

DIRECTORY OF PRODUCTIVE SCIENTISTS OF PAKISTAN(PSP) 2016

The regular qualitative and quantitative evaluation of publicly funded research is desirable throughout the world in order to gauge the efficacy of exploitation of public funds. Pakistan Council for Science and Technology conducts regular studies which provide information about the productive scientists of Pakistan based on research related parameters including authorship of books, PhD research supervision, cumulative impact factor and citations for the papers published in impact factor journals, patents granted, awards won and winning of competitive grants. Additional parameters under applied research output i.e. Crop Varieties / Engineering Process / Medical Devices etc. are also taken into account for scientists and engineers involved in the applied research.

PCST has previously published 07 directories on the subject “Productive Scientists of Pakistan” in the last twenty years. This is the 8th study carried out which it includes the data of **3268** scientists of Pakistan employed in public/private sector universities, colleges and R&D organizations who have contributed in scientific research from beginning of their career up to 2015. It is to be mentioned here that application for the PSP is voluntary in nature and the data reflected in the directory are provided by the applicants through online application process. It incorporates a wide range of indicators for assessment of both quantity and quality of research and its impact. The number of registered scientists has considerably increased if compared to 2728 scientists in the previous directory.

The evaluation and finalization of this life time research output of scientists has been achieved through many steps and in consultation with experts. A sub-committee of experts peer reviewed “Books (Published/Edited), Awards (National/International) and Applied Research Output (Medical and Engineering)” component for the Directory of Productive Scientists of Pakistan (PSP) to finalize the claims made by the applicants.

- The Evaluation is done on the basis of the criteria, which has been developed and approved by a high level committee in 2016 (<http://www.pcst.org.pk/psp.php>).
- It must be considered that this directory contains the information based on the available data provided by scientists of various R&D/S&T institutions and universities of Pakistan.
- The data not meeting set criteria and/or having no documentary proofs has not been included.
- The weightage for different research areas under the revised PSP criteria is as under:

i.	Cumulative Impact Factor	30%
ii.	Total Citations & <i>h</i> -Index	30%
iii.	Patents Granted	05%
iv.	Patents Commercialized	05%
v.	Ph.D. Supervised	05%
vi.	Books Published / Edited	05%
vii.	External Research Grants (0.5 M & Above)	05%
viii.	Crop Varieties/Engineering Process/Products / Medical Devices etc.	10%
ix.	Awards	05%

➤ The benchmarks (the highest scores for each parameter obtained by applicants) are given below for ready reference:

S.No	Parameter	Benchmark* (Highest Score)	Percentile Score**
1.	Books	765.417	5
2.	Patents	111.262	10
3.	PhDs	405	5
4.	Grants	515	5
	Publications	-	60
5.	i. Impact Factor	944.687	30
	ii. Citations	5177.331	15
	iii. <i>h</i> -Index	62	15
6.	Applied Research Output (crop varieties etc)	86.833	10
7.	Awards	117.5	5

*Score of applicants is calculated after applying divisibility. For example for Cumulative Impact Factor (IF) of an applicant:

