in medium level are likely to get more research projects or fundings than faculty in low level RE but the results are not significant like of faculty

in high level RE. Probability of faculty getting research project is much higher and significant than faculty in low and medium level of research environment.

While looking into how personal characteristics impact the chances of getting research fundings or projects, results show like earlier patterns that male faculty members have significantly higher chances of getting research projects as compare to female faculty members. Foreign qualified faculty members are more likely to get research projects but according to results in table above the results are not significant. Associate professors and professors are likely to get more research projects than assistant professors but professors have significantly higher probability of earning a research project. Results show that only faculty with 10-15 years of experience are likely to have more chances of getting research projects as compare to faculty with below 5 years of experience other experience brackets show negative relation which means they are not likely to get more research projects than faculty with below 5 years of experience.

TTS faculty just like previous results have higher chances of getting research projects as compare to BPS and contractual faculty but the results are not significant. Also, faculty that

CHAPTER 6

6   CONCLUSION AND POLICY RECOMMENDATIONS

This chapter presents the conclusion, the limitations of the research and policy recommendations that can guide the future policies.

6.1   Conclusion

Research productivity has become one of the important measures of university performance. All around the world universities are ranked on the basis of their research output. Universities are now prioritizing research engagement of their faculty and are incentivizing their research activities to maximize their productivity. There are various factors that impacts research productivity. Research productivity depends on personal characteristics of researcher but it is also significantly influenced by the environment researcher have in which research is being done. This study analyzes how research environment of the university impacts the research productivity of faculty members along with their personal characteristics.

The objective of the study was to analyze what is current research environment of public sector universities in Pakistan and how is that research environment impacting the research productivity of the faculty members of social sciences. In this study primary data was used which was collected through questionnaires. Once the data was collected, situational analysis was done followed by OLS and logistic estimation to analyze the impact of university research environment on research productivity of faculty members.

Through situational analysis one of the key findings, we get was that the overall research environment of universities in Pakistan is below average and not very conducive for research. The variable of incentives and workload on faculty members has the lowest mean score shown in table 5.2. Percentage frequency distribution shows that most of the faculty members are dissatisfied with the research environment of the universities. Findings related to research productivity shows that male faculty members are more productive than female faculty, foreign qualified and faculty members employed under TTS have higher research productivity as compare to their counterparts.

The regression table 5.5 shows that the faculty in high level of research environment have significantly higher research productivity and are more likely to earn research projects as compare to faculty in low and medium level research environment. Another key finding was that faculty in high level research environment publish more in W category journal and have lower publications in X and Y category journal as compare to faculty in low level research environment. This shows that faculty in high level research environment prefer to publish more but in high ranked journals. Therefore, to maximize research productivity and increase the quality and visibility of research produced better conducive research environment in universities is very crucial.

6.2 Limitations

There were various hindrances faced while obtaining the data some of the limitations of this study are following:

- The response rate while collecting the data was very low. Initially the faculty members were approached through emails, they were given several reminders for 3-4 weeks but the response was very low. Universities in Islamabad were visited in person and it was realized that faculty members were more comfortable with hard form of survey instead of google form or digital surveys. Overall, the faculty members were less cooperative and most of them were unavailable. So, due to lack of time and resources and cooperation of faculty members only 188 responses were collected out of 950 faculty members.

- Another limitation of the study is that the analysis of this study is heavily dependent on the responses of the respondents. There is uneven distribution of data with respect to region, designation and universities therefore the results could be biased but the data is in general analyzed which reflects overall impacts of research environment on research productivity of faculty. To minimize the problem administration of universities were approached so that faculty responses regarding research environment could be verified but we got no response from administration of any university. Similarly, the research outputs of faculty members who had google scholar account and information available online were verified but most of the faculty members had no information online because of which we had to rely on what information had been given by the respondents.

6.3 Policy Recommendations

In the light of our findings and the responses of faculty members, the policy recommendations that can help universities improve their research environment and maximize their research productivity are:

- Improvement in quality of higher education institutions is needed. According to our findings the research environment of universities is below average which is not conducive for the research productivity of the faculty. Pakistan has seen rapid growth in the number of universities but instead of expanding in numbers current university infrastructure must be improved to create better and conducive research culture and environment.

