

**“NIRF INDIA RANKINGS 2022: A STATISTICAL ASSESSMENT OF TOP 100 UNIVERSITIES”****Sumathi GM<sup>1</sup>, Mamatha HK<sup>1\*</sup>, Shiva Prasad Kollur<sup>2</sup>, Chandan Shivamallu<sup>3\*</sup>**<sup>1</sup>Department of Health System Management Studies, JSS Academy of Higher Education & Research, Mysuru, Karnataka, India—570015<sup>2</sup>Department of Physical Sciences, Amrita Vishwa Vidyapeetham, Mysuru, Karnataka, India<sup>3</sup>Department of Biotechnology & Bioinformatics, JSS Academy of Higher Education & Research, Mysuru, Karnataka, India—570015

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**Abstract**

Higher education in India encompasses a diverse range of institutions offering undergraduate and postgraduate degree programs in various fields of study. The government's objective is to have a significant number of universities and colleges ranked among the top 1000 worldwide. The National Institutional Ranking Framework (NIRF) was introduced to assess and rate Indian higher education institutions based on national criteria, emphasizing inclusive and accessible education while striving for global excellence to enhance overall quality. This statistical study focuses on evaluating the accreditation and ranking system of universities in India and its effectiveness in improving academic quality and achieving a favourable global position. A multiple regression analysis was conducted to predict the Total Score using 16 independent variables. The results indicate that the included variables significantly predict the total score, and all sixteen variables contribute significantly to the prediction. Higher scores across all parameters and sub-parameters are associated with a higher total score, emphasizing the importance of each parameter and sub-parameter in attaining a favourable rank. These findings underscore the pivotal role played by the accreditation and ranking system in India in enhancing academic quality and fostering global competitiveness.

**Keywords:** NIRF, Other Ranking, Descriptive Statistics, Multiple Linear Regression**Introduction**

Higher education in India refers to the educational opportunities available to students after completing their secondary education. It includes various types of institutions such as universities, colleges, and institutes that offer undergraduate and postgraduate degree programs (1). In India, higher education provides specialized knowledge and skills in a wide range of subjects such as arts, science, commerce, engineering, medicine, law, and more. It aims to prepare students for their desired professions or fields of interest.

Institutional effectiveness involves a continuous and organized approach of gathering, examining, and utilizing data and information pertaining to the objectives and achievements established to uphold the mission and purpose of higher education institutions (2).

There are many organisations which provides rankings for comparative information and serve as a reference for students, researchers, and policymakers. Among them very few has been considered as a standard organization. QS World University Rankings is an annual publication by Quacquarelli Symonds (QS), a British company specializing in education and study abroad. Times Higher Education (THE) World University Rankings: The Times Higher Education World University Rankings, published by Times Higher Education magazine, rank



universities worldwide (3). The Academic Ranking of World Universities, also known as the Shanghai Ranking, is published by the Shanghai Ranking Consultancy. Each ranking organization uses its own set of methodologies and indicators to evaluate universities and assign rankings.

The NIRF Top 100 university ranking for 2022 serves as a valuable resource for all stakeholders in the education ecosystem. It not only offers an objective assessment of universities but also encourages healthy competition and drives continuous improvement in the quality of education and research (4). By recognizing and appreciating the achievements of these universities, the NIRF ranking contributes significantly to the overall development and progress of the higher education sector in India. The NIRF Top 100 university ranking for the year 2022 has shed light on the exceptional performance and accomplishments of higher education institutions in India. Through a meticulous assessment of various parameters and sub parameters, the NIRF ranking has effectively captured the key aspects that define the quality and excellence of universities (5). The rankings have not only recognized universities that excel in teaching, research, and infrastructure but also have highlighted the importance of outreach, inclusivity, and perception.

