

An Approach for Improving Admissions: A Case Study of an Unaided Undergraduate Engineering Institute

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Abstract—Engineering is one of the most preferred career options for the students. Although this field has witnessed a decline in the recent past, the impact of this decline on reputed educational institutes is negligible. Students line up for admissions in premier institutes and prefer to wait beyond the final round up to the spot round. A study was conducted in a premier unaided engineering college to design an approach for attracting students resulting in maximum allotment and conversion of the allotted students in actual admissions. Perception of the students admitted in the institute from A.Y. 2017-18 to A.Y. 2021-22 was collected to understand factors in selecting the institute. Correlation analysis was employed to analyze the perception of 839 students of A.Y. 2021-22. Weights of the factors revealed that three out of the nine factors accounted for more than 50% of the student perceptions. Certain initiatives were undertaken at the institute level to achieve 100% CAP allotment and conversion of the allotted students into actual admissions. As a result of these initiatives, a significant change was noted in the allotment and conversion of the allotted students into actual admissions. During the A.Y. 2023-24, the allotment was 100% and 64.36% of the allotted students accepted their seat and reported to the institute within the first two rounds. Around 93.31% of students reported in for admissions in three rounds. The institute initiatives also influenced the preference code option exercised by the students while filling the admission option form. It was observed that during A.Y. 2022-23 and A.Y. 2023-24, more than half of the students admitted in the institute had provided a preference choice for their admission between 1 and 10 thereby indicating that they were mostly inclined to seek admission in one of the ten branches offered by the institute.

number of students and increase the conversion rate of students allotted during the centralized admission process.

Keywords: Career option, Common entrance test, Centralized admission process, Undergraduate engineering, Premier institutions, Student perception.

I. INTRODUCTION

SINCE long, engineering has been considered as one of the most lucrative and preferred career options by the students (Patil et. al., 2020). In the recent past, the Indian engineering education has witnessed a sharp decline and many seats were vacant throughout the country. This decline may lead to recession or even to economic crisis (Singh et al. 2021). As a result, many of the engineering education institutes were forced to reduce their intake or change the course offerings. Some of the institutes were even forced to close down their entire unit. Much research has been carried out to probe the reasons behind the changed thought process of the students. The issue of retention of students is not only limited to retaining the students allotted to the institute but it is also about the continuation of the course (Tinto, 2006). As per the statistics published by the American society for engineering education, many of the premier institutes across the globe continue to struggle with admissions. Brand of the institute also plays an important role in attracting the students (Summers and McCulley, 2006).

However, the impact of this change is negligible for reputed institutes. It has been observed that the students continue to line up for admission in premier institutes, wait till the final admission round and even the spot admission round. Their intention is to grab the seats created due to cancellation or those remaining vacant after the final admission round in the premier institutions. Most of the students also tend to sacrifice their preferred branch over the institute. Researchers have pointed out that many students admitted in the first year of engineering have a fair idea about the specialization that they

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The results of this study will serve as a guideline for un-aided undergraduate engineering institutes to attract a significant

intend to study (Ostafichuk et. al., 2017).

It is a well known fact that the demand for any branch depends upon the supply of engineering graduates and the market scenario. This creates a cyclic pattern for every engineering branch. The frequency of every such cycle depends on numerous factors and is outside the scope of this study. In the recent past, this frequency has been disturbed as many of the institutes have increased the admission intake for branches having high demand thereby increasing the supply of engineering graduates of these branches in the market. In spite of this, some of the branches still continue to attract the students for quite a longer period.

As such it is necessary to identify the factors that influence their decision in selecting a particular institute and branch. This study will help the institutes to devise suitable strategies in increasing the demand for lesser sought branches of their institutes, increase the number of meritorious students applying for admission and ultimately improve the brand image of the institute.

II. LITERATURE REVIEW

A study to investigate the decision making process of the students in choosing an engineering school was recently undertaken in France (Maryse et. al., 2021). Semi directive interviews were conducted for the 18 engineering students' participants from three different schools. The aim of the study was to develop an effective strategy to attract talented students. Researchers identified a diverse range of factors such as individual or psychological, economic, social as well as those related to the institute that influenced the selection of an engineering school. Four important findings have been outlined in this study. These include the usefulness of preparatory classes, quality education at a low cost, emphasis on social factors or capacity building in the recruitment process and adopting a targeted and differential marketing approach.

