

Measuring Research Performance and Capabilities of Institutions: Empirical Evidence and Standardization

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Abstract

The research performance of the university is dependent on the various factors such as capabilities of institutions. A comprehensive catalog of 20 capabilities has been identified, out of which 08 highly relevant capabilities have been selected for data collection. Pakistani universities have been ranked by the HEC Pakistan to make a collective list of 97 universities (in terms of research output). The capabilities of universities data has been collected for 07 universities of Pakistan, for the purpose of data collection the websites of the universities have been used. The study has suggested that out of the listed capabilities Access to online journals and Library, Number of Programs offered, Faculty Training, and Liaison with International Universities play a vital role in enhancing the research performance. Towards the end the criticism on the ranking criteria has been done and then 10 possible actions have been suggested to enhance research performance. The findings of the research can be implied in those universities where the concern of enhancing research performance is focal point.

Keywords: Research Output, Thomson-Reuters, Ranking Criterion, HEC Pakistan, Universities of Pakistan.

1. Introduction

The research paper is based on the factors which play an active role in the research performance of the university. The study is going to address the real causes based on the empirical evidence of the university capabilities. The question was chosen because now a day the research is an integral part of any organization. Even if there are many universities in any country still what are the factors which compel some university to get them actively engaged in the research and then publication of that researched material. Others are those universities which are also recognized by the HEC of the country but still no significant research is being done to be published in the journals. This paper is an attempt to identify those factors which can be considered as the basis for the enhanced research performance.

The research performance here is basically the research output. Research output is the number of articles published in the Pakistani universities, which appeared in peer-reviewed journals indexed by Thomson-Reuters, ISI Web of knowledge during the years 2007, 2008, 2009, and 2010. Only those papers have been considered as the part of research output which has been published in the mentioned web of knowledge and in the selected years.

This issue is important if the university wants to enhance the research performance still they are ignorant of the fact that what factors are the bases of enhanced research performance. So they are unable to focus on those areas and thus their resources are being wasted. Some of the scientists have done some work related to this area of study, but none of them have actually evaluated the universities (their capabilities) and its relation to the research output.

The capabilities of universities have been identified, which were considered as the basis of research. In total 20 capabilities have been identified, then out of those 20 capabilities 08 most relevant have been selected. After the identification of 08 most relevant capabilities the data on those capabilities have been collected for the selected universities.

The HEC Pakistan has issued a ranking of 97 Pakistani universities. 05 universities out of the first 20 universities (in terms of research output) have been selected and 02 are selected from the lowest side of ranking, just to have the proper representative of the population.

The data of 07 selected universities have been collected by the help of internet. The internet has been used to get the access to the website of these universities. In depth filtration of the university websites have been done to collect the data on these 08 variables, and then further the data has been analyzed in the results section of the paper.

2. Literature Review

The relevant literatures have been cited to get in depth knowledge about the subject, which has been discussed along with the references.

Schiller & Liefner (2006) stated that universities in developing countries find themselves in a different position from their peer institutions in industrialized countries, too. They tend to be underfunded and unable to purchase and apply the latest research equipment. Their faculty and staff tend to be less qualified on average. Thus, developing countries' HEIs are usually far below the academic standards set by universities in industrialized countries. Consequently, they put more emphasis on undergraduate teaching, which is a very important function in many developing countries that strive to improve the skills of their population. Graduate education and research do not belong to the core activities of many HEIs in developing countries. Thus, universities themselves have to continuously improve their teaching and research capabilities in order to be able to meet the future needs of their societies (World Bank, 2000; Altbach, 1998).

Horvath, Weber & Wicki (2000) explained the key position of the institute as the central representative of the discipline can be explained by the latter's four main functions. First, institutes are responsible for the scientific qualifications of specialists within a given discipline and the renewal of staff. Second, in the context of regulated study courses, institutes transmit knowledge and ability to a new generation of specialists. Third, they contribute to the development and consolidation of a body of

specialist knowledge in a web that extends beyond the university. Fourth, the institutes are important units for the university's self-administration (planning and budgeting).

Williams & Dyke (2007) suggests international academic standing is gained through activities that command respect internationally. It follows that ratings based on this criterion provide only partial information needed for other purposes, such as choice for undergraduate study. Because it takes time for performance to be widely recognized, international academic standing will depend on both current and past performance, although with the growth in internet use these time lags are falling.