As per the National Institutional Ranking Framework, Ministry of Education, Government of India, clearly states that the analysis of the NIRF parameters and sub parameters has showcased the multifaceted nature of university ranking. Institutions that prioritize teaching and learning, invest in research and professional practice, foster a diverse and inclusive environment, and enjoy a positive reputation have emerged as top performers (6). The rankings have not only provided recognition and prestige to these universities but have also guided aspiring students and researchers in making well-informed choices.

Globally, the responsibility of delivering quality education to the youth and preparing them with the necessary skills and abilities has been placed upon the higher education system (7). Visionaries and policymakers worldwide have been actively striving to enhance the quality of higher education by establishing national and international accreditation and ranking organizations. They aim to assess performance by implementing accreditation and ranking criteria. (8).

In the early 20th century, the United States pioneered the concept of university rankings. In 1983, US News and World Report published the first-ever institutional rankings in the USA. NIRF India Rankings 2020: Analysing the Ranking Parameters and Score of Top 100 Universities (9). According to Boulton<sup>2</sup>, a university's ranking impacts how it is perceived by the government and other organizations, influencing funding decisions and project priorities. Many universities prioritize achieving a higher ranking due to the positive publicity and recognition it brings to the institution. NIRF India Rankings 2020: Analysing the Ranking Parameters and Score of Top 100 Universities (10).

As higher education continues to grow, the utilization of university ranking has become a tool within academia (11). In recent years, systems that compare and rank universities have emerged, leading to an increased focus on national ranking systems in numerous countries. Internationally, various methods exist for evaluating and ranking academic institutions. Among these, the most widely recognized ones include the Times Higher Education World University Rankings (THES), QS World University Ranking, rankings by the United States National Research Council, and the Academic Ranking of World Universities (ARWU) by Shanghai Jiao Tong University (12).

The federal government aspires to see at least 50 universities and colleges among the top 1000 worldwide. Parallel to this, the launch of NIRF sought to rate Indian higher education institutions using national criteria, with an

emphasis on inclusive and accessible education and the pursuit of global excellence to improve overall quality (Athilal et al., 2016).

The criteria used for evaluation are divided into five Parameters and Subparameters

1. TLR is an acronym for Teaching Learning and Resources, and it measures the core academic tasks.
  - a. SS: Student strength.
  - b. FSR: Faculty student ratio.
  - c. FQE: Faculty with Ph.D.(equivalent)/ and experience.
  - d. FRU: Financial resource and Utilisation.
  - e. OE: Online education.
2. Excellence in research outcomes and scholarship is the focus of research and professional practice (RP).
  - a. PU: Publications.
  - b. QP: Quality of Publication.
  - c. IPR: Intellectual property rights.
  - d. FPPP: Footprint of projects and Professional practice.
3. Graduation Outcomes (GO), which gauges how well students have learned their lessons.
  - a. GUE: Metric for University examination.
  - b. GPHD: Metric for number of Ph.D. students graduated.
4. Outreach and Inclusivity (OI), with a focus on gender, economic, and social representation.
  - a. RD: Region Diversity.
  - b. WD: Women Diversity.
  - c. ESCS: Economically and socially challenged students.
  - d. PCs: Physically challenged students.
5. Based on evaluations from academic and professional peers and employers, perception (PR).  
Employer and Academic peer.

Consideration is given to both the overall and discipline-specific rankings. Only institutions with campuses for teaching or research are eligible to participate, including open universities and affiliate organizations. A minimum of three batches of undergraduate students and two batches of postgraduate students must have graduated from the institution. Indian institutions are required by the NIRF to keep accurate and consistent information on themselves (13).

The current statistical study specifically examines the accreditation and ranking system of Universities in India, evaluating its effectiveness in enhancing academic quality to attain a favorable position in global accreditation and ranking.

