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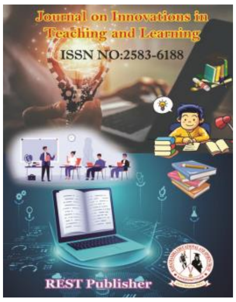

Analysis of Indian Technical Institution using ARAS Method

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Abstract: *An educational establishment, like a college of engineering or technological university, that offers specialized degrees and classes that concentrate on technical as well as scientific disciplines that educate learners from a variety of technological and engineering fields can be identified as an Indian technical institution. Indian Technological Institutions are educational organizations that offer specialized instruction and training in a range of technical fields, such as engineering, technology, including applied sciences. These schools are crucial in providing students with the understanding, skills, and expertise they need to pursue jobs in business, research, and growth, and contribute to the technological state of the entire nation. In an attempt to bridge the gap between academic studies and practical uses, they frequently offer undergrad and postgraduate programs, participate in studies, and work with companies. Given our expertise in the domain, we recognize the pressing necessity to conduct a performance evaluation of Indian technical institutions, considering relevant alternative and evaluation parameters. Such a study holds significant value in providing empirical insights into a critical public policy concern. This paper employs the ARAS methodology to assess the performance of technical institutions in India. The "ARAS" technique is an assessment of performance methodology that evaluates the productivity and efficacy of organizations or alternatives by taking account of a number of factors and their relative weight. : "Faculty strength, Student intake, Number of Ph. D awarded (Ph.D), Number of patents applied for (Patent), and Campus area (CA)". "Computational time, Simplicity, Mathematical calculations involved and Flexibility". For the Indian Technical Institution using "ARAS" method, the Student Intake is in the 1st Rank, Campus area is in the 2nd rank, Faculty strength is in the 3rd rank, Number of patents applied for (Patent) is in the 4rth Rank, and Number of Ph. D awarded is in the 5fth Rank. Conclusion: After analyzing, the Student Intake holds up the 1st rank and is the best factor to include when it comes to Indian Technical Institution.*

Keywords: MCDM, ARAS method, Faculty Strength, and Student Intake.

1. INTRODUCTION

A technical institution's primary objective is to investigate and spread knowledge. Although the latter type of work is achieved through teaching, the former is performed through research. Technical institutions have become vital to a nation's advancement in the knowledge sector for now [1]. A deeper investigation of the Kanpur computer center uncovers an Indian technical elite having American aspirations that were fundamental in both the establishment of computing learning in India along with the expansion of the Indian IT sector [2]. It encompasses diverse programs in applied arts, hotel management, construction, town planning, pharmacy, and various technological fields, contributing to the development of India's human resources [3]. Indian policymakers for the technical education sector are in a state of disarray due to the severe talent shortage the industry is experiencing, the rapid growth of both the number of vocational colleges and their enrollment capability, and the incapacity of learners to apply for entrance in significant numbers. The quality of technical education has been the subject of a tone of research over the last few years [4]. A technical institution's primary objective is to learn and to share knowledge. While the latter type of work gets done through teaching, the earlier is performed through research. Technical institutions have become vital to a nation's achievement in this era of the information economy. The resources provided by government agencies must be utilized more effectively to address the rising demand for education as more young people in India register in technical education programs [5]. To ensure the effectiveness of technical institutions in nurturing engineers and professionals, it is crucial to assess their performance, although this area has received limited attention compared to other industries due to the challenges in measuring their output[6]. In order to maintain competitiveness in the fast-paced and competitive global landscape, it is imperative to enhance the quality of the technical education system. This is essential for cultivating skilled human resources that can support the nation's goals of sustained growth and self-reliance in the fiercely competitive global environment[7]. Comparison research projects on the administration of overseas students offer an opportunity to look at and compare the strategies used by Indian universities, public as well as private[8].The academic generated by colleges and technical colleges in India is analyzed in this study, along with a comparison of their activities in terms of publications and patenting [9]. The Ministry of Human Resource Development (MHRD) established an initiative in November 2012 that made psychological counseling necessary for students at centrally financed technical schools including the "Indian Institute of Technology (IIT)", "Indian Institute of Management (IIM)", and "National Institute of Technology (NIT)", introducing mental health treatment for undergraduates as an entirely novel idea in India.[10]. Contributions in state scientific and technical institutes are necessary for these functions. Owing of the impacts, long gestational lags, externalities, externalities, and externalities of agricultural research, the public sector takes an active role in this sort of endeavor [11]. Instead of exclusively recruiting from prestigious technical institutions, their approach has been to seek out highly skilled and motivated candidates from colleges in the second and third tiers, prioritizing individual qualities over the reputation of the institution[12]. Engineering and technological institutes in India will be greatly influenced by the collaboration, either directly or indirectly. However, research on how people use electronic information sources at technological institute librarians across the country is significantly inadequate [13]. The insufficient number among Dalits and OBC scientists is also highlighted by data gathered from renowned scientific and technical organizations like IITs. At Indian Institute of Sciences (IISc) official numbers for statistics are further backed by this anthropological in nature study [14]. The government of India's plan to address the lack of engineers with advanced technical training was a significant acknowledgement of the prevailing gap in the country's workforce. This recognition stemmed from the realization that India's rapidly growing economy and industrial sector required a skilled engineering workforce equipped with the latest technical knowledge and expertise [15].