A study was conducted in the United Kingdom to understand the perception of students in opting for the engineering foundation year program (Natalie, 2022). The author used a storytelling method to collect the student responses. Responses were collected from 82 undergraduate students. The findings of the study states that the role of the family member plays a significant role while selecting the engineering course. It was noticed that the students who did not disclose the role of their family or friends in selecting the course had opted for admission by coincidence.

Joshi et al., (2020) conducted a study to find out the effect of various facilities to improve the learning environment in technical institutions. The study reveals that apart from the various ancillary services required, one of the key factors to attract the good students in the institutes is to provide a conducive teaching learning environment. Franchetti, (2012) carried out a study on retention of female candidates in the

University of Toledo. The author concluded that design of the quality engineering program reflects the retention of students.

Reis, et. al., (2012) conducted a study to ascertain the motivation in joining the engineering program. The study shows that occupation of the parents play an important role while selecting the program. Further they found out that potential students do not bother about the opinion of others. This indicates that the students are making a conscious decision based on concrete information available with them.

A study on motivation and continuation of male and female students for pursuing engineering courses was conducted in Riyadh, Saudi Arabia (Wafa et. al., 2021). The survey was conducted to identify factors that motivate the students in selecting an engineering program. The authors conclude that apart from various factors, the role of the family member who has acquired the highest qualification plays a vital role in selecting an engineering course. Enrollment in engineering programs can be enhanced by visiting the schools in the proximity of the institutes. Authors opine that counseling sessions about various engineering programs may be arranged for improving the admissions.

Many researchers have contributed to improve the admissions and retention ratio of the admitted engineering students. In the changing circumstances, it is equally important to devise an approach to attract the potential students, convert the CAP allotment into actual admissions and retain the students who have been admitted into the institute. This study builds upon existing studies that focus on why students choose a particular institute of engineering course. The present study will help the unaided engineering institutes in several ways such as concentrating on factors that contribute to the admission process, employ new methods for attracting potential students, increase the retention of the students admitted through CAP and ensure that majority of the seats allotted through CAP are converted in actual admissions during the first admission round.

III. OBJECTIVES OF THE STUDY

The study was conducted in a reputed engineering institute located in the western region of Maharashtra State, India with following objectives:

- To identify the factors influencing the students for selection of the undergraduate engineering college
- To determine the relationship between identified factors influencing the admissions and ranking these factors
- Development of a suitable mechanism for admission improvements and to enhance the conversion of allotted students into actual admissions

IV. METHODOLOGY

As discussed earlier, full allotment of seats and 100% actual admission has become a rare phenomenon and a challenge for institutions. The data for this study has been collected from a reputed institute located in Western Maharashtra, India. This section outlines the admission procedure, collection of student perception and admission statistics.

a. **Admission procedure:** In India, the process of undergraduate engineering admission is carried out at the respective State level. The admission process for the professional courses in the State of Maharashtra is carried out in a centralized manner by the State Common Entrance Test Cell (Admission brochure published by State Common Entrance Cell, Government of Maharashtra, 2023). The admission process is carried out in four stages, which are briefly described as follows:

Stage I: In the first stage, the State Common Entrance Test (CET) cell publishes a common admission brochure containing detailed rules and regulations and other necessary information for admission to various professional courses. The CET cell then invites online applications for the examination from the prospective (aspiring) students, conducts the entrance examination at various places throughout the state and declares the results. The answer keys along with the examination paper attempted by the student are released after the said examination to avoid any confusion amongst the students.

Stage II: After the declaration of the CET result, prospective students fill the online application form and get their documents verified at the facilitation center (FC) designated by the State CET Cell. Although a facility for self-verification of the form is available, students find it convenient to visit the FC as it enables the students to get their doubts cleared from the faculty of the institute. The students also get a chance to observe the facilities provided by the concerned institute. On the basis of the credentials (information) given by the aspiring candidates, a provisional merit is displayed by the competent authority and the same is available to students through their login.