### **Methodology**

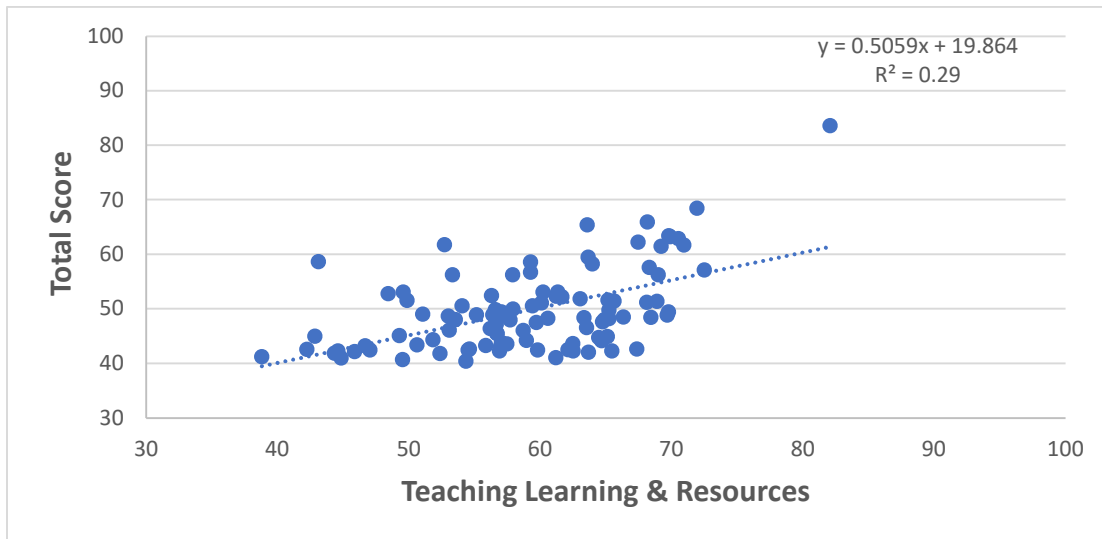
The study focuses on the top 100 NIRF-2022 universities. The many factors that influence the ranking of these top universities were investigated. The current study is a descriptive cross-sectional study in nature, with data gathered from the NIRF's official website. Following the acquisition of data, it was analysed using SPSS-21 and Excel. Followed by Multiple Linear Regression was carried out to estimate the relationship between independent variables on total score. This study would be useful for institutions to target the main parameters in order to get a higher ranking and for students to decide whether or not to enrol in a particular university.

**Results**

Table 1 shows the descriptive statistics of the parameters defining the ranking. It is observed that TLR and OI have the most concentrated scores with minimum Standard deviation. RCP and Perception have a greater amount of randomness with higher Standard deviation. The maximum score of 100 is in only one parameter, i.e. perception.

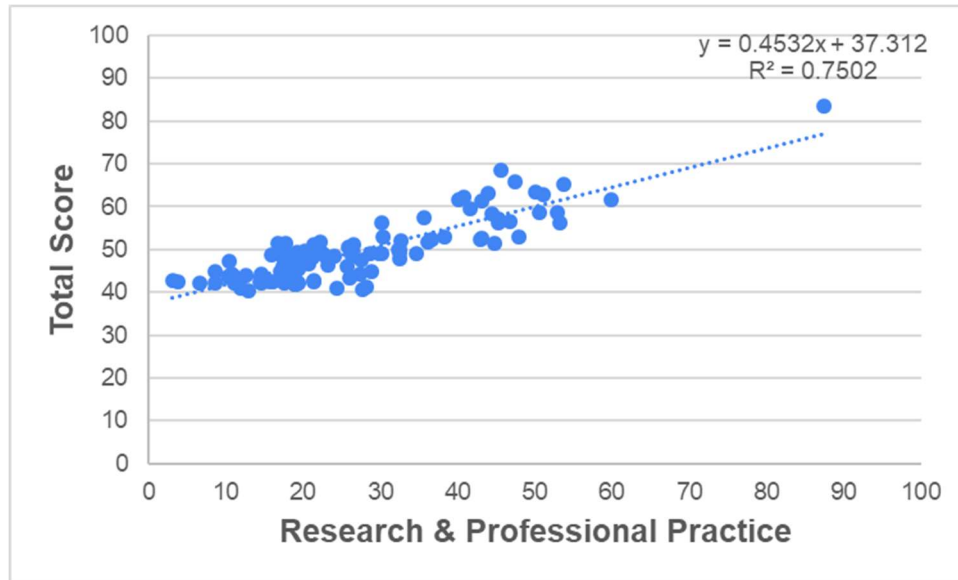
**Table 1: Descriptive Statistics of parameters**