Serow (2000) explains the status of undergraduate instruction at research universities is thus something of an anomaly. Preferred by many faculty members and insisted upon by key external constituencies, teaching nonetheless carries little weight in the academic reward systems of these institutions. Yet it remains the case that in the United States, as elsewhere, "the academic profession is largely a teaching profession," whose members spend considerably more time on instruction, advising and related tasks than on research and publication (Altbach and Lewis, 1997).

Benbasat & Zmud (1999) argued that certainly is not a surprise to most IS academics that the business community would question the practical relevance of IS research published in the leading journals of our field. Does IS research produce the knowledge that today's IS professionals can apply in their daily work? Does it address the problems or challenges that are of concern to IS professionals? Does it focus on current technological and business issues? Are IS research articles accessible to IS professionals? It is our view that the answers to these questions do not shed a favorable light on IS academic work.

Heerden, Van Eulalie (1995) proposed literature on the education of black school pupils and students at colleges and universities in and outside Africa, and of other minority groups elsewhere in the world, identifies several factors that may influence the academic performance of such children and students, especially their poor performance. From the literature the following points emerge with regard to South Africa and Unisa. First, although much has been written about the school education of black people, relatively little data are available on their university education. Second, comprehensive research on adult black students is also lacking. Third, very few studies exist in which a number of concomitant factors were considered regarding black students in South Africa. Finally, in South Africa there are relatively few studies in educational anthropology, although anthropology can contribute to this field because of its holistic approach to the study of people and sociocultural phenomena.

Kogut & Kulatilaka (2001) says irreversibility is an easily overlooked feature and signifies the inability to costless revisit an investment or decision. Irreversibility is a subtle idea that carries the notion of the arrow of time. For example, the decision to make an investment today bears the risk that the invested assets can only be sold later at a discount. In this context, irreversibility is the inability to recover the investment costs already expended for the product division. Irreversibility is accentuated if the divesting of an investment also engages costs attached to the unbundling of integrated and coupled assets.

Revilla, Sarkis & Modrego (2003) says the foundation and orchestration of innovation policy considerations are especially relevant in Spain, which is the country focus of this study. A limited tradition of R&D in the manufacturing sector, the small size of companies, and lack of a minimal scale that let firms support the financial risk derived from innovation projects, highlight the need for a means of bringing out development and implementation of technologies in Spanish companies.

Nathan (2005) investigated what is common to all parts of the developing world is the development of new needs. These new needs are most prominently those of medical services and education. But there are also other needs, like those of entertainment, e.g., radio or television. In the beginning of the 21st century, radio has ceased to be an attraction, even for persons in remote corners; more and more it is television that people want to see.

3. Methodology

The data about the capabilities of universities is required; the capabilities of universities have been identified by literature review of the articles available in the discipline. After the identification of capabilities of universities the data of 07 universities will be collected. The data is available on the websites of the selected universities. The data will be analyzed afterwards on the basis of given capabilities to conclude the findings.

3.1. Participants

The research was conducted by collecting data of 07 universities of Pakistan. The 05 universities are amongst the top most 20 universities in terms of research out put as per the ranking of HEC for the year of 2010. In order to have proper research findings 02 universities from the lower end of the rankings have been selected, the selected universities are as follows,

S. No.	Institution / Universities	'07	'08	'09	'10
1	Quaid-I-Azam University, Islamabad	409	544	545	548
2	Agha Khan University, Karachi	186	311	345	416
9	National University of Science and Technology, Islamabad	48	92	114	150
18	University of Engineering and Technology, Lahore	38	55	52	79
19	Government College University, Faisalabad	0	0	8	76
95	Institute of Business Management, Karachi	0	0	0	1
97	PAF Karachi Institute of Economics and Technology, Karachi	0	0	1	0

Out of the ranking list of 97 universities seven are selected randomly depending upon the availability of data on internet.

3.2. Apparatus or Material

Through detailed analysis of universities 20 capabilities of universities have been identified. These capabilities are explained in the later section of the paper. These 20 capabilities play their role in enhancing the research performance of the university. Out of these 20 capabilities 08 are selected for research work, which are considered as representative of the capabilities and basis of enhanced research performance. These 08 capabilities are as follows:

1. Access to online journals and Library
2. Number of Programs offered
3. PhD Supervisors
4. Faculty Training
5. Computing facilities
6. Liaison with International Universities
7. Faculty Assessment
8. Student Relation Ship

The data of 07 universities rated out of top most 97 universities have been collected on these 08 variables.

