

Ranking of Tunisian Scientists according to their efficient productivity. An overview of Scientific Research Output in Tunisia: Assessment of University Performances

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Introduction and Methods:

Based on the Ranking of Tunisian Scientists, the number of scientists in each subfield is computed for all Tunisian Universities and the ranking of the Tunisian Universities is then computed according to the number of scientists in each subfield, the arithmetic and geometric means of the ranks and the overall number of scientists in the ranking.

Results:

Field	Data	Overall	Mathematics, Engineering and Computer Science	Medical Sciences and Pharmacology	Chemistry and Material Science	Physics	Biology and Geological Sciences
Université de Manouba	Scientists	2	2	0	0	0	0
	Ranking	7	4	6	6	6	7
Institut de Santé Publique	Scientists	1	0	1	0	0	0
	Ranking	9	6	5	6	6	7
Université de Gabès	Scientists	2	0	0	1	0	1
	Ranking	7	6	6	3	6	5
Université de Tunis	Scientists	4	3	0	0	1	0
	Ranking	5	3	6	6	4	7
Université de Sousse	Scientists	4	0	3	0	0	1
	Ranking	5	6	4	6	6	5
Université de Monastir	Scientists	34	0	28	1	3	2
	Ranking	3	6	2	3	1	4
Université de Sfax	Scientists	51	2	20	2	1	26
	Ranking	2	4	3	2	4	1
Université de Carthage	Scientists	31	5	0	1	3	22
	Ranking	4	1	6	3	1	2
Université de Tunis Manar	Scientists	52	5	35	5	2	5
	Ranking	1	1	1	1	3	3

Table 1: Standings of Tunisian Universities according to the number of leading scientists in each scientific field

	Biological and Medical Sciences		Overall Standings	
	Number of Scientists	Ranking	Number of Scientists	Ranking
Université de Manouba	0 Scholar	8	2 Scholars	7
Institut de Santé Publique	1 Scholar	6	1 Scholar	9
Université de Gabès	1 Scholar	6	2 Scholars	7
Université de Tunis	0 Scholar	8	4 Scholars	5
Université de Sousse	4 Scholars	5	4 Scholars	5
Université de Monastir	30 Scholars	3	34 Scholars	3
Université de Sfax	46 Scholars	1	51 Scholars	2
Université de Carthage	22 Scholars	4	31 Scholars	4
Université de Tunis Manar	40 Scholars	2	52 Scholars	1

Table 2: Standings of Tunisian Universities according to the number of scientists in Biological and Medical Sciences and to the overall number of scientists in the ranking of Tunisian Scientists

Discussion:

Seeing that the Google Scholar 5 Years Hirsch Index > 0.8 Lifelong Performance Hirsch Index for most of the scientific, the obtained data of the universities reflects the current and historical situation of the Tunisian Universities. So, these results could be used to analyze classifications based on the historical or current performances of Tunisian Universities.

a. Explanation of International Classifications

There are three known types of rankings

- **Rankings classifying the Université de Tunis Manar as the leading University of Tunisia (like ARWU):** These rankings are generally based on the number of publications or the number of citations as a metrics. As the Université de Tunis Manar is the Tunisian University having the most important number of professors, it is clear that it would be easily ranked first according to its number of historical or recent publications. Furthermore and as the Université de Tunis Manar is the Tunisian University having the most important number of leading scientists according to Table 2, it is absolutely clear that this university would receive the most important number of citations among Tunisian Universities.
- **Rankings classifying the Université de Sfax as the leading University of Tunisia (like Leiden):** These rankings are generally based on the number of citations per paper as a metrics. As the University of Sfax has the most important number of leading scientists in Biological and Medical Sciences as shown in Table 2 and as such fields of research are generally characterized by an important value of the rate of the number of citations per paper, it would be evident that the University of Sfax would have the best number of highly cited publications in Medical and Biological Sciences that would help ameliorating the rate of number of citations per paper for the University. This will let the University of Sfax be classified first among Tunisian Universities according to the number of citations per paper for the University and all the international classifications based on this metrics.

- **Rankings classifying other Tunisian Universities as the leading University of Tunisia:** In general, these rankings use metrics that are not related to scientific research and by that cannot be used to evaluate research performances of Tunisian Universities. However, exceptions can occasionally exist.

b. Reasons of the deficiencies

In general, the poor performances in Core and Social Sciences are explained by the lack of regular updates in Scientific Research and the lack of originality in the choice of Research Areas. However, there are some other particular reasons that are given for each of the Tunisian Universities in Table 3