2. ARAS METHOD

The advancements in theoretical aspects have contributed to enhancing the effectiveness, practicality, and versatility of the method. Notably, the application of the ARAS method encompasses key sectors, including agriculture, industry, service industry, and information industry, with a particular focus on the industry sector. This comprehensive coverage highlights the method's broad applicability and convenience in various domains [16]. To summarize, the ARAS method shows great potential for the field of construction engineering as it provides a strong methodological foundation for decision-making support. However, its practical success relies heavily on the advancement of computerized systems that facilitate multiple criteria decision support [17].Expert assessments were used to quantify the significance of each end condition using the SWARA approach in order to determine the weighting of the criteria. a total of seven Iranian natural gas and oil enterprises' performance ratings were then assessed in accordance with the set standards, and their rankings were then determined employing the interval-valued fuzzy the ARAS approach [18].For the selection of the optimal mobile device, both the Individual COPRAS and ARAS methods are employed, providing respective preference ranking orders for the different models. A comparison of the rankings generated by both techniques reveals that the overall outcomes are largely consistent, albeit with slight variations in the rankings of intermediate alternatives [19].By applying the ARAS method, a comprehensive evaluation was conducted, considering the performance of the suppliers in relation to multiple criteria. This assessment enabled a systematic and quantitative analysis, resulting in closeness coefficients that provided insights into the relative performance levels of each supplier across the evaluated criteria [20].In this study, the calculation of criteria weightages was carried out using the Entropy method, while the Additive Ratio Assessment (ARAS) method was employed to determine the best option and establish a preference ranking order for the alternatives. The analysis revealed that cast alloy steel emerged as the most favorable choice, followed by cast iron and carburized steels, whereas hardened alloy steel was ranked as the least desirable option among the group [21].To validate the effectiveness of our proposed approach, a case study related to third-party logistics (3PLs) is conducted, accompanied by a comparative analysis that demonstrates the efficiency of the proposed method. Furthermore, the sensitivity analysis results indicate that our approach exhibits flexibility and reliability in handling various scenarios [22].Additionally, the ARAS method is known for its simplicity and practicality, making it easy to comprehend and apply in real-life situations. This method provides an "absolute" estimation for each alternative, further enhancing its practicality and usefulness[23].The sophisticated "Analytic Hierarchy Process (AHP)" and ARAS methods were used to select the best option, while the ARAS method was used to calculate the best criteria weights. Additionally, the value of authoritative predictions in the process of making choices was assessed using the AHP technique [24].The paper stresses a case study concentrating on SW assessment in order to demonstrate how the framework may be employed in real-life scenarios. It provides the moment integrated SAW-ARAS method used in the logistics industry and created a refusing fuzzy environment. This approach provides those in management and practice seeking efficient SW selection with useful guidance [25].

Alternate Parameters: 1. Faculty Strength: The number of professors contracted by an institution is frequently referred by the term its faculty strength. 2.Student Intake: The concept of "student intake" describes the total number of freshmen who have been admitted to or accepted in a school at the moment. 3.Number of Ph. D awarded (Ph. D): The entire number of doctorate degrees awarded to people by a program or institution of higher learning is commonly referred to as the number of Ph.Ds. granted.4.Number of patents applied for (Patent):The aggregate number of applications made to protect the rights to intellectual property for innovations or inventions is shown by the total amount of licenses applied for. 5.Campus area (CA):Campus area (CA) is a word employed when referring to the actual region of a school's constructions, features, and gardens inhabit.