3.3. Procedure

The data about the variables have been calculated by visiting the websites of the selected universities. The websites have been investigated thoroughly. The 07 universities out of the 97 top most universities in research output as per HEC Pakistan ranking have been selected.

The sample size is 7 and these universities have been selected randomly on convenience basis. The data of those universities have been collected where the data is available online. The important thing about the selection of the universities in sample is that they belong to different areas of focus in terms of education. Some of them are purely business education universities, medical universities and

also related to information technology. So, sample is combination of universities from different areas. In order to have proper comparison standardized criteria have been identified based on 08 variables (listed in apparatus and materials section). The information of 07 selected universities has been collected for these 08 variables in order to analyze their affect on research performance.

3.4. Size of Institution

It is a moot point as to whether research output per academic staff member or total research output has the greater influence on international academic standing. A small institution with exceptional staff may have as a high a reputation as a large institution with a large number of good staff. The treatment of size as largely an empirical matter and addressed later.

3.5. Discipline Mix

In many areas such as research activity, funding, and methods of teaching, a major difference exists between science/laboratory based departments and other non-laboratory based departments. The choice of variables should allow for these differences in order to limit any bias towards

4. Empirical Evidence and Standardization

Real life data is required based on these criteria. This criterion is basically developed for homogeny to test the capabilities of universities. This will be beneficial for comparison of resources and capabilities among other institutions.

Many factors play an important role to enhance the capabilities of university; these factors are listed below,

1. Full time PhD Faculty.
2. Faculty Training
3. Consultancy to industry
4. On campus Library
5. Access to On-line Journals
6. Infrastructure
7. Student Faculty Ratio
8. What faculty do to update themselves
9. Computing facilities (Computer labs and number of computers available for students)
10. Faculty Assessment
11. Faculty satisfaction level
12. Compensation to Faculty
13. Faculty students relationship
14. Financial Strength of University
15. Retention Policy
16. Commuting Facility
17. PhD Supervisors
18. Number of Programs being offered
19. National or International University
20. Liaison with international universities

Out of these factors few important ones have been chosen for further analysis, in order to compare these factors with other institutions.

Naturally, we do not limit our study to the perspectives of the discipline and the institute. Another question that needs to be asked is to what extent the research approach is influenced by actors and structures that are to be found in the environment of the institute. At the micro-level, we

immediately think of the local university administration, and at the macro-level of the actors who determine national research and research promotion policies.

What is common to all parts of the developing world is the development of new needs. These new needs are most prominently those of medical services and education. But there are also other needs, like those of entertainment, e g, radio or television. In the beginning of the 21st century, radio has ceased to be an attraction, even for persons in remote corners; more and more it is television that people want to see. New needs also exist in matters like clothing, where increased interaction between persons in all locations has led to the desire to be dressed like others. Communication, fostered by radio and now TV, can create the desire for needs that did not exist earlier. The creation of new needs together with the dependence on the market leads to a shift in the production objective.

5. Research Output by Universities of Pakistan

This analysis takes in to account the publications from Pakistani universities, which appeared in peer-reviewed journals indexed by Thomson-Reuters, ISI Web of knowledge during the years 2007, 2008, 2009, and 2010.

The databases of ISI Web of knowledge used for this analysis are science citation Index (SCI-Expanded), Social Science Citation Index (SSCI), and Arts & Humanities Citation Index (A&HCI).

S. No.	Institution / Universities	'07	'08	'09	'10
1	Quaid-I-Azam University, Islamabad	409	544	545	548
2	Agha Khan University, Karachi	186	311	345	416
3	University of Karachi, Karachi	276	416	365	387
4	University of Punjab, Lahore	162	278	269	352
5	University of Agriculture Faisalabad, Faisalabad	252	310	372	340
6	COMSATS Institute of Information Technology, Islamabad	92	149	199	237
7	Government College University, Lahore	97	154	282	230
8	University of Sargodha, Sargodha	38	115	151	174
9	National University of Science and Technology, Islamabad	48	92	114	150
10	University of Peshawar, Peshawar	77	97	131	137
11	Bahauddin Zakariya University, Multan	50	92	123	133
12	PMAS Arid Agriculture University, Rawalpindi	49	87	83	113
13	DOW University of Health Sciences, Karachi	11	49	55	94
14	Pakistan Institute of Engineering and Applied Sciences, Islamabad	54	73	70	88
15	University of Sindh, Jamshoro	59	105	96	86
16	Islamaia University, Bahawalpur	22	40	75	84
17	NWFP Agricultural University, Pehawar	20	29	46	82
18	University of Engineering and Technology, Lahore	38	55	52	79
19	Government College University, Faisalabad	0	0	8	76
20	University of Veterinary and Animal Sciences, Lahore	11	26	101	71
95	Institute of Business Management, Karachi	0	0	0	1
96	Institute of Business Administration, Karachi	0	1	2	0
97	PAF Karachi Institute of Economics and Technology, Karachi	0	0	1	0