Field	Data	Overall	Mathematics, Engineering and Computer Science	Medical Sciences and Pharmacology	Chemistry and Material Science	Physics	Biology and Geological Sciences
Université de Manouba	Reasons	The deficiency of the Université de Manouba is mainly explained by limited research productivity and number of professors of this University. The significantly better performance in Mathematics, Engineering and Computer Science is explained by the existence of quality institutions in Research about Computer Science within this University.					
	Ranking	7	4	6	6	6	7
Institut de Santé Publique	Reasons	Excellent Performance for a Governmental Institute. Jointing Governmental Institutes to Tunisian Universities can help ameliorating the research performances of such institutes.					
	Ranking	9	6	5	6	6	7
Université de Gabès	Reasons	The deficiency of the Université de Manouba is mainly explained by limited research productivity and number of professors of this University. The significantly better performance in Chemistry and Material Science is explained by the existence of the FSG and ENIG that are quality institution in Research about Chemistry and Material Science within this University. The significantly better performance in Biology and Geological Sciences is explained by the existence of the Institute of Dry Regions within this University.					
	Ranking	7	6	6	3	6	5
Université de Tunis	Reasons	The Poor Performances is mainly explained by the attribution of all tools and efficient laboratories to the Université de Tunis Manar without letting some of them to its parent Tunisian University, the Université de Tunis, in order to help it survive. Such deficiencies are also explained by the lack of activity of several institutions of the Université de Tunis like ISG, TBS and the ENSIT.					
	Ranking	5	3	6	6	4	7
Université de Sousse	Reasons	The Poor Performance of Faculty of Medicine of Sousse has influenced negatively the standings of the Université de Sousse in Medical Sciences and Pharmacology. The limited performance of the Faculty of Medicine of Sousse is explained by the lack of research productivity and innovation. The poor performances in Biology and Geological Sciences and other Core Sciences is mainly explained by the attribution of all tools and efficient Laboratories to the Université de Monastir without letting some of them to its parent Tunisian University, the Université de Sousse, in order to help it survive.					
	Ranking	5	6	4	6	6	5
Université de Monastir	Reasons	The excellent performance of the Université de Monastir in Medical Sciences and Pharmacology is mainly explained by the existence of the Faculty of Medicine of Monastir, the Faculty of Dental Medicine of Monastir (The only Faculty of Dental Medicine in Tunisia) and the Faculty of Pharmacy of Monastir (The only Faculty of Pharmacy in Tunisia) within the University of Monastir. The deficiency of the University of Monastir in Core Sciences is mainly explained by the unavailability of young leading working researchers in these fields.					
	Ranking	3	6	2	3	1	4
Université de Sfax	Reasons	The quality performance of the Université de Sfax in Biological Sciences and Geology is explained mainly by the existence of the centre of Biotechnology of Sfax that affords quality tools for experimental research. Moreover, this is explained by the interest given by many institutions to Biological Research within the University of Sfax. However, this performance can be ameliorated if Inactive Institutions like the Institute of Olive Trees could be enhanced. As for Medical Sciences and Pharmacology, the University of Sfax is only classified third after the Université de Tunis Manar and the Université de Monastir. This is explained by the fact that the University of Monastir has the only university to include a Faculty of Medicine, a Faculty of Dental Medicine and a Faculty of Pharmacy and that the Université de Tunis Manar is the only university to include many University Hospitals, Research Institutes and Specific Centres. However, the fact cannot be explained only by infrastructural reasons. In fact, there are many specializations that are not involving leading scientists because of the lack of organization of Medical Research and the evaluation of its output.					
	Ranking	2	4	3	2	4	1
Université de Carthage	Reasons	The poor performance of the Université de Carthage in Medical Sciences and Pharmacology is explained by the lack and inactivity of Medical Institutions within the University and the lack of interdisciplinary work with the Faculty of Medicine of Tunis. The adoption of research collaboration with the Faculty of Medicine of Tunis as well as the amelioration of the research performances of several inactive institutions like the Schools of Veterinary Medicine can ameliorate the standings of the Université de Carthage in this field of research. The excellent performance for <i>Engineering and Computer Science</i> is mainly explained by the affiliation of many Engineering Competitive Institutions that has the tools and the techniques to render quality works like SupCom, INSAT, IPEST and the Polytechnic School of Tunisia under the University of Carthage. As for <i>Biological Sciences and Geology</i> , this is rather explained by the existence of rare institutions teaching Animal and Plant Science and of a Centre of Biotechnology in Borj Cedria giving more opportunities and tools to give advanced results for Biological Researches within the University of Carthage. Although these performances are excellent nationwide, the scientific performance in <i>Biological Sciences and Geology</i> is recognized to be not					
	Ranking						

		extremely satisfactory when comparing it to the one of the University of Sfax, the only other University having a Centre of Biotechnology. Effectively, the University of Sfax performs in its Centre of Biotechnology fructuous researches about the promotion and the advanced development of its tools of Analysis by doing Researches in Bioinformatics. However, the University of Carthage that has the best range in <i>Engineering and Computer Science</i> does not have some interest in this field of Research.					
	Ranking	4	1	6	3	1	2
Université de Tunis Manar	Reasons	The first ranks of Université de Tunis Manar is explained by its number of students (44780 students in 2011, Second among Tunisian Universities) and its greatest number of professors (2975 professors in 2011, First among Tunisian Universities). The third rank of Université de Tunis Manar in Biology is explained by the fact that this University does not have a Center of Biotechnology and by the inactivity of certain institutions like the Institute of Veterinary Research of Tunis established in 1897.					
	Ranking	1	1	1	1	3	3
Université de Gafsa	Reasons	Poor Productivity					
	Ranking	No Tunisian Leading Scientists					
Private Universities of Tunisia	Reasons	Poor Productivity					
	Ranking	No Tunisian Leading Scientists					

Table 3: Reasons of the deficiencies of each of the Tunisian Universities

Conclusion:

Tunisian Universities can ameliorate their research performances if they can adjust the Research situation in their inactive institutions and if they can establish collaborations with other Universities and institutions in doing quality interdisciplinary research output