Parameter	N	Min	Max	Mean	Std. Deviation
TLR	100	39	82	59.1	8.017
RPC	100	3	87	27.46	14.404
GO	100	50	98	72.43	10.683
OI	100	33	81	59.84	8.416
Perception	100	2	100	33.1	14.38



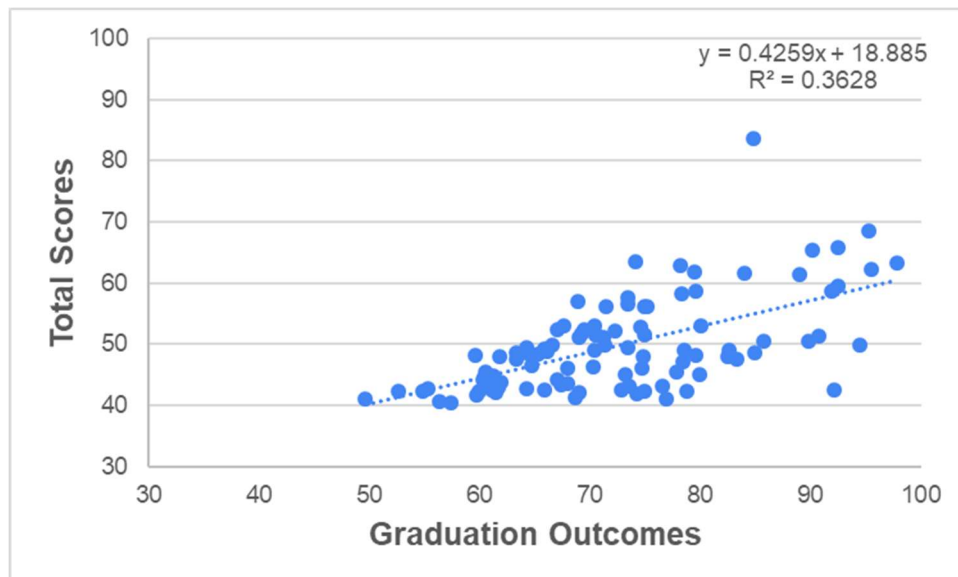
**Figure 1: Teaching, Learning and Resources vs. Total Score.**

Figure 1 shows that there is a weak linear positive correlation between TLR and Total score obtained by the universities. TLR score is distributed around the mean score 59.1 with minor deviations from the mean score throughout all the universities’ total score, which is represented by a straight line. The scatter plot is also used to analyze the association between TLR and Total score. TLR is taken as independent variable and Total score is taken as dependent variable. The relation between the two is represented by a linear regression equation  $y = 0.5059x + 19.864$  with a fit of  $R^2 = 0.29$ . Thus it can be concluded that the universities with higher TLR scores get a higher total score indicating TLR plays a significant role in obtaining a good rank.