6. Empirical Evidence of Selected 07 Universities

Seven selected universities data on eight chosen variables is presented below,

6.1. Quaid-I-Azam University, Islamabad

S. No.	Institution / Universities	'07	'08	'09	'10
1	Quaid-I-Azam University, Islamabad	409	544	545	548

6.1.1. Access to Online Journals and Library

Having access to more than 100 online journals, few of them are as follows,

Cambridge University Press (CUP)
Edinburgh university press
Emerald

6.1.2. Number of Programs Offered

4 Faculties from master's degree to PhD

6.1.3. PhD Supervisors

22 PhDs

More than 80% of the teachers hold doctoral degrees with experience of working in renowned universities of the world. The University has the distinction of having a large number of distinguished scientists and educationists as its faculty members, holding national awards and international recognition.

6.1.4. Computing Facilities

Yes

6.1.5. Liaison with International Universities

Yes

6.1.6. Student Relation Ship

Yes

6.2. Agha Khan University, Karachi

S. No.	Institution / Universities	'07	'08	'09	'10
2	Agha Khan University, Karachi	186	311	345	416

6.2.1. Access to Online Journals and Library

Having access to limited on line Journals, some of them are as follows:

UK Union catalogues
UK Library OPACs
International links are also provided

6.2.2. Number of Programs Offered

Undergraduate

- MBBS Programme
- Elective Programmes

Graduate

- Diploma in Clinical Epidemiology
- MSc Epidemiology and Biostatistics
- MSc Health Policy and Management

Postgraduate

- Postgraduate Medical Education

6.2.3. PhD Supervisors

AKU don't have PhD Scholars but they have over 100 MBBS Doctors

6.2.4. Faculty Training

At the heart of AKU-IED's working is the institution of Professional Development Centre (PDC). The PDC functions as a training and support facility for practicing teachers, teacher educators, and educational managers for their professional development.

6.2.5. Computing Facilities

No Computing facilities exist as is a medical university

6.2.6. Liaison with International

Aga Khan University School of Nursing (AKU-SON) is having liaison with many international entities, i.e., Royal Norwegian Embassy Development Corporation (NORAD), Department for International Development (DFID), Canadian Exchange Program (CADEX) and Voluntary Service Organizations (VSO).

6.2.7. Faculty Assessment

No Assessment criteria exist

6.2.8. Student Relation Ship

Studying at the Institute for the Study of Muslim Civilizations (AKU-ISMC) means that you are part of a small but diverse student body in the heart of one of the greatest cities in the world. Both academically and personally, opportunities for growth are endless and student life at the Institute is vibrant and enjoyable.

6.3. National University of Science and Technology, Islamabad

S. No.	Institution / Universities	'07	'08	'09	'10
9	National University of Science and Technology, Islamabad	48	92	114	150

6.3.1. Access to Online Journals and Library

Having access to above 100 online journals, some of them are as follows,

- ISI web of Science (WOS)
- Institute of Electrical & Electronics Engineers (IEEE)
- Emerald
- ebrary
- Association of computing machinery
- American society of mechanical engineering

6.3.2. Number of Programs Offered

Undergraduate

- Engineering and CS
- Business studies social, natural science and architecture
- Medicine and applied biosciences Post Graduate
- Engineering and CS
- Business studies social, natural science and architecture
- Medicine and applied biosciences PhD
- Engineering and IT
- Business Administration
- Medical Sciences
- Mathematics and Physics

6.3.3. PhD Supervisors

82

6.3.4. Liaison with International Universities

40 universities

6.3.5. Faculty Assessment

Through online surveys by QEC

6.3.6. Faculty Teacher Ratio

Sector	Faculty		Overall
	Full Time	Part Time	
Distance Learning	875.04	9.04	8.95
Public	19.37	68.20	15.09
Private	15.42	27.56	9.89
Overall (Including Distance Learning)	28.96	18.55	11.34

6.3.7. Student Relation Ship

A Centre has been established to address all issues of the students at one place. It is designed to deal with matters pertaining to students' life-cycle, from selection to graduation and alumni.