Stage III: The CET Cell then publishes the final merit list in which a state general category number and category wise / gender wise and university area wise merit number is assigned to each student. A seat matrix showing the seat availability for all types of candidates for all branches and institutes throughout the State is published by the competent authority. The candidates then fill the option form by selecting a college and branch of their choice and rank the choices. A candidate has to fill a minimum one choice and a maximum of 300 choices. The seat allotment is processed by a complex algorithm based on candidate merit, choices and availability of seats at his merit. The candidates can check their allotment status on the official website. After seat allotment, the candidate needs to confirm admission through the login by paying seat acceptance fee and report to the allotted college with necessary original documents and stipulated fee within the specified time period to complete the admission

formalities. If the candidate wishes to wait for a better choice, the candidate may do so by exercising the 'not freeze' option through his login (provided the first choice option was not allotted) and participate in the further allotment rounds. The seats remaining vacant after the first round are offered to the students during the second round and those remaining vacant after the second round are offered to the candidates during the third round. It is imperative for the candidate to accept the seat allotted during the third round.

Stage IV: After allocation of seats through the three CAP rounds, some seats may still remain vacant if candidates who were allotted these seats did not report to the institute within the stipulated period. Such vacant seats will be filled by the respective institutes through institutional spot counseling based on the merit of the aspiring candidates. In order to claim these seats, the candidates need to visit the respective institute and apply for the institute level admission form.

For better understanding, the centralized admission process has been shown in figure 1.

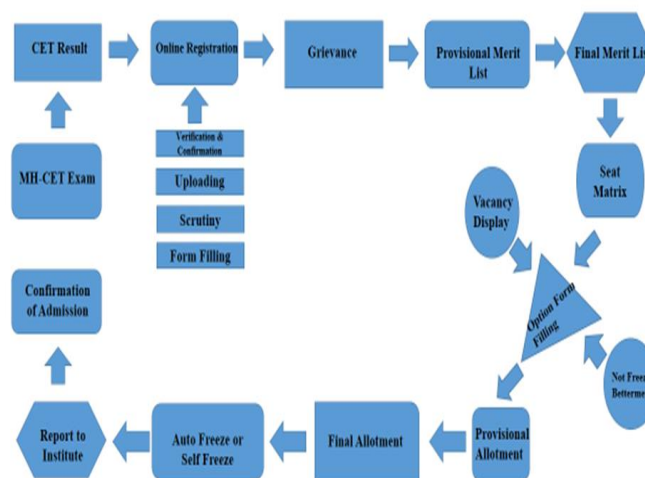


Fig. 1: Flow Chart for Centralized Admission Process (CAP)

b. **Data Collection:** A brainstorming session of institute leaders was arranged to identify the factors influencing student admission in an engineering college. A Google Form was created with open and close ended questions to extract the data for ranking these factors. This form was sent to all the first year students and they were made aware about the importance of the survey. Regular follow up was taken through the first year class coordinators to ensure maximum participation. The scope of this Google Form was quite wide and the data relevant to the current topic is presented herewith. It was seen that the student perception in selecting the institute from A.Y. 2017-18 to A.Y. 2021-22 as their preferred choice was fairly constant over a five year period and is shown in table 1. From the table it is observed that over a period of time student perception has shifted marginally towards obtaining placements and other factors like affiliation, infrastructural facilities and brand value of the institute.

c. **Data analysis:** Perception of 839 undergraduate students who took admission to one of the ten undergraduate branches during A.Y. 2021-22 was tabulated and normalized.

Correlation analysis was then employed to analyze the perception of the students. The values for the correlation analysis for student perception are shown in table 2. Thereafter weights of these factors were calculated using MATLAB. The observed weights and ranking of these factors are shown in table 3.