**Figure 2: Research and Professional Practice vs. Total score.**

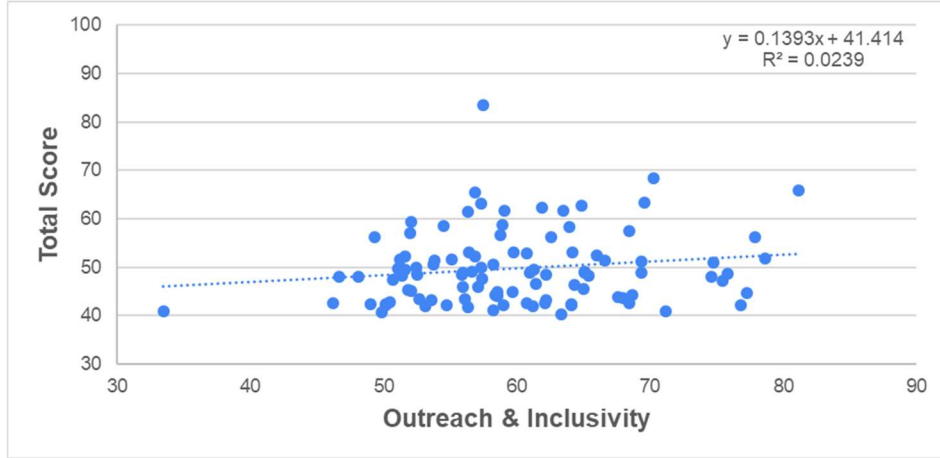
Figure 2 shows that there is a strong linear positive correlation between **RPC** and Total score obtained by the universities. **RPC** score is distributed around the mean score 27.46 with minor deviations from the mean score throughout all the universities’ total score, which is represented by a straight line. The scatter plot is also used to analyze the association between **RPC** and Total score. **RPC** is taken as independent variable and Total score is taken as dependent variable. The relation between the two is represented by a linear regression equation  $y = 0.4532x + 37.312$  with a fit of  $R^2 = 0.7502$ . Thus, it can be concluded that the universities with higher **RPC** scores get a higher total score indicating **RPC** plays a significant role in obtaining a good rank.



**Figure 3: Graduation Outcomes vs. Total score.**

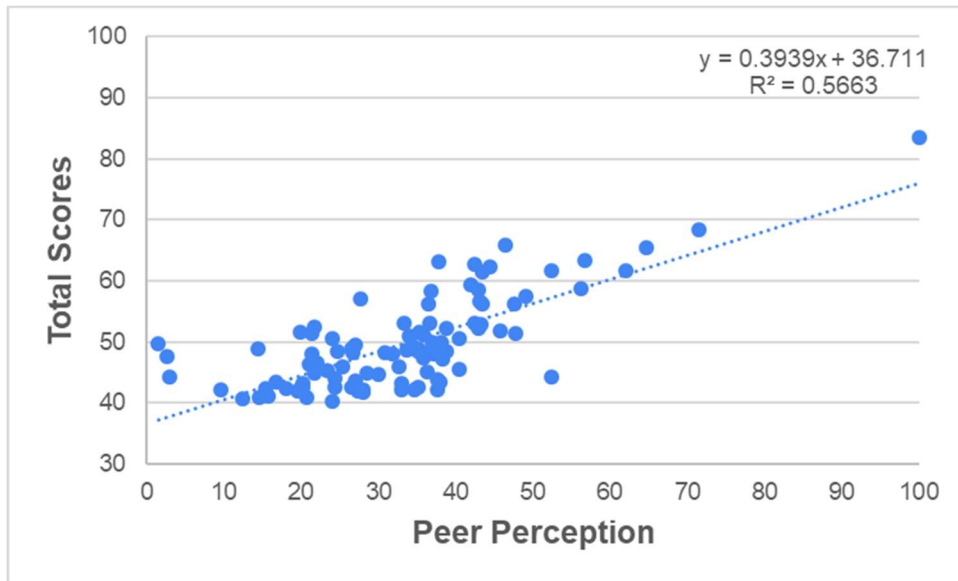
Figure 3 shows that there is a linear positive correlation between **GO** and Total score obtained by the universities. **GO** score is distributed around the mean score 72.43 with minor deviations from the mean score throughout all

the universities' total score, which is represented by a straight line. The scatter plot is also used to analyze the association between **GO** and Total score. **GO** is taken as independent variable and Total score is taken as dependent variable. The relation between the two is represented by a linear regression equation  $y = 0.4259x + 18.885$  with a fit of  $R^2 = 0.3628$ . Thus, it can be concluded that the universities with higher **GO** scores get a higher total score indicating **GO** plays a significant role in obtaining a good rank.