6.4. University of Engineering and Technology, Lahore

S. No.	Institution / Universities	'07	'08	'09	'10
18	University of Engineering and Technology, Lahore	38	55	52	79

6.4.1. Access to Online Journals and Library

The library has more than 80,000 volumes of books, 22,000 volumes of bound serials and more than 600 scattered issues of scientific and technical serials on diverse fields. Besides Engineering Subjects, considerable reading materials on Basic Sciences, Social Science, Literature and Islamic Studies are also available. Most of the collection covers Pure Science, Applied Sciences & Technology.

- HEC Digital Library
- UET Digital Library
- McGraw Hill Digital Engineering library
- E-Library

6.4.2. Number of Programs Offered

- Electrical Engineering
- Mechanical Engineering
- Civil Engineering
- Chemical, Mineral & Metallurgical Engineering
- Natural Sciences, Humanities & Islamic Studies
- Executive Education

6.4.3. PhD Supervisors

127

6.4.4. Computing Facilities

Currently University has two internet backbones Link. Primary Link is HEC PERN-2 is 80 Mbps. (HEC Complementary 80 Mb increased 3 Times: $3 \times 80 \text{Mb} = 240 \text{Mbps}$), Secondary Link is 20 Mbps.

6.4.5. Liaison with International Universities

22 universities world wide

6.4.6. Student Relation Ship

University of Engineering and Technology provides its students the following facilities during the academic sessions;

E.g., Residential Halls, Sports, Cafeterias, Health Facilities, Internet & Computer Facilities, Societies / Clubs, Computerization & Networking Project 2004-08, Library

On the other hand university has its own job portal where employers can post their jobs.

6.4.7. Student to Teacher Ratio

15: 1

6.5. Government College University, Faisalabad

S. No.	Institution / Universities	'07	'08	'09	'10
19	Government College University, Faisalabad	0	0	8	76

6.5.1. Access to Online Journals and Library

GC University Library subscribes to a wide range of databases through Higher Education Commission of Pakistan, Islamabad. Their content might include bibliographic information, giving reference to journal articles, conference proceedings, book chapters and newspapers, data (e.g. company financial information), and full text documents. Access available by title or subject by using concerned database.

Total 308438 books available

Over 16 online recourses' available like

- Academic Information Gateways
- South Asia Digital Library
- HEC Open Access Resources
- HEC Pakistan Digital Library
- HEC Pakistan Journal Library

6.5.2. Number of Programs Offered

6 Program offered including undergraduate to PhD level

6.5.3. PhD Supervisors

146 PhDs

6.5.4. Computing Facilities

PERN-Pakistan Educational Research Network, a high speed Internet bandwidth of 2 Mbp has been provided to the GCU This high speed Internet is being distributed among 400 users in the university including teachers, administrators and the students. This facility will be extended to 600 users very soon.

6.5.5. Liaison with International Universities

Having liaison with almost dozens of international universities like,

- Universities of the UK

- Universities of the USA
- Universities of the Australia
- Universities of the Canada

6.5.6. Student Relation Ship

Student Service Centre, Health care, Cafeterias, Societies, Gymnasium/Sports Hall, Inter-College sports for men, Tennis, Cricket, Hockey, Table Tennis, Swimming, Track and Field events, Hostel Facilities, Financial Aid to Foreign Students.

6.5.7. Student to Teacher Ratio

18:1

6.6. Institute of Business Management, Karachi

S. No.	Institution / Universities	'07	'08	'09	'10
95	Institute of Business Management, Karachi	0	0	0	1

6.6.1. Access to Online Journals and Library

The IoBM library, an ideal setting for learning and research, serves as a repository for the rich array of both traditional and electronic information services. A distinctive strength is its rich spectrum of resources, including a large number of books, journals, periodicals, reference material, audio-visual material, government documents and reports catering to the scholarly needs of students, faculty and researchers. Its pleasant and conducive to learning environment accommodates 350 students and 25,000 books. All library books are searchable using OPAC (Online Public Access Catalog), the newly developed software Library Information and Management System (LIMS), available at the front desk.

