

Understanding Aspirations of First Year Undergraduate Engineering Students

Shahabadkar Pramod ¹, Joshi Ajinkya ², Lele Vaishali ³, Patil Vilas ⁴

^{1,2,3,4} K. K. Wagh Institute of Engineering Education and Research, Nashik - 422 003

¹ pramodshahabadkar@gmail.com

² ajinkya_j@rediffmail.com

³ lelevaishali17@gmail.com

⁴ vilas_patil5@rediffmail.com

Abstract: Success of any educational institute largely depends upon how the students excel after they complete their studies. This may be in terms of obtaining dream placement, admission to higher studies in reputed institutes or even starting a venture of their choice. Desired results can be achieved if the aspirations are understood at an early stage and students are groomed properly for achieving their dreams. The objective of this study is to understand the aspirations of engineering students in their first year itself and develop a model for nurturing these aspirations. This paper also identifies factors influencing changes in aspirations and the contribution of these factors.

In the present study, the aspirations of undergraduate engineering students were collected immediately after their admission. This activity was carried out consecutively for three academic years: 2017-18, 2018-19 and 2019-20. Aspirations of 2043 students were collected during this period by using IT tools. The study indicated that maximum students during their first year engineering were inclined towards obtaining placements in multinational firms followed by seeking admission to higher education in reputed institutes, entrepreneurship and joining the civil services. The institute under consideration has developed a five stage model to help the students in fulfilling their aspirations. This includes establishment of a Career Development Cell, Entrepreneurship Development Cell, International Facilitation Centre, Higher Study Cell and Novel Master Student Program.

Aspirations were collected again during the final year in order to understand the deviations when students moved from first to final year. Results indicate that there was a substantial shift in the student aspirations. By the time the students reached the final year, there was an increase of 47.90% in the number of students who opted for placements while the number of students planning for higher studies decreased by 30.51%. Brainstorming session was conducted to identify

the factors that prompted the students to change their minds during their course curriculum.

The data presented here will give an insight to the academicians and institutes in understanding student ambitions and developing a model for fulfilling them.

Keywords: *Employability; Placements; Student aspirations; Entrepreneurship; Higher education; Undergraduate engineering students; Student support; Google forms.*

1. Introduction

An aspiration can be defined as a hope, desire, aim or ambition to achieve something. For students these are the values, beliefs or abstract statements in respect of their future educational or employment plans. Studies suggest that a large number of engineering students aspire for managerial positions even before they get exposure to any engineering work (Rynes et. al., 1988).

According to the All India Survey on Higher Education (2019), maximum students at undergraduate level were enrolled in Arts followed by Science, Commerce and Engineering stream. At the same time, the India Skills Report (2020) has pointed out that the engineering sector continues to be the most dominant sector in terms of employment. The National Employability Report (2019) points out that around 80% of the engineering graduates are not fit for employment. In this context it is very necessary to identify the aspirations of the students at the entry level and groom them properly so that they become employable. Timely support and grooming will also reduce the chances of changing the aspirations.

Institutes are extending various services and facilities to improve the quality of the learning environment and boost the morale of the students (Joshi et. al., 2020). The institutes located in mega cities have an added advantage as they are in a position to offer better exposure to students in

terms of quality education and requisite skill sets. At the same time, finding more internship opportunities for fresher in larger cities is comparatively easier. "Given a rich environment learning becomes like the air-it's in and around us" quoted by Sandra Dodd excellently explains the importance of college campus in the hearts of students. Colleges with lush green campuses, a canteen with appetizing food, a library with abundance of books and variety of technical events are sources of attraction and motivation for the students. Additional facilities such as sports, gymnasium, foreign language courses and soft skills foster the all around development of the students.

The Start-up India initiative by the country's Department of Industrial Policy and Promotion helps to build a positive, effective ecosystem in the country, turning business ideas into a reality for a flourishing start-up environment. States and union territories across the country have introduced start-up policies following the government's initiative. Start-up funding in India has consistently attracted big investors from across the globe. Some of these include ride-hailing companies, hotel chains, digital payment services and online food apps. This scenario assimilates in the mind of students that the college they are selecting should provide substantial resources for development of entrepreneurial skills. Placements and alumni strength also exhibit the excellence of the college.

It should be noted that the aspirations of the students undergo a sea change by the time they complete their education. The institute should try to identify and understand these changes over a period of time and extend necessary support to the students. A module to support the students to fulfil their aspirations has been developed by the institute under consideration and is discussed in the subsequent sections.