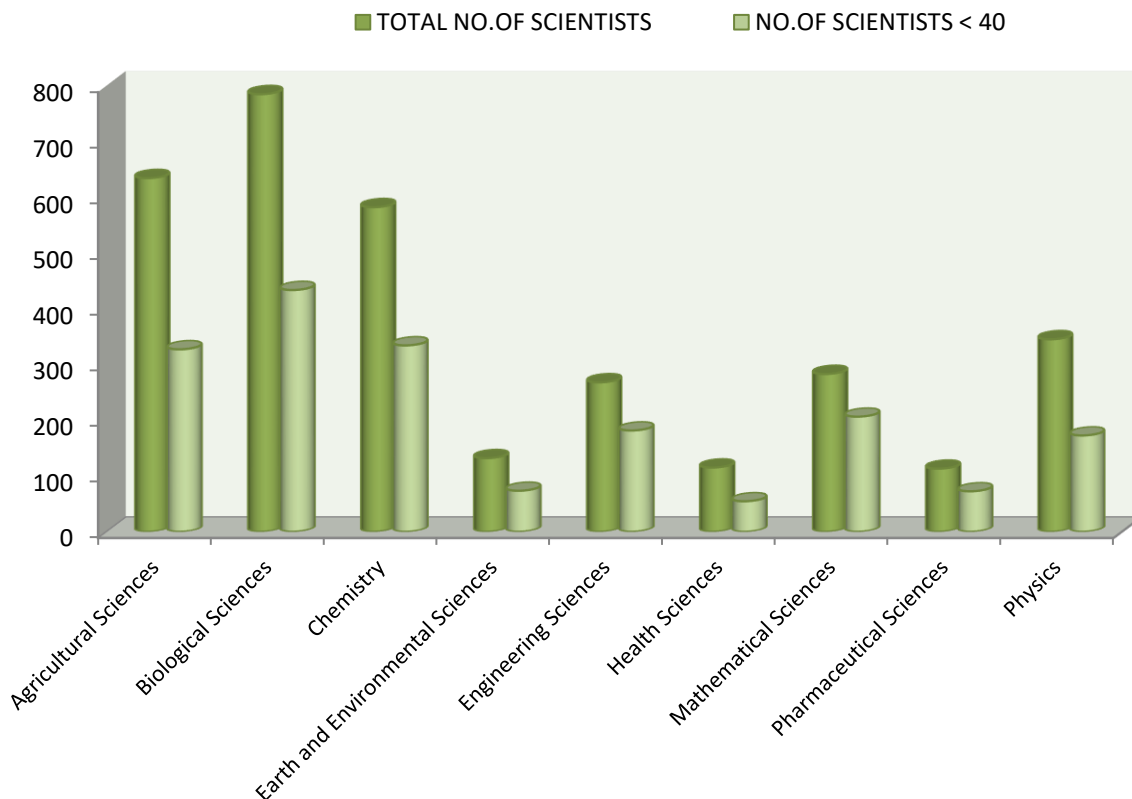
- The IF of each journal is obtained from the JCR
- IF of each paper is calculated by dividing journal IF by number of authors e.g. If a paper having 2 authors is published in a journal with IF 3, the Divided IF is $3/2 = 1.5$.
- The Divided IF is summed up for all the publications of applicant and is Author Impact Factor

**** An applicant can assess his/her own score for any parameter by dividing his/her score by applying the following formula:**

$$\frac{\text{Percentile Score}}{\text{Benchmark Score}} \times \text{Score of Applicant}$$

e.g. for awards, if the applicant's score is 40 then $5/71 * 40 = 2.82$.

➤ Result is presented discipline wise in 09 categories. A discipline-wise break up of scientists is given below:



- A separate ranking in the directory has been made for the first time for productive scientists having threshold age limit of 40 years and below to encourage young scientists and is presented separately for each discipline. It is promising to note that 57.13% of total registered productive scientists are below the age of 40.
- All possible efforts were made by PCST to contact scientists by emails/phone calls for data collection through online system as well as through their CVs along with proof of their credentials. However, many scientists could not provide complete information for the directory, and hence their data may not be complete.
- Draft result was uploaded on **February 16, 2017** on the PCST official website for verification of data by the applicants before the final release of the document, so that if any discrepancy found, updation/amendments can be made in the directory. A huge amount of data and queries were received in response for completion of missing data that was previously not provided by the applicants. Further data for PSP was received when applications were invited for RPA 2016-17 on November 10, 2016 through national press and were incorporated in the present document.
- The scoring system takes into account a variety of different factors from which the academic status and output of scientists is judged. This system provides a fairly comprehensive evaluation of the scientific productivity of our scientists. However, as no system of evaluation can be regarded as perfect, different opinions about the relative weightages given in this Directory, may exist. The review of criteria for RPA and PSP is an ongoing process. We fully acknowledge the suggestions and comments received from scientific community to improve the criteria, which will be reviewed before announcement of next PSP shortly.