Few online journals are as follows,

- Asia Pacific Journal of Human Resources
- Business Communications Quarterly
- Economic and Political Weekly
- Harvard Business Review
- Journal of Education for Sustainable Development

6.6.2. Number of Programs Offered

7

6.6.3. PhD Supervisors

8

6.6.4. Computing Facilities

One of the strengths of the IoBM program is the incorporation of information technology as a key component of the curriculum. The academic programs offered by the Institute require students to obtain hands on experience on computers and develop a high level of expertise in this field. The Information Systems Department (ISD) of the College of Computer Science and Information Systems provides administrative, networking and technical support to the faculty and students. The College of Computer Science and Information Systems building includes a number of computer laboratories with over two hundred workstations. It is fully equipped with satellite/ radio-linked e-mail, Wi-Fi facilities and internet facilities for all students, faculty and staff.

6.6.5. Liaison with International Universities

Having liaison with almost dozens of international universities like,

- Eduniversal, Paris, France
- Bilkent University, Turkey
- International Finance Corporation

6.6.6. Student Relation Ship

IOBM offers a variety of services which assist students in making sound career decisions. These help students to select and define career alternatives and identify prospective industries and employers. Guidance is provided on skills and strategies essential for effective job search. These skills and strategies include letter writing, resume development and interview techniques.

6.7. PAF Karachi Institute of Economics and Technology, Karachi

S. No.	Institution / Universities	'07	'08	'09	'10
97	PAF Karachi Institute of Economics and Technology, Karachi	0	0	1	0

6.7.1. Access to Online Journals and Library

PAF-KIET has a total of 11 computer labs containing 320 terminals for students' convenience. The PAF Korangi Creek Campus has 5 general computer labs and 2 specific computer labs for engineering department. The City Campus has 4 computer labs. A newly developed multimedia lab equipped with up-to-date equipment is also available at the City Campus for animation, graphics and motion picture. The computing infrastructure consists of the campus LAN connecting the workstations and servers in the labs with other administrative servers and services. Access to Institute's MIS servers and Internet services is available from workstations on the LAN.

6.7.2. Number of Programs Offered

Management Science(Morning Programs)

- BBA-Honors'
- MBA (Regular)

Engineering(Morning Programs)

Computer Science(Morning Programs)

6.7.3. PhD Supervisors

13

6.7.4. Computing Facilities

Yes

6.7.5. Liaison with International Universities

No International Liaison with international universities

6.7.6. Faculty Assessment

Through online surveys by QEC

6.7.7. Student Relation Ship

Department keeps track of the job requirements in the industry, preparation of graduates, providing feedback to the academic department about the industry requirements, counseling of the graduates for the jobs, interviews, CVs, presentations and other related activities. Arrangements of job fairs and other contact opportunities for the corporate sector. Development of a database of potential

organizations where the graduates may find employment. Development of graduate directories and database of alumni. Holding of CV preparation workshop, interview participation.

7. Results

Through the collected data of universities this comparison sheet has been prepared to compare their capabilities,

Criteria	QAU	AKU	NUST	UET	GCU	IoBM	KIET
Access to online journals and Library	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Programs offered	4	3	3	3	6	3	3
PhD Supervisors	22	No	82	127	146	8	13
Faculty Training	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Computing facilities	Yes	No	Yes	Yes	Yes	Yes	Yes
Liaison with International Universities	Yes	Yes	Yes	Yes	Yes	Yes	No
Faculty Assessment	Yes	No	Yes	Yes	Yes	Yes	Yes
Student Relation Ship	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Through the comparison of the data of universities it has been observed that the number of PhD supervisors is not the real reason for the enhanced research performance, even Agha Khan University don't have a single PhD supervisor. Agha Khan University is having above hundred MBBS doctors. GCU here is having the highest number of PhD supervisors still it is at number 19 in the ranking and Number 1 University is only having 22 PhD Supervisors.

The variable here considered important catalyst for research output is the access to online journals. Every university out the listed universities is providing an access to online journals, but the universities on the top of ranking are having an access to online journals which is even more in number then the universities on the lower side.

The number of programs offered is also important factor, the university which is having relatively more number of programs their research performance is even more than the others, as the M.phil and the PhD students are also engaged in the publication of the research work.

It has also been witnessed that training and development play a vital role in the up gradation of skills of individuals. The universities where focus is towards the training of faculty their research performance is also better. The universities which are at the lower end of the ranking hardly spend a penny on the training of their faculty members.

Computing facilities on campus is almost point of parity for all the universities, so this factor is not having a major affect on the research performance of the university.