2. Literature review

Alpay et. al. (2008) carried out a survey of undergraduate engineering students to explore the student motivation and aspirations. A questionnaire was obtained from 2330 engineering students of seven branches from different year groups. A similar feedback with suitable modifications was also obtained from 108 alumni. Results of this study indicate that in the early stages, factors such as making a difference, invention and financial security are more important for the students. The factor of financial security becomes dominant in the final year. In order to maintain and boost the level of motivation, authors have suggested engaging the students in real life issues during the

early stages and improving the integration between R&D and undergraduate education.

A study of first year engineering students was conducted to examine the relation between aspirations and attitude towards engineering (Rohde et. al., 2018). Responses for the study were obtained from 2916 students of four large public universities across the US. Responses were measured on a seven point anchored numeric scale. Researchers observed a significant association between attitude towards engineering and aspirations to certain career fields. Students aspiring for engineering or industry as a career had a more positive attitude towards engineering. Certainty in pursuing engineering / industry as a career option was observed more for students pursuing Mechanical engineering and less for those pursuing Biomedical engineering.

Upadhyay (2019) suggested a model to determine factors that affect the ambition of the students and identify differences in behaviour patterns of students in metro and non-metro cities. Around 500 samples were collected from various engineering colleges of Mumbai and Dehradun region. Regression analysis model was used to obtain inferences. Results indicate that female students aspire to pursue their career in their respective domain as opposed to their male counterparts. Demographics were found to play a significant role in the behaviour pattern. Students from the metro region were observed to be more inclined towards industry and higher education. Students with strong academics were found to have an even distribution of aspirations as opposed to their counterparts who focussed more on seeking a job. The author advocates that such inferences will help the institutes to groom the students as per their aspirations.

Dennehy and Dasgupta (2017) investigated the impact of peer mentoring on women experiences and retention in engineering. The newly admitted female engineering students were assigned to female or male or no mentors on a random basis for a period of one year. The impact was observed for one year while the mentorship was active and one year after the mentoring period was over. It was observed that those assigned with female mentors showed more belonging, motivation, confidence, better retention and greater aspirations in the engineering field. Authors have pointed out that same gender mentoring for short duration promotes success and retention of female students in engineering.

A study to extend the understanding of first year engineering students thinking about competencies, identity, career preview, aspirations,

fear related to engineering practice and motivation was conducted in an Australian urban University (Bennett et. al., 2015). The study involved around 1100 first year engineering domestic and international students during the first semester. Result suggests that international students perceive a larger gap between their own attributes and those of an engineer. International students assessed themselves more negatively for most of the elements included in the study. Researchers have pointed out a general lack of awareness about technical skills and required knowledge amongst the students. The institutes should assist the students to develop their sense of identity and purpose.

Most of the past research has focused on understanding the aspirations of the students during the early stages of their engineering career. Past research also suggests how the inferences and outcome of the research will help the institutes to assist the students in fulfilling their aspirations. On the other hand, the present study not only identifies the aspirations of the students during their first year engineering course but also highlights the initiatives undertaken by the institute to fulfil them. This study has tried to determine the shift in the student aspirations and factors influencing this change. The objectives of the study are mentioned in the following section.

3. Objectives:

Based on the previous studies, a need was felt to understand the aspirations and thereby design a module to groom the students for achieving their dream. The objectives of the study are:

- To understand the aspirations of first year undergraduate engineering students
- To develop a module to fulfil the aspirations
- To understand deviations in the aspirations of students during their course duration
- To identify the factors influencing change in the aspirations and contribution of these factors.

4. Methodology for Data Collection

IT tools like Google sheets and Google forms present a convenient way of collecting and analyzing the data from stakeholders. Use of such methods enables the researchers to collect quick and impartial responses, ensure maximum participation and transparency (Shahabdkar et. al., 2019).

This study employs a mixed method i.e. qualitative and quantitative for analyzing the data. Google forms have been employed for the survey.

A questionnaire was designed in consultation with senior faculty members of the institute and industry representatives. Around 29 questions consisting of few open ended and multiple choice questions were included in the Google form. Respondents were also asked mention reasons for selecting engineering besides the expectations from the institute. The students were presented with four options and were requested to choose one. The options included joining a multinational organisation, admission to higher education in India and abroad, entrepreneurship and joining Civil Services.