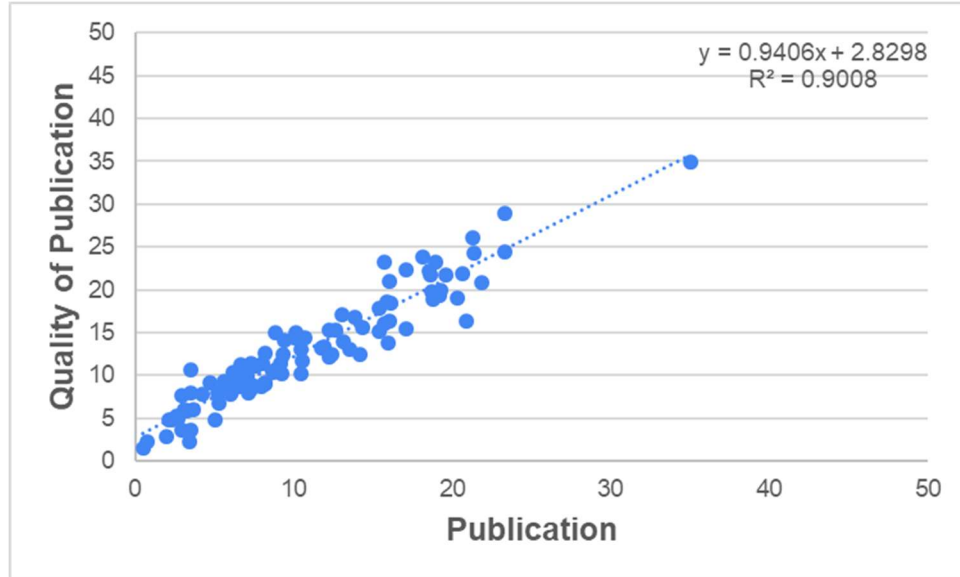
**Figure 4: Outreach and Inclusivity vs. Total score.**

Figure 4 shows that there is a weak linear positive correlation between **OI** and Total score obtained by the universities. **OI** score is distributed around the mean score 59.84 with minor deviations from the mean score throughout all the universities' total score, which is represented by a straight line. The scatter plot is also used to analyze the association between **OI** and Total score. **OI** is taken as independent variable and Total score is taken as dependent variable. The relation between the two is represented by a linear regression equation  $y = 0.1393x + 41.414$  with a fit of  $R^2 = 0.0239$ . Thus, it can be concluded that the universities with higher **OI** scores get a higher total score indicating **OI** plays a significant role in obtaining a good rank.



**Figure 5: Peer Perception vs. Total score.**

Figure 5 shows that there is a linear positive correlation between Peer Perception and Total score obtained by the universities. Peer Perception score is distributed around the mean score 33.1 with minor deviations from the mean score throughout all the universities' total score, which is represented by a straight line. The scatter plot is also used to analyze the association between Peer Perception and Total score. Peer Perception is taken as an independent variable and Total score is taken as dependent variable. The relation between the two is represented by a linear regression equation  $y = 0.3939x + 36.711$  with a fit of  $R^2 = 0.5663$ . Thus, it can be concluded that the universities with higher Peer Perception scores get a higher total score indicating Peer Perception plays a significant role in obtaining a good rank.



**Figure 6: Publication vs. Total score.**

Figure 6 shows that there is a strong linear positive correlation between Publication and Total score obtained by the universities. Publication score is distributed around the mean score 33.1 with minor deviations from the mean score throughout all the universities' total score, which is represented by a straight line. The scatter plot is also used to analyze the association between Publication and Total score. Publication is taken as an independent variable and Total score is taken as dependent variable. The relation between the two is represented by a linear regression equation  $y = 0.9406x + 2.8298$  with a fit of  $R^2 = 0.9008$ . Thus, it can be concluded that the universities with higher Publication scores get a higher total score indicating Publication plays a significant role in obtaining a good rank.