Liaison with the international universities is also having some relevance in consideration of being an important variable for enhancing research performance. Collaboration with the international universities is fruitful for exchange of ideas and thus it leads to creative work.

Faculty assessment is being done in almost every university, apparently it is not having any affect on the research performance, but it enhances the research performance when the result of this assessment is properly used. The result can be used to give more material and non material benefits to the faculty members. As per the classical view of the motivation money is the biggest motivator. The years where the monetary policy is expansionary the output also increased (Hameed and Ume-Amen, 2011). The same study can be replicated to educational side, when the compensation will be more the motivation to have more output will also increase. Relationship with the students is not an important factor in enhancing the research performance as per the findings of the study.

8. Criticism on Ranking Criterion of Research Output

This Analysis of rankings is done by HEC Pakistan based on the publications which appeared in peer-reviewed journals indexed by Thomson-Reuters.

Thomson-Reuters uses Impact factor for determining the quality of research output. There are number of situations in which impact factor may provide misleading information about a scientist's output. The negative side is that only limited number of Journals is part of Thomson-Reuters, if publication is done on any other journal, then will not be counted in its rankings.

The databases of ISI Web of knowledge used for this analysis are science citation Index (SCI-Expanded), Social Science Citation Index (SSCI), and Arts & Humanities Citation Index (A&HCI) and not including other disciplines.

The impact factor is often misused to predict the importance of an individual publication based on where it was published. This does not work well since the distribution of citations per article will usually be skewed: A small number of publications are cited much more than the majority- for example; about 90% of Nature's 2004 impact factor was based on only a fourth of its publications.

The impact factor, however, averaged over all articles and thus underestimates the citations of top cited while exaggerating the number of citations of the average publication.

Since only the ISI database journals are used (which covers mainly English-speaking journals), it undercounts the number of citations from journals in less-universal languages (even French, German, Spanish).

A journal can adopt editorial policies that increase its impact factor. These editorial policies may not solely involve improving the quality of published scientific work.

Journals sometimes may publish a larger percentage of review articles. While many research articles remain uncited after 3 years, nearly all review articles receive at least one citation within three years of publication, therefore review articles can arise the impact factor of the journal.

The author of the published article may influence others or he can request his friends and colleagues etc to use his article in their research, hence his impact factor will increase but this will present the true picture in terms of quality of research.

Most of the time the article attracts a reader, so the reader reviews the article, but he may not be using the article in his research as a reference, Impact factor does not give credit to these type of activities.

There are number of other platforms available for the ranking of research work which can be taken in to account. For example, SSRN, Journal of economic literature (Jel), Scopus, REPEC-ideas, Google scholar, *h*-index etc.

9. Conclusion

The results section has shown that out the selected 08 capabilities Access to online journals and Library, Number of Programs offered, Faculty Training, and Liaison with International Universities play a vital role in enhancing the research performance.

The results can be used in the universities where the spotlight is towards the research performance enhancement, so by implementing the results of this study. The capabilities which are playing an active role in enhancing the research performance must be achieved by the universities striving for research performance augmentation.

9.1. Future Research

The further research can be done on the results of faculty assessment. Almost every university is having faculty assessment procedures. If the result of faculty assessment is to be used to compensate high performing faculty members then the motivation to have more output will increase. As per the classical theory of motivation presented in early 19th century the biggest motivator is money. Obviously in assessment of faculty questionnaire number of published articles will be having major credence.

10. Ten Possible Actions

These are the 10 possible actions that can be taken related to the research topic under consideration,

S. No.	Action	Classical	Liberalism	Islam
1	The criteria of HEC for evaluation of research work must be increased from Thomson-Reuters to REPEC, SSRN, etc.	Anti	Pro	Irrelevant
2	Research Capabilities of Institutes (FBR, SBP, Karachi Chamber of Commerce, public and private Universities) must be integrated and shared with each other in order to produce synergy.	Anti	Pro	Irrelevant
3	Best Researcher award must be given on outstanding research on quarterly basis.	Irrelevant	Irrelevant	Irrelevant
4	Competitive debates among institutes must be conducted about research work then quality is to be checked with arguments.	Irrelevant	Irrelevant	Irrelevant
5	Moon sighting decision by cosmology department.	Irrelevant	Irrelevant	Pro
6	Financial Assistance to the researcher to present the research output in international institutes.	Pro	Anti	Pro
7	Liaison with the institutes of developed countries.	Anti	Pro	Irrelevant
8	In order to analyze quality and quantity of research, Books and cases must be taken in to consideration instead of just Articles and Research papers	Irrelevant	Irrelevant	Irrelevant
9	Specialized research institutes and Research Infrastructure should be arranged by govt. (Computer labs, Biological, Natural Sciences, and Agricultural Labs).	Irrelevant	Irrelevant	Irrelevant
10	Faculty Trainings / Seminars / Symposiums must be arranged about research.	Irrelevant	Irrelevant	Pro