Aspirations of 2043 first year engineering students were collected over a three year period from A.Y. 2017-18 to A.Y. 2019-20 immediately after the admissions.

Table 1. Characteristics of respondents

Respondent characteristics	Year 1 2017-18	Year 2 2018-19	Year 3 2019-20
No. of participating students	683	701	659
Sex ratio (Male : Female)	65:35	67:33	66:34
Age group (years)	17 - 19	17 - 19	17 - 19

The characteristics of the respondents are shown in table 1. The overall process adopted by the institution in developing the model and helping the students to fulfil their aspirations is shown in figure 1.

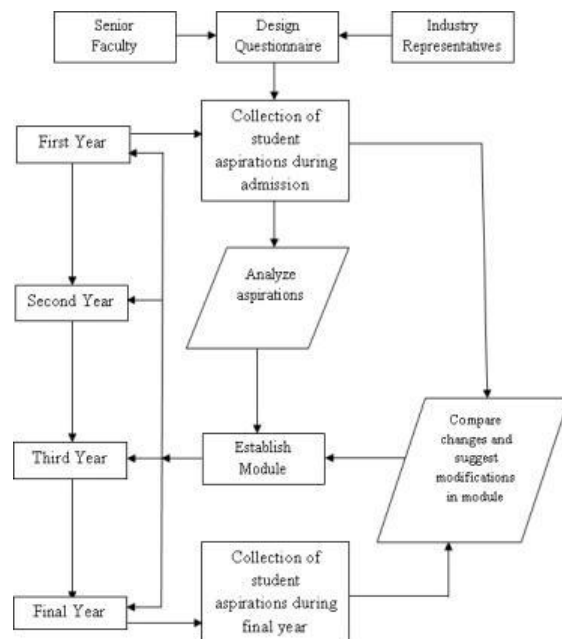


Figure 1. Process for fulfilling student aspirations

The survey was executed by the Training and Placement Cell in association with the first year department. A class-wise schedule was prepared to make the students aware about the objective of survey. Students were also apprised about the importance of the activity. The questionnaire so designed was circulated amongst the first year students via Google Forms soon after the first year admissions. A snapshot of this Google form is shown in figure 2.

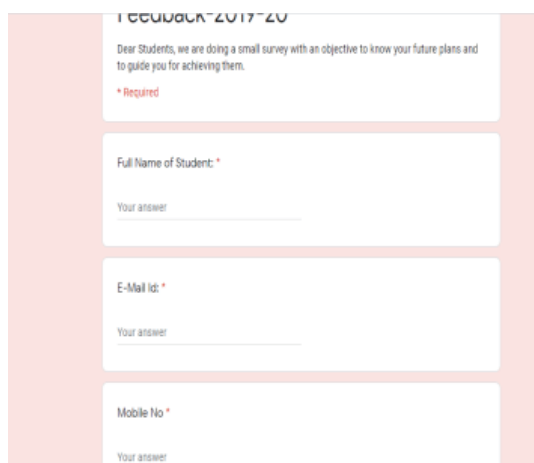


Figure 2. Google Form for collecting aspirations

5. Model for fulfilling student aspirations

The aspirations of the students may change by the time they complete their education. It is therefore necessary to understand these aspirations at an early stage and provide necessary support accordingly. The institute has developed a five stage model to fulfil the student aspirations. This model is discussed in brief as follows:

5.1 Career Development Cell:

The Career Development Cell has been established with an objective of training the students for enhancing their technical skills, soft skills and assisting the students to obtain a dream job through campus interview. In order to enhance the employability skills and help the students to fulfil their aspirations, the institute has launched a unique training module. This module involves various activities such as TPO connect, expert lectures / seminars / workshops for first year students. Team building, motivational workshops for second year, HR connect and 60-70 hours structured training programs for third year and company specific training, programming skills, post selection training for the students of final year. Through this cell students are also trained for competitive examinations.

5.2 Entrepreneurship Development Cell:

The Entrepreneurship Development Cell has been established in the institute to develop entrepreneurial skills among the students and motivate them to take up entrepreneurship as a career option. Under this initiative boot camp, entrepreneurship awareness camp and expert lectures, are conducted by industrialists / entrepreneurs and experienced professionals from time to time. In order to promote industry academia collaboration, an industry cell has also been set up in collaboration with the local industry. To bridge the gap between curriculum and industry, the cell has established a Centre of Excellence in association with a couple of industries.