TABLE 1
PERCEPTION OF STUDENTS IN SELECTING THE INSTITUTE

Parameters	Perception of students in percentage while selecting an institute				
	A.Y. 2021-22	A.Y. 2020-21	A.Y. 2019-20	A.Y. 2018-19	A.Y. 2017-18
Quality of teaching and learning	20.99	20.95	26.49	24.24	24.26
Good placements	18.17	15.69	18.80	16.92	16.23
Affiliated to Pune University	14.16	13.93	12.45	12.70	11.71
Location of the institute	10.24	10.87	9.07	11.58	13.59
Infrastructural facilities	9.88	10.18	8.78	6.87	6.82
Brand names of the institute	8.78	8.98	6.39	7.99	7.90
NBA / NAAC Accreditation	8.25	8.70	9.19	9.97	8.95
Industry - Institute interaction	7.39	7.67	5.39	6.12	6.57
Could not get admit in other institutes	2.08	3.03	3.43	3.60	3.97

TABLE 2
CORRELATION ANALYSIS OF STUDENT PERCEPTION

	Quality of teaching and learning	Good placements	Affiliated to Pune University	Location of the institute	Infrastructural facilities	Brand names of the institute	NBA / NAAC Accreditation	Industry - Institute interaction	Could not get admit in other institutes
Quality of teaching and learning	1								
Good placements	0.1772	1							
Affiliated to Pune University	0.1069	0.1669	1						
Location of the institute	0.0380	0.1003	0.2227	1					
Infrastructural facilities	0.2754	0.3526	0.28226	0.1301	1				
Brand names of the institute	0.1523	0.1850	0.1893	0.0773	0.2133	1			
NBA / NAAC Accreditation	0.1847	0.2040	0.2635	0.1433	0.3043	0.1874	1		
Industry - Institute interaction	0.2027	0.2216	0.2695	0.1838	0.3396	0.2277	0.3654	1	
Could not get admit in other institutes	-0.16214	-0.0389	0.0527	0.0892	-0.0049	0.0480	0.0920	0.0389	1

TABLE 3
PERCENT WEIGHTS AND RANKING OF STUDENT PERCEPTIONS FOR VARIOUS FACTORS

	Quality of teaching and learning	Good placements	Affiliated to Pune University	Location of the institute	Infrastructural facilities	Brand name of the institute	NBA / NAAC Accreditation	Industry - Institute interaction	Could not get admit in other institutes
Percent weight	27.84	13.552	10.266	9.297	9.237	8.473	7.883	7.016	6.433
Rank	I	II	III	IV	V	VI	VII	VIII	IX

d. **Institute initiatives:** The weights of the factors so obtained and mentioned in table 3 indicate that three out of the nine factors namely quality of teaching and learning, good placements and affiliation to SP Pune University are significant in selecting the college and contribute to over 50% of the student perception. The institute focused on these three factors and undertook various activities with an aim of attracting the students allotted to the institute. Some of the important activities undertaken by the institute for enhancing the key factors mentioned above are briefly mentioned below.

- **Quality of teaching and learning:** Institute used different teaching software in the classroom to enhance the quality of teaching and learning. All classrooms were equipped with internet and projectors for power point presentations. LerniCo software was used to evaluate student learning through MCQ's in every classroom during the lectures.

- **Placements:** It is observed that the initiatives undertaken by the institute enhance the number of placements and packages offered by the recruiters (Shahabadkar et. al., 2021). A module as shown in table 4 was developed to train the students from first year to final year engineering. The main objective was to make the students industry ready. Soft skills training, CV writing workshops, MOCK interview and practice GD sessions were arranged from the third year itself to make the students ready for campus interviews. Foreign language training in Japanese, German and French language was arranged for enhancing international language skills.

- **Infrastructural Facilities:** Campus infrastructure was modernized and green audit was conducted regularly from a third party.

- **NBA and NAAC accreditation:** Institute ensures that the eligible programs are accredited by NBA from time to time. Currently seven UG and PG branches are accredited by NBA in the third cycle and NAAC with A grade. UGC has also granted autonomy status to the institute.

- **Expert lectures:** Industry experts and alumni were invited to deliver expert talk on technical topics to the students. These experts and alumni shared their experiences and guided the students on certain issues.

- **Industry-Institute Interactions:** The Industry Leadership summits, HR Connects and CEO Connects were organized regularly in the institute with an objective of making students aware about industry expectations and bridging the gap between industry and academia. Industrial visits were organized regularly and the Center of Excellence was established in the institute to train the students on the latest

technologies. To provide a practical exposure about the application of engineering knowledge, additional industrial visits were arranged on a regular basis.