Evaluation Parameters: 1.Computational time: The period or time required for an electronic device or software program to complete an assignment or computation is typically referred to as computation time. 2.Simplicity: Being straightforward, comprehensible, or not disproportionately sophisticated can be referred to as minimalism or simple. 3.Mathematical calculations involved: The computational tasks as well as computations executed to solve problems with mathematics or formulas can be referred to as the "mathematical calculations involved." 4.Flexibility: The ability or ability to change, adapt, or adjust quickly and effectively to respond to different conditions, requirements, or needs can be referred as flexibility.

3. RESULTS AND DISCUSSION

TABLE 1. Indian Technical Institution

Factors	Simplicity	Mathematical calculations involved	Flexibility	Computational time
Faculty strength (FS)	139.530	29.150	35.600	31.080
Student intake (SI)	142.970	33.690	30.050	53.060
Number of Ph.D awarded (Ph.D)	122.580	29.180	23.100	38.350
Number of patents applied for (Patent)	128.280	24.600	38.050	44.360
Campus area (CA)	158.360	27.960	28.060	33.330

Table 1 shows the various factors and the evaluation parameters considered here when evaluating the Indian Technical Institution.

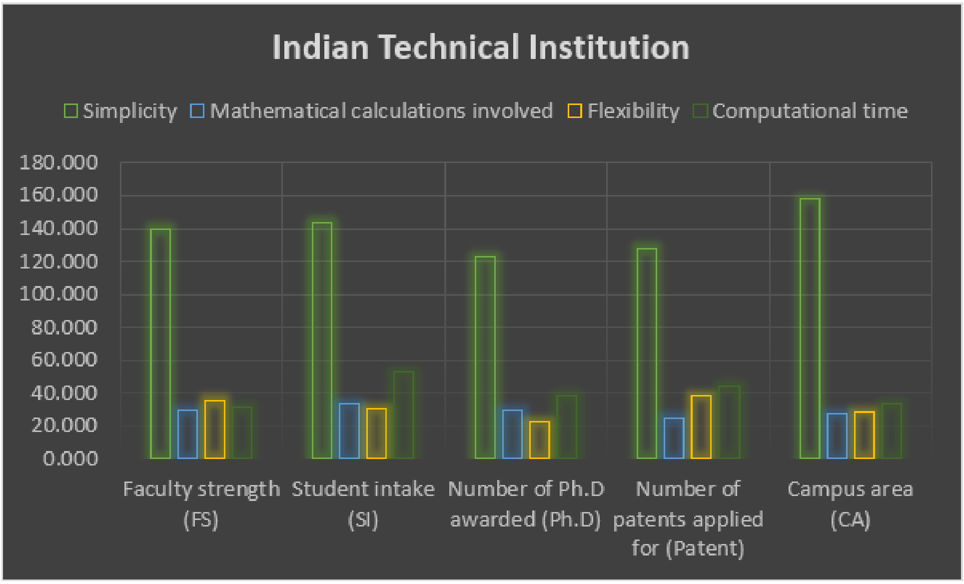

FIGURE 1. Indian Technical Institution

Figure 1 illustrates How the Indian Technical Institution is analyzed using the various alternate as well as evaluation parameters.

TABLE 2. Normalized Matrix

Factors	Normalized Matrix			
Max or Min	0.18629	0.03963	0.04476	0.03656
Faculty strength (FS)	0.16414	0.03429	0.04188	0.03656
Student intake (SI)	0.16818	0.03963	0.03535	0.06242
Number of Ph.D awarded (Ph.D)	0.14420	0.03433	0.02717	0.04511
Number of patents applied for (Patent)	0.15090	0.02894	0.04476	0.05218
Campus area (CA)	0.18629	0.03289	0.03301	0.03921

Table 2 shows the Normalized Matrix for the various factors and the Evaluation parameters such as flexibility, simplicity, Computational time and Mathematical calculations involved.