5.3 International Facilitation centre:

Under this initiative, the institute has established an international facilitation centre to help the students aspiring for higher education in foreign countries. Besides providing training and guidance for certain foreign languages such as German, Japanese and French, the centre also helps the students for preparation of various competitive exams such as GRE, GMAT, IELTS and TOEFL. The centre aims to arrange student and faculty exchange programs with foreign Universities. Under this initiative expert talks, interaction with foreign University officials and counselling sessions are conducted from time to time.

5.4 Higher Study Cell:

Through this cell, software has been purchased for conducting the online tests. Online tests for various post graduate exams such as Master of Engineering (M.E), Master of Technology (M. Tech), and Master of Business Administration (MBA) are conducted on a regular basis. This helps the students to prepare for higher studies and seek admission to premier educational institutions in the country.

5.5 Master Student Programme:

In order to hone the soft skills of the students, a unique initiative - Master Student Programme (MSP) has been developed by the Institute. Under this initiative, 14 second year students irrespective of their branch are identified as speakers. Every year different trending topics beyond the curriculum are assigned to the students. These 14 speakers are groomed by speakers of previous year. The target audience for this event is first year students and members of the organizing committee. Feedback is collected after the event from the audience. This activity serves as a platform to sharpen the soft and personality development skills of the students.

Soft and aptitude skills are essential for getting the job through the campus interview. Similarly

innovation and finance skills are necessary for becoming a successful businessman. Different skills should be imparted to the students for achieving their aspirations. These skills were identified in consultation with experts. Mapping of the skill-sets with student aspirations and initiatives of the institute are shown in the table 2.

Table 2. Mapping of student aspirations with initiatives of the institute

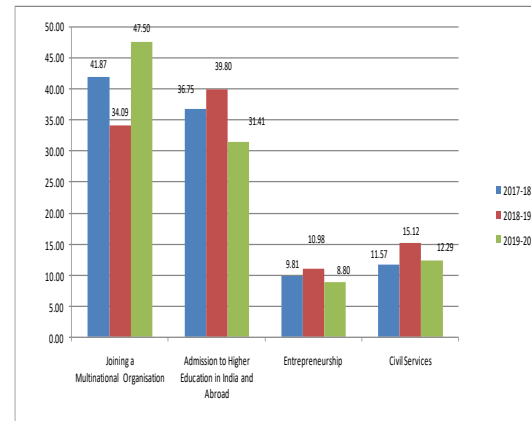
Student Aspirations	Desired and necessary skills	Initiatives to address aspirations
Joining multinational organization	Technical knowledge, Aptitude skills like quantitative, logical and verbal, soft skills, organizing skills, foreign language	Career development cell Master student programme International facilitation centre
Admission to higher education in India and abroad	Technical knowledge, foreign language	Higher study cell International facilitation centre
Entrepreneurship	Innovation skills, banking and finance, leadership qualities, branding	Entrepreneurship development cell
Civil services	Social awareness, aptitude skills like quantitative, logical and verbal	Career development cell

6. Results and Discussion

The various initiatives discussed above serve as a tool to fulfil the student aspirations. The aspirations of the students change by the time they complete three years and join their final year engineering. Change in aspirations might be due to variety of reasons including change in their priorities, knowledge gained during the period and opportunities provided by the institute for fulfilling their aspirations.

The student aspirations for A.Y. 2017-18, 2018-19 and 2019-20 are shown in the figure 3. It was noticed that around 41.87% students admitted in A.Y 2017-18 had expressed their desire to join multinational organizations followed by 36.75% for pursuing higher study, 9.81% for starting their own business while 11.57% students expressed their desire to join civil services after completion of their studies. A similar trend has been observed for the students admitted in A.Y 2018-19 and A.Y. 2019-

20. A recent study has also indicated that students are more inclined towards job security rather than in acquiring requisite technical skills (Patil et. al., 2020).



With an objective of understanding the change in aspirations, data collected from the students of A.Y 2017-18 were collected again during A.Y 2020-21 i.e. when these students reached the final year. The statistics of the change in the aspirations is shown in table 3. This data indicates that a significant shift in the student aspirations by the time they complete their education.