TABLE 4
TRAINING MODULE TO MAKE THE STUDENTS INDUSTRY READY

Class	Name of the program	Outcome
First Year	TPO connect and expert lectures / seminars / workshops	Students are made aware about: <ul style="list-style-type: none"> • Training and Placement Cell and various activities undertaken by the cell • Eligibility Criteria of the visiting companies and other details • Importance of Academic Marks / Percentage
	Foreign language training (Japanese and German)	Enhances the employability skills of the students
Second Year	"Team Building and Motivational" workshops	Students are trained for public speaking, group activity and SWOC Analysis
Third Year	Structured training programs (60 to 70 hours)	Students are trained for Aptitude Test and Soft Skills
	HR Connect	Students are made aware about industry expectations
Final Year	Company specific training	Prepares students for the placements for the recruitment drives
	Programming skills (Post selection training activity)	Making students industry ready

- **Brand Value of the institute:** Regular efforts were made to reach out all the stakeholders that include students, parents, alumni and industry leaders through various print media and social media by displaying activities and achievements of the institute.

The students allotted in the CAP rounds were approached via phone calls by faculty of the concerned branch. The students were made aware about the importance of the selected branch. One to one counseling of the students was made for improving the admissions and to reach out potential students to make them aware about brand name of the college.

V. RESULT AND DISCUSSION

The initiatives undertaken by the institute had a positive outcome on the admissions for the subsequent two years.

- **Seat allotment:** Because of the various initiatives discussed above, the institute was able to attract a significant number of students for all branches. A cent percent allotment was seen during the next two years i.e. AY 2022-23 and AY 2023-24. Some students cancelled their admissions after the cutoff date because of various reasons such as admissions in other areas like MBBS and NDA. No student can be admitted on the vacant seats after this date.

- **Choice code:** Additionally, the efforts of the institute had a significant influence on the choice code i.e. institute preference code opted by the students while filling the option form. It was observed that during the next two academic years i.e. A.Y. 2022-23 and A.Y. 2023-24, more than 53% students (admitted in the institute in one of the ten branches) had provided a preference choice between 1 and 10.

This indicates that more than half of the students admitted in the institute during these two years focused on seeking admission in any of the ten branches of the institute. The choice range of the students for two academic years is shown in table 5.

TABLE 5
STUDENT CHOICE RANGE FOR A.Y. 2022-23 AND 2023-24

Choice Range	Number of Students			
	A. Y. 2022 - 23 (Intake 960)	Percent of total intake for AY 2022-23	A. Y. 2023 - 24 (Intake 1020)	Percent of total intake for AY 2023-24
1 To 10	513	53.43	544	53.33
11 To 20	140	14.58	127	12.45
21 To 30	97	10.10	78	7.64
31 To 40	57	5.93	67	6.56
41 To 50	39	4.06	40	3.92
51 +	119	12.39	110	10.78

- **Seat retention:** A significant and positive influence was noted on the seat retention of the CAP admission rounds. In A.Y. 2023-24 the allotment was 100% and 34.64% of the allotted students accepted their seat in the first round while 64.36% of the total intake seats were filled within the first two rounds. During A.Y. 2022-23, 34.30% of the allotted students accepted their seats in the first round while 65.09% of the total intake seats were filled within the first two rounds.

The seat acceptance for A.Y. 2022-23 and A.Y. 2023-24 during the CAP rounds has been shown in table 6.

TABLE 6
SEAT ACCEPTANCE STATUS FOR A.Y. 2022-23 AND A.Y. 2023-24

CAP Round	A.Y. 2022-23	A.Y. 2023-24
	Percent cumulative seat acceptance	Percent cumulative seat acceptance
I	34.30	34.64
II	65.09	64.36
III	93.92	93.31

Some students canceled their admissions after the third CAP round. These seats were subsequently made available for the institute level admissions.