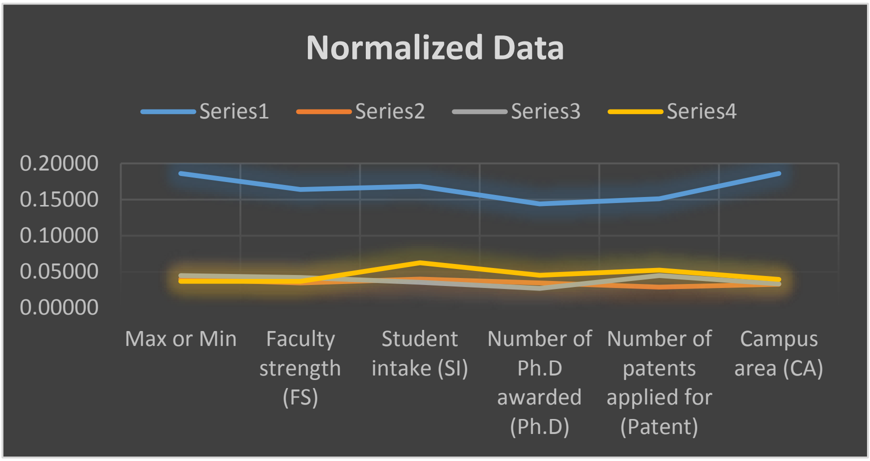

FIGURE 2. Normalized Data

Figure 2 illustrates the Normalized Data for the various alternate and evaluation parameters.

TABLE 3. Weight Matrix

Factors	Weight Matrix			
Max or Min	0.25	0.25	0.25	0.25
Faculty strength (FS)	0.25	0.25	0.25	0.25
Student intake (SI)	0.25	0.25	0.25	0.25
Number of Ph.D awarded (Ph.D)	0.25	0.25	0.25	0.25
Number of patents applied for (Patent)	0.25	0.25	0.25	0.25
Campus area (CA)	0.25	0.25	0.25	0.25

Table 3 shows the Weight Matrix for the Indian Technical Institution.

TABLE 4. Weight Normalized Decision Matrix

Factors	Weight Normalized Decision Matrix			
Max or Min	0.04657	0.00991	0.01119	0.00914
Faculty strength (FS)	0.04103	0.00857	0.01047	0.00914
Student intake (SI)	0.04205	0.00991	0.00884	0.01560
Number of Ph.D awarded (Ph.D)	0.03605	0.00858	0.00679	0.01128
Number of patents applied for (Patent)	0.03773	0.00723	0.01119	0.01305
Campus area (CA)	0.04657	0.00822	0.00825	0.00980

Table 4 shows the Weight Normalized Decision Matrix for the Various factors as well as Evaluation parameters

TABLE 5. Optimality Function Si

Factors	Si
Max or Min	0.0768
Faculty strength (FS)	0.0692
Student intake (SI)	0.0764
Number of Ph.D awarded (Ph.D)	0.0627
Number of patents applied for (Patent)	0.0692
Campus area (CA)	0.0728

Table 5 shows the Optimality Function Si for the evaluation of the Indian Technical Institution.

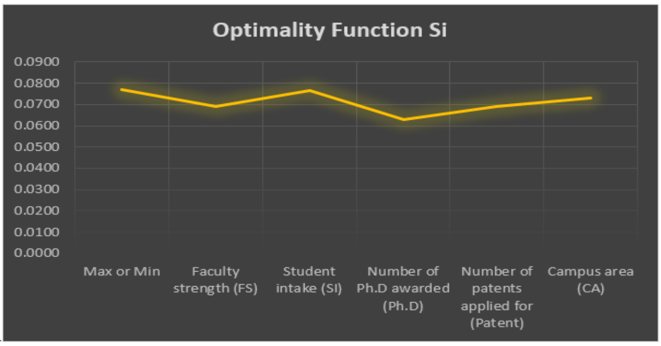

FIGURE 3. Optimality Function Si

Figure 3 illustrates the Optimality Function Si for the various alternate parameters such as Faculty strength, campus area, and student intake.

TABLE 6. Utility Degree Ki

Factors	Ki
Max or Min	0.17981
Faculty strength (FS)	0.16204
Student intake (SI)	0.17884
Number of Ph.D awarded (Ph.D)	0.14679
Number of patents applied for (Patent)	0.16199
Campus area (CA)	0.17054

Table 6 shows the Utility Degree for the various alternate parameters.