Table 3. Comparison of student aspirations with the revised aspirations

Student Aspirations	Percentage of students aspiring during first year of Engineering	Percentage of revised aspiration of same batch in final year	Percentage for change in aspirations
Joining multinational organization	41.87	89.77	47.9
Admission to higher education in India and abroad	36.75	6.24	- 30.51
Entrepreneurship	9.81	1.70	- 8.11
Civil services	11.57	2.28	9.23

From the above table, it is observed that there is a significant change in the aspiration of students especially those interested in seeking a job. Around 41.87% of students aspired for the job when they were in first year. By the time these students reached the final year, percentage of students aspiring for job increased up to 89.77%. This indicates a positive shift of 47.90% students towards securing a job.

Brainstorming session between the students and senior faculty were held to identify the factors influencing the change in the aspirations over a period of time. Nine most influencing factors were identified through this brainstorming session and are listed below:

- Changes in family background: Over a period, there will be substantial changes in the family background such as financial status and general awareness.
- Peer motivation: Fellow student getting a good job in an MNC with a higher package may act as an influencing factor.
- Peer perception about the aspirations: Informal communication among the students about the chances of fulfilling particular aspiration will affect the student aspirations.
- Institutional activities: Activities undertaken by the institute and success ratio of such activities may influence the perception of the students.
- Success stories observed by the students during their four years campus life also contribute to the change in aspirations.
- Probability for fulfilment of aspirations: Over a period of time student weighs his/her aspirations against the possibility of achieving it and then revises the aspirations over a period.
- Government policies: Changes in government policies like economic condition of a country, employment and business opportunities also exert an impact on the student aspirations.

- Academic marks of Students: Academic marks will make the student eligible for the various job opportunities available through the campus interview and also for the government jobs. This factor is also likely to influence the change in aspiration.
- Opportunities provided and available in the institute: Many institutes in India are having a strong Training and Placement Cell. This cell provides the opportunities of getting the job in MNC's with a higher package. Training programs are being carried by the T&P cell to make the students industry ready. Probably this is one of the major reasons why students feel that there is more chance of fulfilling the job aspiration compared to other aspirations.

Feedback was collected from the students to understand the most influencing factor leading to changes in aspiration over the course duration. The students were presented with nine options and were asked to choose the most influencing factor.

Results indicate that “Probability for fulfilment of aspirations” is a major factor influencing the change followed by “opportunities provided and available in the institute” and “success stories observed by the students”. It was also observed that factors such as “government policies” and “changes in family background” exerted least impact on the student aspirations. The result of this survey has been shown in figure 4. This feedback will serve as a tool while redesigning the model discussed in section 5.

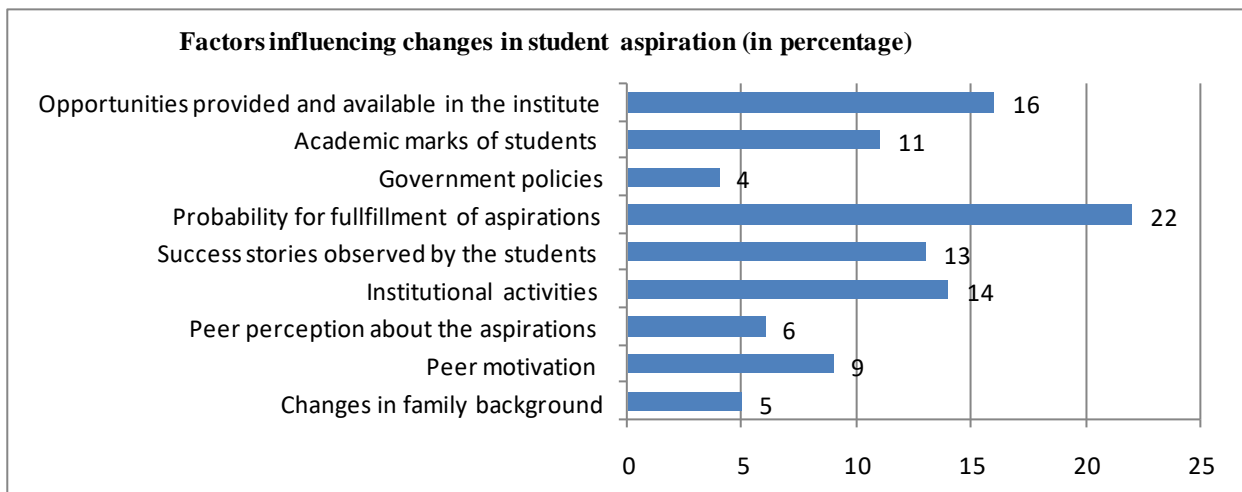


Figure 4. Factors influencing changes in student aspirations

7. Conclusion

This paper focuses on understanding the aspirations of first year students. From the survey, it is observed that majority of the students admitted

in the first year engineering aspire of getting a good job followed by admission to higher study. A few dream of becoming an entrepreneur and very less students aspire to explore their career in Civil Services.