**Table 2: Correlation between the parameters**

Correlations						
		TLR	RPC	GO	OI	PERCEPTION
TLR	Pearson Correlation	1	.194	.063	.297**	.286**
	Sig. (2-tailed)		.053	.532	.003	.004
	N	100	100	100	100	100

RPC	Pearson Correlation	.194	1	.430**	-.085	.620**
	Sig. (2-tailed)	.053		.000	.398	.000
	N	100	100	100	100	100
GO	Pearson Correlation	.063	.430**	1	-.140	.338**
	Sig. (2-tailed)	.532	.000		.165	.001
	N	100	100	100	100	100
OI	Pearson Correlation	.297**	-.085	-.140	1	.179
	Sig. (2-tailed)	.003	.398	.165		.075
	N	100	100	100	100	100
PERCEPTION	Pearson Correlation	.286**	.620**	.338**	.179	1
	Sig. (2-tailed)	.004	.000	.001	.075	
	N	100	100	100	100	100

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows the correlation between the different parameters that decide the total score for ranking, and it is found that there is a correlation between RPC and Perception (0.620) at a significant level of 0.01.

**Table 3: Model Summary table of multiple linear regression**

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.999 <sup>a</sup>	.998	.997	.412

Table 3 provides the R, R<sup>2</sup>, adjusted R<sup>2</sup>, and the standard error of the estimated, which can be used to determine how well a regression model fits the data. R represents multiple correlation coefficient. A value of 0.999 indicated a good level of prediction. R<sup>2</sup> represents the coefficient of determination, which is the proportion of variance in the dependent variable that can be explained by the independent variables. Value of 0.998 indicates that our independent variables explain 99.8% of variability of dependent variable.

**Table 4: ANOVA Table**

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5644.528	16	352.783	2082.325	.000 <sup>b</sup>
	Residual	14.062	83	.169		



Total	5658.590	99			
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The F ratio in the ANOVA table tests whether the overall regression model is a good fit for the data. The table shows that the independent variables statistically significantly predict the dependent variable,  $F(16, 95) = 2028.32$ ,  $p < 0.001$ , indicating the regression model is a good fit of the data.

**Table 5: Coefficients table**

Coefficients						
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	
	B	Std. Error	Beta			
1 (Constant)	.026	.941		.028	.978	
SS 20	.250	.021	.109	11.767	.000	
FSR 25	.315	.021	.163	14.851	.000	
FQE 20	.247	.032	.088	7.809	.000	
FRU 20	.316	.017	.142	18.207	.000	
OE 35	.267	.032	.056	8.340	.000	
PU 35	.298	.025	.254	12.095	.000	
QP 35	.304	.026	.257	11.749	.000	
IPR 15	.280	.022	.089	12.889	.000	
FPPP 15	.276	.038	.061	7.327	.000	
GUE 60	.207	.011	.110	18.396	.000	
GPHD 40	.208	.007	.280	29.686	.000	
RD 30	.110	.007	.110	15.630	.000	
WD 30	.082	.018	.037	4.602	.000	
ESCS 20	.103	.018	.035	5.789	.000	
PCS 20	.145	.033	.027	4.349	.000	
AC +ACCN	.099	.004	.188	23.054	.000	

a. Dependent Variable: Total Scores

From table 5, unstandardized coefficients indicate how much the dependent variable varies with an independent variable when all other independent variables are held constant. Statistical significance of the independent variables is given in the column Sig.