- According to our results TTS faculty have better research performance than other faculty. This reflects that, through incentivizing research of faculty members, they are encouraged and motivated to engage more in research activities. Therefore, to encourage faculty members satisfactory incentives should be given to them on engaging in research activities.

- The findings suggest that majority of faculty members are not getting enough time for their research because of teaching and administrative workloads. More time spent on research could have positive impact on the research productivity of faculty members. So, university administration must not over burden faculty members with teaching and administrative workloads. Some faculty suggest that there must be separate staff for performing admirative duties.

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8   APPENDIX

8.1   Questionnaire For Faculty Members

1. Name:

2. Age:

3. Gender:

4. Qualification:

5. Any qualification from foreign university? (Mention Qualification, university name and country):

6. Name of university you are teaching at:

7. Designation:

8. Department:

9. Subject:

10. Total years of experience as faculty:

11. When did you join this institution as faculty member? (year)

12. Are You BPS faculty or TTS?

    ○ BPS   ○ TTS

13. Are you converted from BPS to TTS or TTS to BPS?

    ○ No   ○ BPS to TTS   ○ TTS to BPS

14. Are you supervising any research students?

    ○ Yes   ○ No

15. How many students have you supervised?

    PhD: MPhil: BS:

52

16. When did you get promoted on your current designation? (Year)

17. How satisfied are you with the library at the university campus?

1	2	3	4	5
Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied

18. Are you satisfied with the books and other resources available at library?

1	2	3	4	5
Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied

19. Do you have access to any digital databases at library?

o Yes   o No

20. Is there any Internet facility at campus If yes than how satisfied are you with the internet?

1	2	3	4	5
Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied

21. Is there any computer lab facility for research purposes?

o Yes   o No

22. Do have any special spaces or rooms for research activities?

o Yes   o No

23. To what extent do you think department or university infrastructure and facilities at your department support productive research activities?

1	2	3	4	5
Very Unsupportive	Unsupportive	Neutral	Supportive	Very Supportive

24. How often your department holds seminars, workshops and conferences?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

25. How often university arrange training sessions for faculty and students?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

26. How frequently other research activities are organized within your department?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

27. Research activities has positive impact on your research productivity?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

28. Are you currently engaged in any research collaboration?

o Yes   o No

29. How often you collaborate in research within your department?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

30. How often you collaborate with other university for research projects?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

31. How often you collaborate internationally?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

32. Is your department supportive in facilitating research collaborations?

1	2	3	4	5
Very Unsupportive	Unsupportive	Neutral	Supportive	Very Supportive

33. Do you think collaborations helps in increasing research productivity?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

34. Are there any financial incentives or grants provided by the university for research activities?

o Yes   o No

35. Are there any non-financial incentives provided by university for research?

       ○ Yes   ○ No

36. Is there any administrative support by university in your research work?

       ○ Yes   ○ No

37. To what extent is university supportive to your research activities?

1	2	3	4	5
Very Unsupportive	Unsupportive	Neutral	Supportive	Very Supportive

38. How often university provides you with research leaves?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Always

39. Are you satisfied with the incentives provided by university for your research/?

1	2	3	4	5
Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied

40. How would you describe your teaching work load?

1	2	3	4	5
Very Low	Low	Normal	HIgh	Very High

41. Your teaching work load is preventing you from engaging into research activities.

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

42. How would you describe your administrative workload?

1	2	3	4	5
Very Low	Low	Normal	HIgh	Very High

43. Your administrative workload is preventing you from engaging into research activities?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

44. You get enough time to do your research work?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

45. Less teaching and administrative work load would increase your research productivity?

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

46. What is your total no. of publications?

47. How many journal articles have you published?

48. How many publications are in W category journal?

49. How many publications are in X category journal?

50. How many publications are in Y category journal?

51. How many books have you authored?

52. How many book chapters have you authored?

53. What is your current h index?

54. Have you earned any research project?

55. How many of your publications were published when you joined this institution?

56. How has the research environment of this institution impacted your research productivity?

57. Do you think that social sciences in universities have lower research productivity as compare to other disciplines? If yes then what do you think are the main causes of lower productivity?

58. In your view how university environment impacts your research productivity? What will you suggest to improve in university research environment to have higher research productivity?