It appears that the student aspirations undergo a considerable change by the time they reach the final year. Results indicate that the percentage of students planning to apply for a job rose by 47.90%. At the same time percentage of students aiming for higher education has declined by 30.51%. This change indicates that students feel that probability of securing jobs through campus placements is more.

Currently many institutes are conducting different activities to assist the students for fulfilling their career goals other than placements. However, the authors feel that the current efforts are not enough and hence the institutes must provide more opportunities in fulfilling aspirations other than placements.

8. Future scope

This study was conducted in an urban college located in the western part of India. Authors feel that aspirations presented in this paper needs to be compared with the aspirations of students studying in metro cities. Study considering additional attributes such as family income and rural / urban background; correlation of 10th, 12th and qualifying exam marks with their aspirations can be undertaken. This study will help the institutes to understand and support the student ambitions which will serve as a guideline for further research.

References

- All India Survey on Higher Education 2018-19 (2019), Retrieved from <http://aishe.nic.in/aishe/viewDocument.action?documentId=263>, last accessed 19th October 2020.
- Alpay, E., Ahearn, A. L., Graham, R. H. and Bull, A. M.J. (2008), Student enthusiasm for engineering: charting changes in student aspirations and motivation, *European Journal of Engineering Education*, 33(5-6), pp. 573-585. DOI: 10.1080/03043790802585454
- Bennett, D., Kapoor, R., Rajinder, K. and Maynard. N. (2015), First year engineering students: Perceptions of engineers and engineering work amongst domestic and international students, *The International Journal of the First Year in Higher Education*, 6(1), pp. 89-105. DOI: 10.5204/intjfyhe.v6i1.272
- Dennehya, T. C. and Dasgupta, N. (2017), Female peer mentors early in college increase women's positive academic experiences and retention in engineering, *Proceedings of the National Academy of Sciences of the United States of America*, 114(23), pp. 5964–5969. DOI: 10.1073/pnas.1613117114
- India Skills Report 2020, Wheebox, https://wheebox.com/assets/pdf/ISR_Report_2020.pdf, last accessed 19th October 2020.
- Joshi, A. S., Nandurkar, K. N. and Pawar, P. J. (2020), A Novel Approach for Improving Quality of Learning Environment in Technical Institutions, *Journal of Engineering Education Transformations*, 34(1), pp. 93-108. DOI: 10.16920/jeet/2020/v34i1/151377
- National Employability Report Engineers Annual Report 2019, Aspiring Minds', https://www.aspiringminds.com/wp-content/uploads/2019/05/NER_Engineer_2019-V5 last accessed 10th September 2020.
- Patil, V. K., Joshi, A. S. and Kadave, P. T. (2020), Role of Stakeholders in Improving Indian Engineering Education Ecosystem, in *Glimpses of Engineering and Technology in the Modern World*, Virudhunagar Hindu Nadars' Senthikumara Nadar College, Virudhunagar, Tamil Nadu, In Press.
- Rohde, J. A., Verdín, D., Doyle, J., Godwin, A., Kirn, A., Benson, L. and Potvin, G. (2018), Investigating the Intersection of Career Aspirations and Engineering Beliefs in First Year Engineering Students, *Proceedings of 2018 IEEE Frontiers in Education Conference (FIE)*, San Jose, CA, USA, pp. 1-8, DOI: 10.1109/FIE.2018.8659311.
- Rynes, S. L., Tolbert, P. S. and Strausse, P. G. (1988), Aspirations to Manage: A Comparison of Engineering Students and Working Engineers, *Journal of Vocational Behavior*, 32(2), pp. 239-253.
- Shahabaddkar, P., Joshi, A., Nandurkar, K. (2019), Developing IT Enabled Mechanism for SWOC Analysis: A Case Study, Proceedings of the 2nd International Conference on Manufacturing Excellence, pp. 158-164.
- Upadhyay, E. M. (2019), Research on Engineering Students behavioural analysis for focused aspirations, *International Journal of Engineering and Advanced Technology*, 9(1), pp. 227-231. DOI: 10.35940/ijeat.A1127.109119