A multiple regression was run to predict Total Score from 16 independent variables. These variables statistically significantly predicted total score,  $F(16, 95) = 2028.32$ ,  $p < 0.001$ . All sixteen variables added statistically significantly to the prediction,  $p < 0.05$

## Conclusion

In conclusion, the statistical study focused on evaluating the accreditation and ranking system of universities in India with the objective of assessing its effectiveness in improving academic quality and achieving a favourable global position. The findings of the statistical analysis suggest that higher scores in all parameters and sub-parameters contribute to obtaining a higher total score, indicating the significance of each parameter and sub-parameter in securing a good rank. These results indicate that the accreditation and ranking system in India plays a crucial role in enhancing academic quality and promoting competitiveness on a global scale.

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## References

1. Aguillo, I., Bar-Ilan, J., Levene, M., & Ortega, J., Comparing University Rankings. *Scientometrics*, 85(1), 2010, 243–256. <https://doi.org/10.1007/s11192-010-0190-z>
2. Dixon, R., & Hood, C., Ranking Academic Research Performance: A Recipe for Success? *Sociologie Du Travail*, 58(4), 2016, 403–411. <https://doi.org/10.1016/j.soc-tra.2016.09.020> doi: 10.4000/sdt.1229
3. Mukherjee, B., Ranking Indian Universities through Research and Professional Practices of National Institutional Ranking Framework (NIRF): A case study of Selected Central Universities in India. *Journal of Indian Library Association*, 52(4), 2017, 93–107.
4. Reddy, K. S., Xie, E., & Tang, Q., Higher education, high-impact research, and world university rankings: A case of India and comparison with China. *Pacific Science Review B: Humanities and Social Sciences*, 2(1), 2016, 21. <https://doi.org/10.1016/j.psr.b.2016.09.004>
5. Vernon, M. M., Balas, E. A., & Momani, S., Are university rankings useful to improve research? A systematic review. *PLOS ONE*, 13(3), 2018, e0193762. <https://doi.org/10.1371/journal.pone.0193762>.
6. Salmi, J. (2009). *The Challenge of Establishing World Class Universities*. Washington: World Bank Publications, <https://siteresources.worldbank.org/EDUCATION/Resources/278200-1099079877269/547664-1099079956815/547670-1237305262556/WCU.pdf>
7. Rajan KS, Swaminathan S and Vaidhyasubramanian S, (2018), Research Output of Indian Institutions during 2011- 2016: Quality and Quantity perspective, *Current Science*, Vol 114, No4
8. Kumaran, S. & Rajkumar, T. (2019). "Publications of Indian Universities in National Institutional Ranking Framework: A study", *Library philosophy and Practice*, <https://digitalcommons.unl.edu/libphilprac/2553>
9. R.V. Rao, V.J. Savsani, D.P. Vakharia, Teaching–Learning–Based Optimization: An optimization method for continuous non-linear large scale problems, *Information Sciences*, <https://doi.org/10.1016/j.ins.2011.08.006>.
10. Jerald Ozee Fernandes Balgopal Singh Accreditation and ranking of higher education institutions (HEIs): review, observations and recommendations for the Indian higher education system DOI: 10.1108/tqm-04-2021-0115.
11. Didham RJ, Paul OM (2015) The Role of Education in the Sustainable Development Agenda: Empowering a learning society for sustainability through quality education. In *Achieving the Sustainable Development Goals: From agenda to action*, Institute for Global Environmental Strategies

12. Bhatia, A., & Singh, S. P. (2021). Predicting NIRF Ranking using Machine Learning. In Proceedings of the 3rd International Conference on Computing Methodologies and Communication (pp. 547-553). Springer.
13. Jha, P. C., & Aggarwal, M. (2019). Predicting NIRF Ranking of Indian Universities and Institutes using Machine Learning Techniques. *Journal of Data Science*, 17(4), 611-626.
14. Jain, A., & Sood, S. K. (2020). NIRF Ranking Prediction of Indian Universities using Machine Learning Algorithms. *International Journal of Computer Applications*, 180(7), 1-5.