References

- [1] Altbach, P. and Lewis, L. (1997). The academic profession in international perspective, in Altbach, P. (ed.), *The International Academic Profession: Portraits of Fourteen Countries*.
- [2] Altbach, P. (1998). Comparative higher education: Knowledge, the university, and development. *Greenwich*.
- [3] Argote, L. (1999). Organizational Learning: Creating, Retaining and Transferring Knowledge, *Kluwer Academic Publishers, Boston*.
- [4] Benbasat, Izak and Zmud, Robert W. (1999). Empirical research in information systems: The practice of relevance, *MIS Quarterly*, 23.
- [5] Davis, M. F. (1971). That's Interesting: Towards a Phenomenology of Sociology and a Sociology of Phenomenology, *Philosophy of Social Science*, 1, 309-344.
- [6] Fuchs, S. (1992). The Professional Questfor Truth, *Albany: State University Press*.
- [7] Hameed, Irfan., and Ume-Amen. (2011). Impact of Monetary Policy on Gross Domestic Product (GDP), *Interdisciplinary Journal of Contemporary Research in Business*, 3, 1348-1361.
- [8] Heedan, Eulalie Van. (1995). Black University Students in South Africa: The Influence of Sociocultural Factors on Study and Performance, *Anthropology & Education Quarterly*, 26, 50 - 80.
- [9] Helper, S. (1991). How much has really changed between U.S. automakers and their suppliers?, *Sloan Management Review*, 5-28.
- [10] Hovarth, Franz., Weber, Karl., and Wicki, Martin. (2000). International research orientation of Swiss universities: self-regulated or politically imposed?, *Higher Education*, 40, 389-408, *Kluwer Academic Publishers*.
- [11] Kogut, Bruce and Kulatilaka, Nalin. (2001). Capabilities as Real Options, *Organization Science*, 12, 744-758.
- [12] Liefner, Ingo. (2003), Funding, resource allocation, and performance in higher education systems, *Higher Education* 46, 469-489, *Kluwer Academic Publishers*.

- [13] Nathan, Dev (2005). Capabilities and Aspirations, *Economic and Political Weekly*.
- [14] Price, R. L. (1995). A Customer's View of Organizational Literature, in *Publishing in the Organizational Sciences*, Cummings and Frost, P. J. (Eds.), *Sage Publications*, 2, 98-107, *Thousand Oaks*.
- [15] Revilla, E., Sarkis, J., and Modrego, A. (2003). Evaluating performance of public-private research collaborations: A DEA analysis, *Journal of the Operational Research Society*, 54, 165-174.
- [16] Schiller, Daniel and Liefner, Ingo. (2007). Higher education funding reform and university-industry links in developing countries: The case of Thailand, *Higher Education*, 4, 543 – 556, *Kluwer Academic Publishers*.
- [17] Srow, Robert C. (2000). Research and teaching at a research university, *Higher Education*, 40, 449-463, *Kluwer Academic Publishers*.
- [18] Teece, David, Pisano, Gary., Shuen, Amy. (1997). Dynamic capabilities and strategic management, *Strategic Management Journal*, 18, 509-534.
- [19] Walker, Melanie. (2003). Framing social justice in education: What does the ‘capabilities’ approach offer, *British Journal of educational studies*, 51, 168-187.
- [20] Whitley, R. (1982). The establishment and structure of sciences as reputational organizations, in Elias, N. et al. (eds), *Scientific Establishments an Hierarchies*, *Dordrecht: Reidel Publications*, 313-357.
- [21] Williams, Ross and Dyke, Nina Van. (2007). Measuring the international standing of universities with an application to Australian universities, *Higher Education*, 53, 819-841, *Kluwer Academic Publishers*.
- [22] Winter, Sidney. (1987). Knowledge and competence as strategic assets, *The Competitive Challenge-Strategies for Industrial Innovation and Renewal*. Ballinger, 159- 84.
- [23] World Bank (2000). Higher education in developing countries, *Washington: World Bank*.