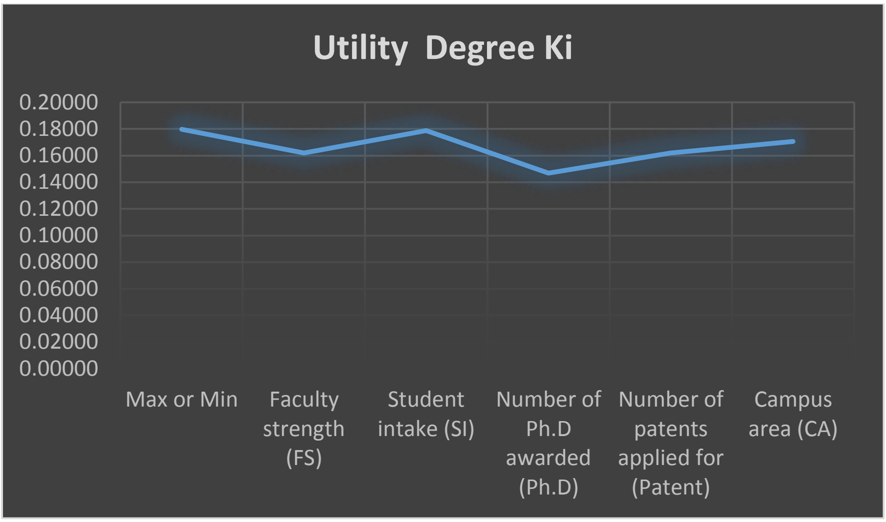

FIGURE 4. Utility Function Ki

Figure 4 illustrates the Utility Function Ki for the five types of factors or the alternate parameters considered in this study.

TABLE 7. Rank

Factors	Rank
Faculty strength (FS)	3
Student intake (SI)	1
Number of Ph.D awarded (Ph.D)	5
Number of patents applied for (Patent)	4
Campus area (CA)	2

Table 7 shows the Final Rank after analyzing the Indian Technical Institution. Here Student Intake is in the 1st Rank, Campus area is in the 2nd rank, Faculty strength is in the 3rd rank, Number of patents applied for (Patent) is in the 4rth Rank, and Number of Ph.D awarded is in the 5fth Rank.

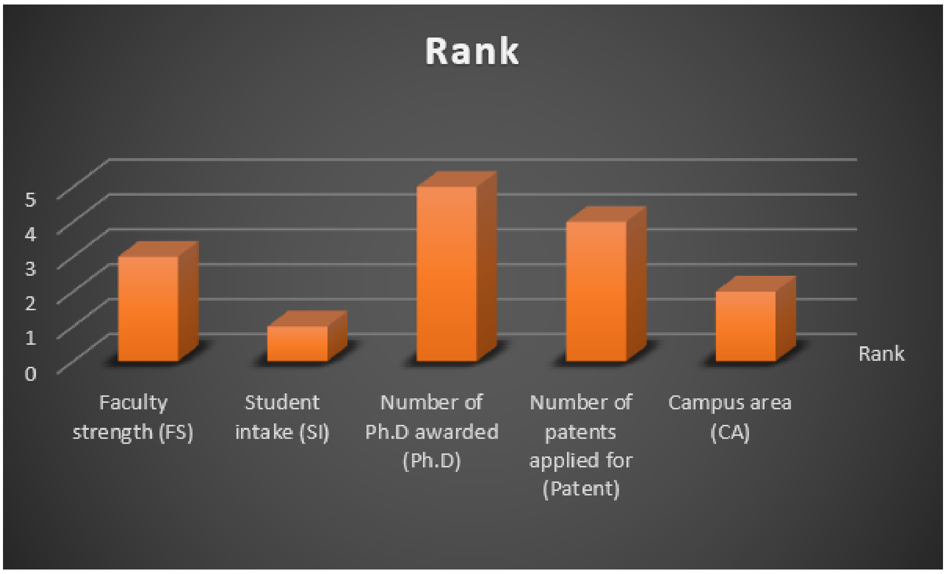

FIGURE 5. Rank

Figure 5 illustrates the final rank after analyzing the Indian Technical Institution. From the graph , the Student Intake takes up the 1st Rank.

4. CONCLUSION

An educational establishment, like a college of engineering or technological university, that offers specialized degrees and classes that concentrate on technical as well as scientific disciplines that educate learners from a variety of technological and engineering fields can be identified as an Indian technical institution. Indian Technological Institutions are educational organizations that offer specialized instruction and training in a range of technical fields, such as engineering, technology, including applied sciences. A technical institution's primary objective is to investigate and spread knowledge. Although the latter type of work is achieved through teaching, the former is performed through research. Technical institutions have become vital to a nation's advancement in the knowledge sector for now.To summarize, the ARAS method shows great potential for the field of construction engineering as it provides a strong methodological foundation for decision-making support. However, its practical success relies heavily on the advancement of computerized systems that facilitate multiple criteria decision support.

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