VI. CONCLUSION

While selecting an institute or course, the students are influenced by a variety of factors. In this paper an effort has been made to identify the factors influencing the students while taking admission in an Engineering College. Total nine factors were identified through brainstorming sessions. The student perception was analyzed through correlation analysis and weights of these factors were determined. Results indicate that three out of the nine factors accounted for more than 50% of the student perceptions. Based on these factors, certain initiatives were undertaken to achieve 100% CAP allotment and conversion of the allotted students into actual admissions. The institute initiatives also influenced the preference code option exercised by the students while filling the admission option form. More than half of the students admitted in the institute had provided a preference choice for their admission between 1 and 10. This indicates that the students were mostly inclined towards taking admission in the institute rather than the ten branches offered by the institute.

Moreover, this paper highlights perception of students while choosing an Engineering College. It is observed that quality of teaching and learning plays a vital role in selection of institute followed by placements and the affiliating body. Institutes must concentrate on improving the quality of teaching and learning and quality placements for attracting students. The institute must also focus on enhancing the brand value to reach out to maximum potential students. This study will serve as a guideline for un-aided undergraduate engineering institutes to attract a significant number of students and increase their admissions.

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REFERENCES

- Franchetti, M. (2012). An Analysis of Retention Programs for Female Students in Engineering at the University of Toledo. *Journal of Pre-College Engineering Education Research*, Vol. 2(1), Article 3. DOI: <https://doi.org/10.5703/1288284314652>
- Information Brochure (2023). Information brochure for admission to full time professional undergraduate technical courses. Published by State CET Cell, Government of Maharashtra. <https://mahacet.org>.
- Joshi, A. S., Nandurkar, K. N., & Pawar, P. J. (2020). A Novel Approach for Improving Quality of Learning Environment in Technical Institutions. *Journal of Engineering Education Transformations*, Vol. 34(1), pp. 93-108. DOI: 10.16920/jeet/2020/v34i1/151377
- Maryse, G., Romain, M., & Klara, K. (2021). Understanding the factors influencing students' choice of engineering school. *European Journal of Engineering Education*. 47(2), pp. 1-14. DOI: 10.1080/03043797.2021.1993795
- Natalie, W. (2022). Why do Students Choose to Study on Engineering Foundation Year Programmes within the UK?. *European Journal of Engineering Education*, Vol. 48(1), pp. 157-179. DOI: 10.1080/03043797.2022.2047895
- Ostafichuk, P., Jaeger, C., & d'Entremont, A. (2017). How First Year Engineering Students Select Their Specialization and How We Can Better Support Them. *Proceedings of the Canadian Engineering Education Association (CEEAI7)*, Paper ID: 065, June 4-7, 2017. pp. 1-8.
- Patil V., Joshi, A., & Kadave, P. (2020). Role of Stakeholders in Improving Indian Engineering Education Ecosystem. In *Glimpses of Engineering and Technology in the Modern World*, pp. 29-39. ISBN: 978-81-942052-7-2
- Reis, A., Patrocinio, C., & Lourtie, P. (2012). Attracting Students to Science, Technology and Engineering Higher Education. *SEFI 40th Annual Conference, Thessaloniki, Greece*
- Shahabadkar, P. K., Joshi, A. S., & Nandurkar, K. N. (2021). Enhancing Employability Skills and Placements in Technical Institutes: A Case Study. *Journal of Engineering Education Transformations*, Vol. 34(4), pp. 13-21.
- Singh, B. J., Sodhi, H. S. and Rippin. (2021). Unleashing a quantitative approach to manage admissions in engineering: a case of the North Indian state. *Journal of Applied Research in Higher Education*, Vol. 13(3), pp. 684-709. DOI: 10.1108/JARHE-06-2020-0174
- Summers, R., & McCulley, J. (2006). Applying Marketing Principles to Attracting and Retaining Engineering Students. Paper presented at 2006 Annual Conference & Exposition, Chicago, Illinois. 10.18260/1-2-194
- Tinto, V. (2006). Research and Practice of Student Retention: What Next?. *Journal of College Student Retention*, Vol. 8(1), pp. 1-19. DOI: 10.2190/4YNU-4TMB-22DJ-AN4W
- Wafa, L, Amal, A., Yasser, I., & Abdelhakim, A. (2021). What Motivates Students to Study Engineering? A Comparative Study between Males and Females in Saudi Arabia. *Education Sciences*, Vol. 11, pp. 1-17. <https://doi.org/10.3390/educsci11040147>